

FINAL INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

**NAVAL AIR STATION OCEANA DAM NECK ANNEX
VIRGINIA BEACH, VIRGINIA**



Prepared for:

United States Department of the Navy

Naval Facilities Engineering Command Mid-Atlantic

Initially Prepared by:

Tetra Tech, Inc.

February 2014

Last Updated by:

Installation Natural Resources Manager

December 2019

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Approving Officials:



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06 January 2015
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Michael Wright
Natural Resources Manager
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Date



1/15/2015
Date

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Virginia Ecological Services
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Date

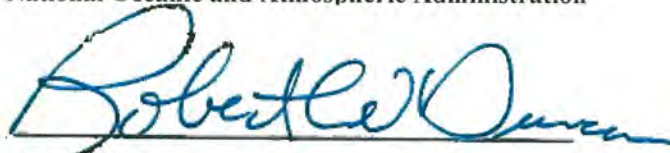
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2/26/15
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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Naval Air Station Oceana Dam Neck Annex

INRMP Review



Date of Annual Review/Update	Name and Title of Reviewer(s)
21 Oct 2014 _____	Attendee sheet available upon request _____
08 Oct 2015 _____	Attendee sheet available upon request _____
12-13 Oct 2016 _____	Attendee sheet available upon request _____
19 Oct 2017 _____	Attendee sheet available upon request _____
24 Oct 2018 _____	Attendee sheet available upon request _____
09 Oct 2019 _____	See appendix M, Encl. 3 _____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Date Adjusted	Section/Page	Comment	Reviewer
20141015	Appendix	Added Final Contract Deliverables	Michael Wright
20150407	Signature Page	Update ICO Signature Block	Michael Wright
20150407	Appendix	Added Pollinator Information	Michael Wright
20140507 to 20150407	Main Doc. & Appendix	Comment Sticky Notes & Text Updates	Michael Wright
20150514	3.2.2	Deleted text and added proposed text submitted by NAVFAC ML EV2 Wetlands SME, Thad McDonald regarding floodplains.	Michael Wright
20150603	Signature Pages	Consolidated all Agency Official Signatures into a single set of Signatures. One additional page of signatures that includes the previous CO signature still remains, until an updated CO signature is obtained.	Michael Wright
20150603	Appendix E	Deleted place holder maps and Added updated 50ft Wetland and Riparian Buffer Map.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20150604	Appendix M	Replaced Capt Chope's 2013 CO Env Policy Letter with Capt Schager's 2015 letter.	Michael Wright
20150608	Appendix F Encl 2	Updated Marine Animal Stranding Reporting SOPs	Michael Wright
20150608	Appendix E	Deleted Placeholder and added updated Watershed/Hydrologic Unit Map.	Michael Wright
20150609	Signature Page	Inserted final consolidated signature page. Deleted old and individual signature pages from the front of the document.	Michael Wright
20150812	Appendix H, Enclosure 14	Replaced Draft NASO DNA Pond/ Stream Assessment with Final Version.	Michael Wright
20150812	Appendix H, Enclosure 13	Replaced Draft Commercial Forest Inventory with the Final Commercial Forest Inventory.	Michael Wright
20150812	Figure1-4	Deleted Map For INRMP Public Distribution Until NOSSA Approval is Obtained for Release.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20150812	Appendix J, Enclosure 2	Deleted Maps For INRMP Public Distribution Until NOSSA Approval is Obtained for Release.	Michael Wright
20150812	Appendix H, Enclosure 2	Inserted Map to Show Nearshore Area to be assessed/surveyed and the Accepted Contractor Proposal.	Michael Wright
20150825	Figure1-4	Replaced Map For INRMP Public Distribution after coordination with NOSSA per PWD Planning Office.	Michael Wright
20150825	Appendix J, Enclosure 2	Replaced Maps For INRMP Public Distribution after coordination with NOSSA per PWD Planning Office.	Michael Wright
20150825	Appendix M, Enclosures 1 & 2	POM16 & POM 18 Project Table and Project Justification and Cost Estimate Updates	Michael Wright
20150909	Appendix M, Enclosures 2	Added POM18 Manpower Justification Input submitted to NAVFAC MIDLANT CORE EV2.	Michael Wright
20150910	Appendix J, Enclosure 2	Updated Hunting Rules and Regulations	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20150922	Appendix F Encl 1 & 2	Updated Sea Turtle SOPs to Include copies of Agreements and Permits.	Michael Wright
20151015	Appendix M , Enclosure 3	Added 08 Oct 2015 INRMP Metrics Agencies Meeting Attendance Roster.	Michael Wright
20151105	Appendix M, Enclosure 3	Added ICO 2015 INRMP Metrics Responses.	Michael Wright
20160606	Appendix M, Enclosure 3	Replaced older version with Final 2015 ICO INRMP Metrics Package. Deleted the NASO/NALFF INRMP information from the package.	Michael Wright
	Throughout	Update protected species info. NLEB found on installation via acoustic monitoring (update status info as well). RBEB found on installation via mist netting. State has listed add. bat species.	Michael Wright
	Appendix I, enclosure 2; Appendix H, enclosure 6	Update Avian Species List to include confirmed observation of Sandhill Cranes in 2016 during Shorebird Survey effort by NAVFAC LANT, Jennifer Wright.	Michael Wright
20160606	Appendix H, Enclosure 9; Appendix F Enclosure 6	Add the following documents to appendix: Natural Heritage Inventory/ Listed Species Survey; Bat Baseline; Sea Turtle Lighting Assessment; and Sea Turtle BA.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	Appendix I; Sections 2.5.1, 3.6, 4.3.5, etc.	Verify that Harp, Harbor and Gray Seals are identified in the INRMP as having been confirmed on the installation.	Michael Wright
	Appendix F, Enclosures 1 & 2	Update Marine Animal Stranding Procedures to reflect personnel/ notification changes.	Michael Wright
20160606	Appendix M, Enclosure 3	Delete early versions and replace with 2015 ICO Final INRMP Metrics Results Package, deleted NASO/NALFF INRMP information that was submitted with the package.	Michael Wright
20160606	Appendix M, Enclosure 3	Deplace 2015 IPAC information with 27 April 2016 information for NASO and NALFF.	Michael Wright
	Appendix I	Need to update Appendix species lists. These lists are not complete. Until updated people should search both the INRMP and it's associated appendices for specific species occurences.	Michael Wright
	Table 2-4	Need to cross-walk Table 2-4 with the FY15 INRMP Metrics List and Feb 2016 version of the Listed Species Survey (appendix h, enclosure 9) and edit Table 2-4 accordingly. Table needs to reflect Terrestrial and as appropriate Marine Species (delete the word Terrestrial from table title update INRMP text accordingly. RBEB, NLEB, Sea Turtles, Sturgeon, etc. need to be added to the table. State listed RBEB and Federal listed NLEB identified on the installation summer of 2015. American Eel determined not warranted for ESA listing. Monarch Butterfly has been petitioned for ESA listing and is currently under review by USFWS.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20160606	Appendix J, Enclosure 7; Still need to update main INRMP text.	Added the following information to appendix. Still need to update appropriate sections /references to Avian Protection Plan Guidance documents in the body of the INRMP. Projects should reference and implement applicable avian collision with powerline reduction/avoidance guidelines/procedures. These documents can be obtained from the following websites: < http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/guidance-documents.php >; http://www.aplic.org/ ; and < http://www.dodpif.org/plans/app.php >. Also need to add to appendix and reference in INRMP the REDUCING BIRD COLLISIONS WITH BUILDINGS AND BUILDING GLASS BEST PRACTICES document from USFWS.	Michael Wright
20160606	Appendix B, Enclosure 3; Still need to update main INRMP text.	Need to add LCAC Land Training Course and Beach Operations Training Course Map to INRMP and reference accordingly in INRMP text.	Michael Wright
	Appendix C	Recommend Changing Appendix to: Commanding Officer Designations and Authorizations: Encl 1 Designation Letters; Encl 2 CO EV Policy; Encl 3 CO Auth to Carry Firearms; etc.	Michael Wright
	Figure 1-4	Figure 1-4. Needs to be updated. Does not depict the PJD wetlands for the NSWDG compound (currently only depicts NWI data for this area. Adjust so SIAs and wetlands can both be viewed. Need to add existing mitigation sites to this map. See appendix E for current wetland maps.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	Section 3.12	<p>Section 3.12. Update as appropriate. In the State of Virginia as of 24 March 2016 <http://www.vdacs.virginia.gov/plant-industry-services-plant-pest-survey-and-detection.shtml> there are 6 ongoing pest survey programs for the following species: Asian Longhorned Beetle; European Grapevine Moth; Giant Hogweed; Gypsy Moth; Khapra Beetle; and Sudden Oak Death (Phytophthora ramorum). Other tracked Pests of Concern in VA: Asian Ambrosia Beetle; Giant African Land Snails; Imported Fire Ants; Pine Shoot Beetle; and Sirex Woodwasp. <http://caps.ceris.purdue.edu/pest-lists>. Invasives in VA: <http://www.dcr.virginia.gov/natural-heritage/vaisc/species/> Not Established but Top goal for prevention in VA: Zebra Mussel; Sirex Wood Wasp; Rusty Crayfish; Sudden Oak Death; Emerald Ash Borer; Chinese Mitten Crab. Established in VA and Goal For Control: Northern snakehead fish; rapa whelk; tree of heaven; japanese stilt grass; imported fire ant; and phragmites. Chesapeake Bay Program Invasive Species Priorities for Mngt.: mute swan, nutria, purple loosestrife, Phragmites, water chestnut, and zebra mussel.</p>	Michael Wright
	Section 2.6.2.1.1	<p>Need to update NLEB status information (April 2015 = Federally Threatened under the ESA). Species was confirmed present on the installation via acoustic monitoring in 2015. Need to add information on: Rafinesque's big-eard bat, state endangerd; Little brown bat, state endangered; and Tricolored bat, state endangered. Confirmed on the installation in 2015.</p>	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	Section 1.7.1	Section 1.7.1. Research origin of statement, "In the northern area of NASO DNA, nearly all of the primary and secondary dunes have been reduced..." Cross reference with Dune Delineation evaluation. Sentence likely needs to be deleted from the INRMP. May be a legacy statement from pre-restoration actions on the North-end dunes. Statement was likely true in the 1990's, but per the 2013-2014 Dune Delineation Report located in the INRMP Appendix, the dunes have recovered and there is sufficient dunal vegetation on the majority of the dunes. VMRC verified the dune delineation and indicated that the NASO DNA's dunes are excellent examples of successful restoration actions resulting in Naturalized Dunes.	Michael Wright
	Section 2.6.2.2	Need to update Piping plover observation information.	Michael Wright
	Section 2.6.2.2.1	VDGIF had not completed State wide surveys since 2010. In FY15 a project was awarded to complete a mapping effort of suitable nesting habitat, nest location surveys, and eagle fledgling tracking. Surveys and tracking, will commence Winter of 2015. Flights completed, 03 Apr 2016 and 05 May 2017, no eagle nests documented on installation; however, nests were document adjacent to the installation within a 2,640ft buffer of the installation boundary.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	Section 2.6.2.2.2	Updated confirmation observations: 21 Aug 2014 by Paul Block, NAVFAC LANT NRS as part of the installation's funded annual shorebird survey efforts; 29 Jun 2016, by Michael Wright, INRM, during morning nesting sea turtle patrols (potential nest, unable to confirm via 30 Jun survey effort, though evidence the next day indicated it may have been predated by coyotes).	Michael Wright
	Section 2.6.2.4.1	Oct 2015 determined to be not warranted for listing under ESA. (Fish-American eel). Not finding is in Litigation.	Michael Wright
	Section 2.6.2.5	Info. needs to be updated with previously discussed species and more details provided associated with all species. In particular monarch butterfly, candidate species for listing under ESA, needs to be added and the Appendix information associated with pollinator species needs to be referenced.	Michael Wright
	Section 3.11.3 and Appendix H, Enclosure 17	Program is currently understaffed. An assessment of need was funded in FY15 to be completed in FY16/17. This assessment should be utilized to direct staffing levels and/or cooperative agreement requirements. This assessment should be added to the INRMP appendix and should be referenced here and in other appropriate INRMP locations.	Michael Wright
	Section 3.11.3, paragraph 2	Delete, the term Game Warden. This term is obsolete conservation officer is now the universal term since these individuals enforce more than Game Species laws. (Apply this throughout document.)	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	<p>Section 3.10.4, pg 3-30 paragraphs 2-3 of 5</p>	<p>Need to update with current information. There are no known eagle nests on the property, as of 05 March 2017 surveying efforts; however, there are known eagle's nests on adjacent landowner property. The installation falls within one or more of the USFWS defined buffers in accordance with BAGEPA of an active nest. Eagles are occasionally observed on the property. Eagles begin establishing nesting territories in the fall, and have active nests over the winter and early spring months. Surveys may be required to ensure there are no violations of established eagle buffer distances (activity should be prepared to fund any required surveys). Coordination with the installation Natural Resources Manager will need to be maintained to ensure no new nests or roosts are established prior to the project construction time-line. Consultations with USFWS and VDGIF may be required. USFWS & VDGIF Distance Buffers associated with active nests (in parenthesis are examples of types of activities extending from the nest out the associated distance requiring regulatory agency consultation and possibly permits: *330ft (motorized watercraft and ATV use, non-motorized recreation/human entry); *660ft (construction, land alterations, etc.); *1,000ft (helicopter and fixed-wing aircraft); *2,640ft (blasting operations, fireworks, and other loud, intermittent noises). Navy awarded a Cooperative Ecosystems Studies Unit Agreement with W&M CCB to survey for eagle nests and track offspring associated with any known nests (survey completed 03 Apr 2016).</p>	<p>Michael Wright</p>

Date Adjusted	Section/Page	Comment	Reviewer
	Various	<p>Need to add Information on Natural Resources Emergency Nuisance and Emergency Wildlife Notification Processes.</p> <p>Need to update with information regarding dead animal notifications and who responds and when they respond.</p> <p>Dead Animals are potential zoonotic disease vectors just as much as living animals. Animals found dead in human populated areas of the installation should be disposed of via cremation (especially when origin of death or animal condition of health cannot be determined or is uncertain).</p>	Michael Wright
	Section 3.10.5.1	<p>Need to add to section on Inactive Nests: Anyone seeking to remove an inactive nest on the installation, prior to removal, must coordinate with the installation NRM. All nest removals must be appropriately documented in order to identify problem locations over time and to update existing Navy databases.</p>	Michael Wright
		<p>Need to add to appropriate sections of INRMP text: If the activity proposes to conduct night operations or install lighting in association with this project, the activity should NOT install lighting that could disorient birds migrating at night. Activity should follow Unified Facilities Criteria (UFC), Interior and exterior lighting systems and controls and ensure: Lighting structures be installed that minimize ambient light (light should be directed/shielded downwards, not up or out), the following website provides examples of acceptable and unacceptable lighting fixtures <http://darksky.org/lighting/lighting-basics/>; and light-bulbs to be installed should utilize a color temperature of no more than 3000 Kelvins (NO blue-rich white lights), utilizing “warm-white” or filtered LEDs can meet this requirement. This may mean more poles have to be installed than what would be required for higher kelvine bulbs to meet any lighting requirements. Following these measures can gain the installation/project Bird Safe LEAD lighting credits. The Activity should take every precaution to avoid potential negative impacts to Migratory Birds. This project is located along the Atlantic Flyway.</p>	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
		<p>Need to add to appropriate sections: The Activity should take every precaution to avoid potential negative impacts to Migratory Birds. This project is located along the Atlantic Flyway. In addition there are known Threatened and Endangered Species that migrate through this area. Landscape alterations (i.e., Tree removal, mowing, land clearing, etc.) actions should occur during months with minimal impacts to migrating and nesting birds. United States Fish & Wildlife Service's (USFWS) recommended time frame for vegetation clearing activities = Nov-Feb. If birds of conservation concern are identified as utilizing this area additional consultations and permit requirements with USFWS may be required. For habitat disturbing activities that must be conducted during the active breeding season, the contractor must perform a pre-job clearance survey by a qualified wildlife biologist (credentials must be provided to the Contract Manager and Installation Natural Resources Manager) to identify any active nests and implement avoidance measures for those particular nests. If any nests are found during these surveys, the contractor must contact the installation natural resources program manager (NRM). The NRM will provide further guidance and coordinate obtaining permits and the associated removal of the nest's, once approved.</p> <p>Project must conduct a survey of migratory birds if conducting vegetation clearing activities in the months of Mar, Apr, May, Jun, Jul, Aug, Sep or Oct. The survey boundary and nest locations must be surveyed with a Global Positioning System (GPS) and placed into an appropriate Geographic Information Systems (GIS) geodatabase. The GIS data must be compliant with the current Navy Data Model Standard Environmental Module (to obtain details, coordinate with the NAVFAC ML EV GIS Coordinator). Any data (date, surveyor name, species, species behavior, nest activity, etc.) not included in the geodatabase, must be placed in tables that can be joined to the associated GIS data. The geodatabase, associated tables, and photos must be provided to the installation NRM and NAVFAC MIDLANT Environmental GIS Coordinator.</p> <p>As of 27 April 2016 the USFWS IPAC system documented 36 species of Breeding Birds of Conservation Concern (BCC) that could occur on the project site. Any take of a migratory bird (including possession of parts of a bird), an active nest, or eggs is a violation of the Migratory Bird Treaty Act, unless appropriate permits and authorizations are obtained. Installation has suitable eagle nesting & roosting habitat.</p> <p>Note: Once a project site has been confirmed to not have any birds nesting on-site, the contractor/activity should conduct daily site checks to harass birds off of the project site and remove any items that look like the start of a nest being built (sticks, moss, other piled debris, etc.). For protected species of birds, once a nest has been established and is active (containing eggs or hatchlings) work must cease until the birds fledge the nest or until appropriate permits and authorizations are granted to remove the nest.</p>	<p>Michael Wright</p>

Date Adjusted	Section/Page	Comment	Reviewer
	Appendix D, Enclosure 5; Appendix J, Enclosures 1 and 2; various	Installation Instructions (Hunt/Fish/Firewood) = Update/Create and update INRMP Accordingly.	Michael Wright
20171025	Appendix F, Enclosure 6 Still need to update INRMP text	Insert Sea Turtle BO received 21 Oct 2016 & Update INRMP accordingly	Michael Wright
20171025	Appendix H, Enclosure 17	Brief ICO on the Conservation Law-enforcement Program Needs Assessment Results and Update INRMP accordingly, after ICO briefing.	Michael Wright
20171025	Appendix M, Enclosure 3	Insert FY16 INRMP Metrics Results & Associated Briefing/Presentation Materials. Delete FY2015 metrics information.	Michael Wright
	Appendix H, Enclosure 9	Insert Feb 2016 Listed Species Survey into INRMP appendices.	Michael Wright
	Appendix H, Enclosure 4	Insert VIMS Dune Delineation Confirmation in the INRMP appendices with the Dune Delineation Report/Survey.	Michael Wright
	various locations	Update INRMP to reflect 2016 Piping Plover, Rosete Tern, and Sandhill Crane observations.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	Throughout	Update Special Status Species Content & lists in the INRMP. Several new State listed species have been added since 2014. An updated comprehensive Species of Concern Inventory is planned to be awarded in 2019 with targeted species of concern surveys in 2019/20.	Michael Wright
20171025	Appendix C, Enclosure 2	Delete Capt. Schager's EV Policy Letter and replace with Capt. Meadows' letter.	Michael Wright
	Appendix I, Enclosure 3	Update with current VNHP & VDGIF documents on rare flora, fauna, and communities.	Michael Wright
	Appendix H, Enclosure 18	Add Enclosure for the Installation's Shorebirds Survey Report.	Michael Wright
	Appendix H, Enclosure 19	Add Enclosure for the Installation's Anuran Acoustic Recorder Survey Report.	Michael Wright
20170809	Appendix K, Enclosure 9	Delete Invasive Species Brochure and replace with 2017 updated brochure.	Michael Wright
	Appendix K, Enclosure 3	Update Appendix K, Enclosure 3 to Read "Feral Animal Control" and insert VDGIF Feral Hog Flyer	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	Appendix E, Enclosure 1	Replace 2011/2016 USACE PJD Wetlands documents/maps with the 2016 documents.	Michael Wright
	Appendix D	Need to add enclosures for installation directory, encroachment action plan, and restrictive easements.	Michael Wright
	Appendix H	Need to add the Environmental Restoration Plan Site Mngt. Plan	Michael Wright
	Appendix D, Enclosure 4	Add updated Landscaping Guidance and associated Native Species lists.	Michael Wright
	Appendix D, Enclosures 1 & 2	Insert 2016 & 2017 Tree City USA/ Arboday Information.	Michael Wright
	Appendix J	Add an Enclosure for Permits: USFWS Sturgeon Permit; VDGIF Kill Permit; VDGIF T&E Species Permit.	Michael Wright
	Appendix H	Add EMS Internal Audit Plan.	Michael Wright
	Throughout as appropriate	Asiatic sand-sedge has been confirmed to occur on the installation as documented in appendix H/encl 9 and appendix K/encl 9. At least 6 small patches have been documented. The largest patch appearing along the installation border with SMR-Camp Pendleton. NASO DNA & SMR-CP NR teams have partnered to try and eradicate this species. Update INRMP with 2016 Fall NPLD event information and resulting follow-on actions/partnerships.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	Appendix K, and throughout text as appropriate	Add non-lead ammunition brochure to Appendix K. Update INRMP text to reflect impacts of lead on wildlife and humans and update hunting program to reflect 2017 introduction of voluntary non-lead ammunition program.	Michael Wright
20171025	Appendix H, Enclosure 16	Remove 2013 Integrated Pest Mngt. Plan (IPMP) and Insert 2016 IPMP	Michael Wright
	Throughout	Recommend revising INRMP's Goals and Objectives to be more clear and quantifiable. Each INRMP project is relevant to at least one of the overarching goals; however, the objectives need to be better stated to ensure it is clear what INRMP projects accomplish those objectives and vice versa.	Michael Wright
	Throughout	Rewrite the INRMP to better mirror Navy and DoD Guidance documents for how INRMPs should be structured and the information that should be included in each of those sections. Consider combining NASO/NALFF and NASO DNA INRMPs into one INRMP.	Michael Wright
	Appendix A, Enclosure 1	NEPA documentation for INRMP Implementation is dated. The overarching Goals of the INRMP are the same; however, there have been significant updates and data collection since the original NEPA EA was completed. Updated EA needs to be structured to follow current DOD/Navy EA structure guidance.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	Throughout	Update text and appendices to reflect information from the following documents: May 2019, Sea Turtle SOP; Dec 2017, 2018 and 2019 Sea Turtle Program Annual Reports; and Sep 2019, NLEB Survey Report. Ensure all surveys and reports received between 2014 and 2020 are incorporated into the INRMP accordingly.	Michael Wright

PLAN UPDATES

This Integrated Natural Resources Management Plan (INRMP) addresses existing future requirements and identifies projects to be implemented. INRMPs should contain the most up-to-date natural resources information, and updates and revisions may be necessary to maintain a proactive management plan. Natural resources managers are encouraged to use geographic information systems (GIS) to supplement their INRMP and to incorporate the guidance and recommendations contained in “Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers” (Benton et al. 2008 and Chief of Naval Operations Operating Instruction [OPNAVINST] 5090.1C Change Transmittal 1 [Ch-1]).

In accordance with the Integrated Natural Resources Management Program (32 CFR Appendix to Part 190), the Sikes Act Improvement Act of 1997, and the United States (U.S.) Department of the Navy (Navy) Environmental Readiness Program Manual (OPNAVINST 5090.1C Ch-1, Chapter 24), installations are required to perform an informal annual review to ensure INRMP information is current, and to evaluate the effectiveness of their INRMP.

The annual INRMP review must be completed in cooperation with the appropriate U.S Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) and state fish and wildlife agency field-level offices. Measure of the success of the INRMP and identification of any issues associated with implementation of the INRMP will result from collaboration with cooperating partners (Navy 2006a). A Memorandum of Understanding (MOU) was signed in 2013 between the U.S. Department of Defense (DoD), USFWS, and state fish and wildlife agencies acting through the Association of Fish and Wildlife Agencies and established under the authority of the Sikes Act. The purpose of this MOU, referred to as the Sikes Tripartite MOU, is to further the cooperative relationship between these federal and state agencies in preparing, reviewing, revising, updating, and implementing INRMPs for military installations. In accordance with DoD Manual 4715.03, the DoD is required to invite USFWS, appropriate state fish and wildlife agencies, and NOAA NMFS (when relevant) to participate in the INRMP review process at installations that contain natural resources under their respective jurisdictions.

The annual review also provides an opportunity to incorporate changes in accepted environmental conservation practices and scientific advances associated with evaluation and implementation of natural resources management. If necessary, the annual review will include an update to the INRMP that includes an updated project list, documentation of significant changes to natural ecosystems, and updates to information contained in the INRMP appendices. Forms to document annual reviews are included in this document, and should be used to document changes to the INRMP that will improve natural resources management. Each entry in the update form should reference the plan section and page number that is being updated to facilitate quick cross-referencing.

Installations are not required to revise their INRMP within a specified time interval; however, a formal review is required every five years in coordination with USFWS, NOAA NMFS (as applicable), and state partners (Navy 2006a). If USFWS and state partners agree, the completed annual review forms may be used in lieu of a formal review. Minor revisions to the INRMP should be completed annually to reduce the need for a more costly and time consuming revision

following the formal five-year review. Annual reviews should be fully documented each year to provide each installation the option to utilize the annual review documentation to fulfill the formal review requirement whenever possible. If results of the formal review determine that the existing INRMP is effective, the INRMP need not be revised. Any revisions to the authorities and guidance documents driving plan update requirements would be implemented as appropriate during the annual or formal review periods.

Annual and formal reviews of this INRMP will occur every five years in coordination with the USFWS, the NOAA NMFS, and the Virginia Department of Game and Inland Fisheries (VDGIF). The formal review shall verify that all environmental compliance projects have been budgeted for and implemented on schedule; that all required natural resources positions are filled with trained staff or are in the process of being filled; projects and activities identified for the coming year are included in the INRMP; all required coordination has been conducted; and that all significant changes to the installation's mission requirements or its natural resources have been identified. The Navy class and hierarchy system for INRMP projects, which identifies which projects qualify as environmental compliance projects, are described in Sections 5.4.1 (Programming and Budget Classification) and 5.4.2 (Project Classification).

INRMP modifications that are necessary are usually covered by the original Environmental Assessment (EA) prepared for the INRMP; however, INRMP modifications should be reviewed to compare the original action documented in the existing INRMP to the proposed modifications to determine if modifications to the INRMP are significant. If INRMP modifications are deemed to be not significant, updated actions will be covered by the original National Environmental Policy Act (NEPA) documentation. Proposed INRMP updates that are deemed significant will require additional NEPA documentation, usually at the EA level.

Activities that may constitute an INRMP revision include, but are not limited to: a change in mission requirements or intensity of land use; a significant change in natural resources baseline conditions; a determination that the old INRMP has proven to be inadequate, was not able to be implemented, or show that projects are ineffective in meeting natural resources management goals as evidenced from monitoring results; natural resources management goals have changed, or the planning horizon of the previous INRMP has expired; or, base realignment and closure actions have been put into effect. Any of these activities should be brought to the attention of the USFWS, NOAA NMFS, and VDGIF during the formal review process.

EXECUTIVE SUMMARY

The United States (U.S.) Department of Defense (DoD) manages approximately 30 million acres (approximately 12 million hectares) of land in the U.S (DoD No date [n.d.]). Each military installation that has suitable habitat for conserving and managing natural ecosystems is required to prepare, maintain, and implement an Integrated Natural Resources Management Plan (INRMP). This INRMP was prepared for the Naval Air Station Oceana, Dam Neck Annex (NASO DNA or Installation), which includes the former Virginia Army National Guard Camp Pendleton and Naval Amphibious Base Little Creek South Virginia Beach Annex (formerly known as Camp Pendleton) portions of the Installation, located at the northern end of the NASO DNA parcel. This INRMP has been prepared in accordance with the following authorities, which were current at the time the INRMP was updated. Revisions to the following authorities and guidance documents would replace the older version, and any necessary changes to the INRMP would be documented during the annual review, or incorporated into the INRMP at the time it is updated:

- DoD Manual 4715.03, INRMP Implementation Manual, 25 November 2013;
- Chief of Naval Operations Operating Instruction 5090.1C Ch-1, Environmental Readiness Program Manual, 18 July 2011;
- Navy Procedural Manual Naval Facilities (NAVFAC) P-73, Vol. II, Natural Resources Management Procedural Manual; 01 May 1987:
- U.S. Code (USC) §670 a-f, the Sikes Act Improvement Act, 18 November 1997;
- Federal Endangered Species Act of 1973 (16 USC §1531-1544, 87 Stat. 884), as amended; and
- 32 Code of Federal Regulations (CFR) Part 190, DoD Natural Resources Management Program, 01 July 2009.

Organization of Document

The INRMP is organized into the following sections:

Section 1 – Introduction. This section provides a discussion of the purpose of the INRMP and the policies that drive it; the goals of the INRMP; details regarding the location and regional setting of the Installation; a brief overview of the history and mission of NASO DNA; and an overview of natural resources management on the Installation including existing natural resources partnerships, data management including geographic information system, and environmental planning.

Section 2 – Existing Conditions. This section describes the existing physical and natural conditions at NASO DNA. Included are climate; physiography and soils; hydrology; ecological communities; flora; fauna; and rare, threatened, and endangered species.

Section 3 – Natural Resources Management Issues. A number of management issues that are relevant to NASO DNA are discussed in this section to help identify responsibilities, opportunities, and potential conflicts in natural resources management.

Section 4 – NASO DNA Natural Resources Management Units. This section provides discussion of natural resources management issues and recommendations for the NASO DNA management units with varying land use constraints and mission requirements. Continuing and new natural resources management actions are identified for each unit.

Section 5 – INRMP Implementation. This section identifies the requirements for INRMP implementation. In particular, this section describes achieving no net loss, NEPA compliance, project development and classification, funding sources, commitments, and use of cooperative agreements.

Section 6 – References. References and internet resources that were used in the development of this document are listed in this section.

Appendix A – National Environmental Policy Act and Coastal Consistency Documentation and Information. Appendix A includes information on National Environmental Policy Act and Coastal Consistency and related documentation prepared or received for NASO DNA, related to the INRMP.

Appendix B – Agency Correspondence. Appendix B includes agency correspondence received in regards to the NASO DNA INRMP, including comments received on the INRMP and mutual agreement letters.

Appendix C – Designation Letter. Appendix C includes a copy of the designation letter which allows the Commanding Officer to delegate authority to an Environmental Director to implement natural resources management activities through the Installation’s Natural Resources Specialist.

Appendix D – Urban Forestry, Grounds Maintenance, and Landscaping Management. Appendix D includes resources for urban forestry, grounds maintenance, and landscaping management at NASO DNA, including Tree City USA application, draft proclamation, pruning and planting guidelines, and native plants for landscaping.

Appendix E – NASO DNA Preliminary Jurisdictional Determinations. Appendix E contains the NASO DNA Preliminary Jurisdictional Determinations (2011 and 2012).

Appendix F – Marine Mammal, Sea Turtle, and Essential Fish Habitat Management. Appendix F includes resources for marine mammal, sea turtle, and essential fish habitat management at NASO DNA, including standard operating procedures for sea turtles at NASO DNA, marine resources stranding database, Virginia Aquarium Stranding Response, Section 7 consultation materials, a biological opinion issued on the Back Bay National Wildlife Refuge Sea Turtle Management Program (2011) and updated to include NASO DNA (2012), and a summary of essential fish habitat and general habitat parameters for federally managed fish species. The essential fish habitat information is provided for species that have the potential to occur in the vicinity of the NASO DNA nearshore environment and not all fish species listed are known to occur at NASO DNA.

Appendix G – Encroachment and Adjacent Land Use. Appendix G contains figures related to encroachment and adjacent land use at NASO DNA.

Appendix H – Surveys and Plans. Appendix H includes copies of recently completed surveys and plans, as well as placeholders for plans scheduled to be completed at NASO DNA during the INRMP plan period.

Appendix I – Flora and Fauna. Appendix I includes the flora and fauna species lists for NASO DNA, and a list of fish and wildlife species identified as Species of Greatest Conservation Need for the Mid-Atlantic Coastal Plain in the Virginia State Wildlife Action Plan (SWAP).

Appendix J – Wildlife Management. Appendix J includes resources for wildlife management at NASO DNA, including fishing and hunting instructions, guidance on feral cats and dogs, and a prescribed burn and smoke management plan.

Appendix K – Educational Outreach. Appendix K contains educational outreach materials for NASO DNA.

Appendix L – Cross-Reference of Integrated Natural Resources Management Plan Guidance for Navy Installations to DoD INRMP Template. Appendix L provides a cross-walk comparison of the NASO DNA INRMP sections with the DoD INRMP template requirements.

Appendix M – Naval Air Station Oceana Dam Neck Annex Environmental Program Requirements Project Updates/Budget Execution Plans. Appendix M includes the Natural Resources Project information for the INRMP, including annual INRMP updates and metrics.

Appendix N – Naval Air Station Oceana Dam Neck Annex Large Size (11” x 17”) INRMP Figures. Appendix N includes a complete set of 11” x 17”-sized INRMP figures.

Map Figures

The Commander, Navy Region Mid-Atlantic’s GeoReadiness Center is the single, authoritative source and distribution point for all geospatial information within the area of responsibility of the Navy Mid-Atlantic Region and is managed by the Mid-Atlantic Facility Engineering Command GIS Division. The GeoReadiness Center houses the most current geospatial information (including aerial photography) for the entire Navy Mid-Atlantic Region and provides access to the comprehensive data set and analysis tools to Regional and DoD decision makers/managers, sponsored contractors, and other sponsored individuals via a secure government Internet site. GIS data for NASO DNA, including those environmental layers used for the development of this INRMP, can be accessed through this portal. Environmental planners, project managers, engineers, and sponsored contractors are encouraged to use the portal to access GIS data for analysis, development of maps and project planning. In addition, the portal provides guidance documentation for the collection of new geospatial data.

The map figures presented in the INRMP are based on Navy and publicly available data, and most include base imagery with true color 1-foot (0.3 meters) resolution satellite imagery from Esri World Imagery (Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community), publically available at http://goto.arcgisonline.com/maps/World_Imagery. All GIS data created or modified for use in this INRMP will be submitted to the Navy Technical Representative and Installation Natural Resources Manager upon completion of this project.

The INRMP text contains standard size figures, with a complete set of larger-sized (11” x 17”) INRMP figures included in Appendix N.

Management Actions and Major Initiatives

The management actions identified for NASO DNA natural resources management program are intended to help the Commanding Officer manage natural resources effectively to ensure that Installation lands remain available and in good condition to support the military mission and to ensure compliance with relevant environmental regulations. These actions incorporate the principles of ecosystem management and are consistent with Navy policy on sustainable, multiple use of natural resources on Navy property. Projects and management actions that have been identified for implementation during the plan period are detailed in Appendix M. The following are some of the plan’s major initiatives:

- review plans and proposed actions to ensure consistency with the Virginia Coastal Zone Management Program and to help obtain a consistency determination when required;
- review plans for projects that have the potential to impact wetlands against NASO DNA wetland delineation maps, and assist the proponent of an action in applying for and obtaining all required state and federal wetlands permits;
- ensure the NEPA planning and documentation process is implemented for proposed development or land use changes on NASO DNA lands;
- manage the NASO DNA hunting and fishing programs to maximize outdoor recreational opportunities and maintain the Installation’s deer and fish populations within carrying capacity;
- implement habitat management practices that promote ecosystem diversity and functionality;
- protect the Installation’s state and federally protected species and their associated natural habitats including areas identified as special interest areas by the state;
- implement sea turtle monitoring protocols, as described in the Standard Operating Procedures for sea turtles at NASO DNA (2013), along the Atlantic coast from mid-May through mid-August, when turtles are most likely to nest in the area;
- implement dune protection measures including installing fencing and posting informational signs to prevent excess vehicle access roads that dissect the fragile dunes ecosystem; and
- encourage implementation of integrated pest management practices throughout the Installation.

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
%	percent
AARR-F	average annual reduction rate for females
AARR-M	average annual reduction rate for
ac	acre(s)
ACHP	Advisory Council on Historic Preservation
AICUZ	Air Installations Compatible Use Zones
BASH	bird/wildlife aircraft strike hazard
BBNWR	Back Bay National Wildlife Refuge
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BO	biological opinion
BOQ	Bachelors Officers Quarters
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Ch-1	Change Transmittal 1
CIN	course identification number
CLE	conservation law enforcement
CLEO	Conservation Law Enforcement Officer
cm	centimeter(s)
CNIC	Commander, Navy Installations Command
CNO	Chief of Naval Operations
CNRMA	Commander, Navy Region, Mid-Atlantic
CO	Commanding Officer
COMNAVREG MIDLANT INST	Commander, Navy Region Mid-Atlantic Instruction
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DDT	dichlorodiphenyltrichloroethane
DMAP	Deer Management Assistance Program
DoD	United States Department of Defense
EA	Environmental Assessment
EFH	essential fish habitat

List of Acronyms and Abbreviations

EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
EPR	environmental program requirements
ERL	environmental readiness level
ESA	Endangered Species Act
EV director	Environmental director
FAA	Federal Aviation Administration
FDR	fawn per doe harvest ratio
FEAD	Field Engineering and Architecture Department
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FR	Federal Register
ft	foot/feet
ft ²	square feet
FY	fiscal year
GIS	geographic information system
GPS	global positioning system
ha	hectare(s)
HD	hemorrhagic disease
in	inch(es)
INRMP	Integrated Natural Resources Management Plan
Installation	Naval Air Station Oceana Dam Neck Annex
IPM	integrated pest management
ERP	Environmental Restoration Program
JEB	Joint Expeditionary Base
km	kilometer(s)
km ²	square kilometers
LCAC	landing craft air cushion
LEED	Leadership in Energy and Environmental Design
LID	low impact development
Legacy	Legacy Resource Management Program
MACS 24	Marine Air Control Squadron 24
MBTA	Migratory Bird Treaty Act
m	meter(s)
m ²	square meter(s)

List of Acronyms and Abbreviations

mi	mile(s)
mi ²	square mile(s)
MILCON	military construction
MMPA	Marine Mammal Protection Act
MOU	Memorandum of Understanding
MRP	Munitions Response Program
msl	mean sea level
MWR	Morale, Welfare, and Recreation
NALF	Naval Auxiliary Landing Field
NAS	Naval Air Station
NASO DNA	Naval Air Station Oceana Dam Neck Annex
NAVFAC	Naval Facilities Engineering Command
Navy	United States Department of the Navy
n.d.	No date
NEPA	National Environmental Policy Act
NFHL	National Flood Hazards Layer
NGO	non-governmental organization
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NMFWA	National Military Fish and Wildlife Association
NR	Natural Resources (i.e., in reference to NR staff or personnel)
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NRM	natural resources manager
NRP	Natural Resources Program
NRS	natural resources specialist
O&MN	Operations and Maintenance, Navy
ODCP	Plan and Oil Discharge Contingency Plan
OHS	oil and hazardous substances
OPNAVINST	Chief of Naval Operations Operating Instruction
OSD	Office of the Secretary of Defense
PA	Programmatic Agreement
ppt	parts per thousand
PWD	Public Works Department
QDM	quality deer management

List of Acronyms and Abbreviations

QRP	Qualified Recycling Program
RCRA	Resource Conservation and Recovery Act
SAIA	Sikes Act Improvement Act
SECNAV	Secretary of the Navy
SERDP	Strategic Environmental Research and Development Program
SHPO	State Historic Preservation Officer
SI	Site Investigation
SIA	special interest area
SPCCP	Spill Prevention, Control and Countermeasures Plan
SWAMP	Southern Watershed Area Management Program
SWAP	State Wildlife Action Plan
SWP3	Storm Water Pollution Prevention Plan
TNC	The Nature Conservancy
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
VAC	Virginia Administrative Code
VDCR-DNH	Virginia Department of Conservation and Recreation, Division of Natural Heritage
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries
VMRC	Virginia Marine Resources Commission
VDOF	Virginia Department of Forestry
VIMS	Virginia Institute of Marine Science
VPDES	Virginia Pollutant Discharge Elimination System

1.0 INTRODUCTION

1.1 PURPOSE AND AUTHORITY

In accordance with 32 Code of Federal Regulations (CFR) Part 190, Department of Defense (DoD) Manual 4715.03, Chief of Naval Operations Operating Instruction (OPNAVINST) 5090.1C Change Transmittal (Ch-1) Chapter 24, Naval Facilities Engineering Command (NAVFAC) Real Estate Operations and Natural Resources Management Procedural Manual 73 (NAVFAC P-73), and the Sikes Act Improvement Act (SAIA or Sikes Act) of 1997 (16 United States Code [USC] §670a-f), the United States (U.S.) Department of the Navy (Navy) must implement and maintain a balanced and integrated program for the management of natural resources. To facilitate the Navy's Natural Resources Program (NRP), the Secretary of the Navy is further directed to prepare and implement an Integrated Natural Resources Management Plan (INRMP) for each military installation that has suitable natural resources. The INRMP must ensure that natural resources management practices comply with all pertinent laws and regulations and, in accordance with Navy policy, must incorporate ecosystem management as the basis for planning and management. In addition, the Sikes Act requires the INRMP be prepared in cooperation with the Secretary of the Department of Interior, acting through the Director of the U.S. Fish and Wildlife Service (USFWS); the Secretary of the Department of Commerce, acting through the Director of the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS); and the head of the Virginia Department of Game and Inland Fisheries (VDGIF). The INRMP must reflect the mutual agreement of these parties concerning conservation, protection, and management of fish and wildlife resources. Such mutual agreement and cooperation will support the principles of ecosystem management by improving the management of ecosystems that cross federal, state, and private boundaries. Under the SAIA, all new INRMPs also must be submitted for public review and comment before final acceptance. To fulfill this requirement, National Environmental Policy Act (NEPA) documentation has been prepared for the INRMP and is presented in Appendix A. Federal and state agency correspondence is included in Appendix B, and updated mutual agreement letters will be inserted into Appendix B upon receipt. The information included in this INRMP update does not represent a significant change, and does not require additional environmental review beyond what was covered by the Environmental Assessment (EA) prepared in 2006 for the INRMP.

Appropriations for implementation of the Sikes Act were recently reauthorized until 30 September 2019 as part of the House of Representatives Bill H.R. 910 that was passed in June 2013. While no significant changes were associated with this reauthorization, the bill did identify the need for DoD installations to improve their commitment to implementation of the Disabled Sportsmen's Access Act of 1998. This Act strives to improve access and provide adaptive equipment for disabled active and former military personnel for hunting, fishing, and/or other outdoor recreational activities on military installations (see Section 3.11.1).

1.2 SCOPE

An INRMP's scope comprises all lands, ranges, nearshore areas, and leased areas 1) owned by the U.S. and administered by the Navy; 2) used by the Navy via license, permit, or lease for

which the Navy has been assigned management responsibility; or 3) withdrawn from the public domain for use by the Navy for which the Navy has been assigned management responsibility (Navy 2006a).

This INRMP outlines conservation efforts and establishes procedures to ensure compliance with related environmental laws and regulations during INRMP implementation over the five-year duration of the plan. Development of this INRMP included input from state and federal stakeholders in addition to cross coordination with other appropriate Navy programs. As required under the SAIA, this INRMP reflects mutual agreement of agencies concerned with the conservation, protection, and management of fish and wildlife resources, including the USFWS and the VDGIF. This INRMP provides the direction for natural resources management at Naval Air Station (NAS) Oceana, Dam Neck Annex (NASO DNA or Installation); however, it does not replace or affect any federal laws, or state responsibility and authority for protecting fish and wildlife resources.

NASO DNA does not have any leased properties managed for natural resources, for example agricultural outleases, and as such, this INRMP does not cover management of leased areas.

This INRMP covers a five-year period, but as ecosystems are dynamic and Installation requirements are subject to frequent modification, natural resources management must be flexible. To accommodate these changes, this INRMP will be reviewed and updated annually by Installation personnel and revised and reapproved after five years in coordination with USFWS, NOAA NMFS, and VDGIF. Natural Resources (NR) personnel will have responsibility for maintaining the currency of this document.

1.3 OBJECTIVES

This INRMP is a long-term planning document that guides implementation of the Installation NRP. The INRMP supports Installation missions, while protecting and enhancing natural resources and providing a variety of outdoor recreational opportunities for Installation personnel. This INRMP integrates all aspects of natural resources management, including the various components of the Environmental Compliance, Environmental Restoration Program, and Cultural Resources programs, as well as the management of sensitive species, wetlands, watershed and floodplain protection, wildlife, grounds maintenance, pest management, and outdoor recreation, with the current military mission. In accordance with the SAIA and OPNAVINST 5090.1C Ch-1, this plan must provide for:

- fish and wildlife management, land management, forest management, and fish- and wildlife-oriented recreation;
- fish and wildlife habitat protection and enhancement;
- wetland protection, enhancement, and restoration;
- integration of, and consistency among, the various activities conducted under the plan;
- establishment of specific natural resources management objectives and time frames for proposed actions;

Introduction

- sustained use by the public of natural resources to the extent such use is consistent with the needs of fish and wildlife management and subject to installation safety and security requirements;
- enforcement of natural resources laws and regulations; and
- no net loss in the capability of military lands to support the military mission of the installations.

1.4 RESPONSIBILITIES

The Sikes Act requires qualified professionals to implement environmental management programs. Implementation of the INRMP at NASO DNA is the responsibility of all NR personnel at the Installation, including the NASO DNA Commanding Officer (CO), who is responsible for managing all aspects of the Installation's natural resources; the NASO DNA Environmental Director; the NAVFAC Mid-Atlantic Regional Natural Resources Manager (NRM); the Installation Natural Resources Specialist (NRS) and NRM; and other Installation personnel. The CO has delegated the authority to an Environmental Director within the Environmental Office to implement natural resources management activities through the Regional NRM (See Appendix C for Designation Letter). The NRM responsible for natural resource management at the Installation is based at NAS Oceana, and also is responsible for natural resources management at NAS Oceana, Naval Auxiliary Landing Field (NALF) Fentress, and Naval Support Activity Hampton Roads Northwest Annex. Other Installation personnel, such as security, grounds maintenance, Morale, Welfare and Recreation (MWR) Department, housing, and safety have functions overlapping the NRP, but report to the Environmental Director on natural resources-related issues. The Regional NRM also oversees natural resources management for other installations in the Mid-Atlantic Region, including NAS Oceana and NALF Fentress, Naval Support Activity Hampton Roads Northwest Annex, Naval Weapons Station Yorktown, and Joint Expeditionary Base (JEB) Little Creek – Fort Story.

The Installation CO's Environmental Policy (Navy 2011a) has made certain commitments that include, but are not limited to:

- compliance with federal, state and local environmental laws, regulations and policies,
- integration of environmental stewardship into operational decisions;
- pollution prevention at its source whenever possible; and
- continual improvement of the Installation's environmental performance.

Stakeholders of NASO DNA natural resources include federal and state natural resources agencies, local governments and landowners, civic and conservation groups, and the Navy. For this INRMP, a stakeholder is an individual, group, or agency that has the responsibility or mandate to preserve and manage Installation natural resources, that has a right or privilege to make use of the natural resources, or that may be affected directly or indirectly by natural resources management actions conducted at the Installation.

1.4.1 Installation Stakeholders

The organization chart below (Figure 1-1) illustrates the Navy chain of command for NASO DNA. OPNAVINST 5090.1C Ch-1, Section 1.4 provides a detailed description of environmental responsibilities associated with different positions within the Navy. To implement the INRMP while ensuring successful accomplishment of the military mission, the Commander, Navy Region Mid-Atlantic (CNRMA), acts as a trustee for NASO DNA. At the Installation level, the NASO DNA CO and the Installation NRM are directly involved in implementation of this INRMP, while ensuring successful implementation of the military mission. The NASO DNA CO is responsible for ensuring that NASO DNA personnel comply with the laws and requirements relevant to the conservation and management of natural resources. The Installation NRM is responsible for the daily implementation and coordination of the INRMP, as well as ensuring this INRMP is reviewed annually and updated as necessary to reflect current natural resources conditions, and formally reviewed and updated every five years as required by the SAIA. In addition to these responsibilities, the Installation NRM also manages a Microsoft Access database that contains survey, permit/regulatory consultation, and project review information; and is responsible for storing and maintaining equipment need to conduct management of natural resources at the Installation and to support this INRMP. The Regional NRM provides additional assistance to the Installation NRM for implementation of the INRMP.

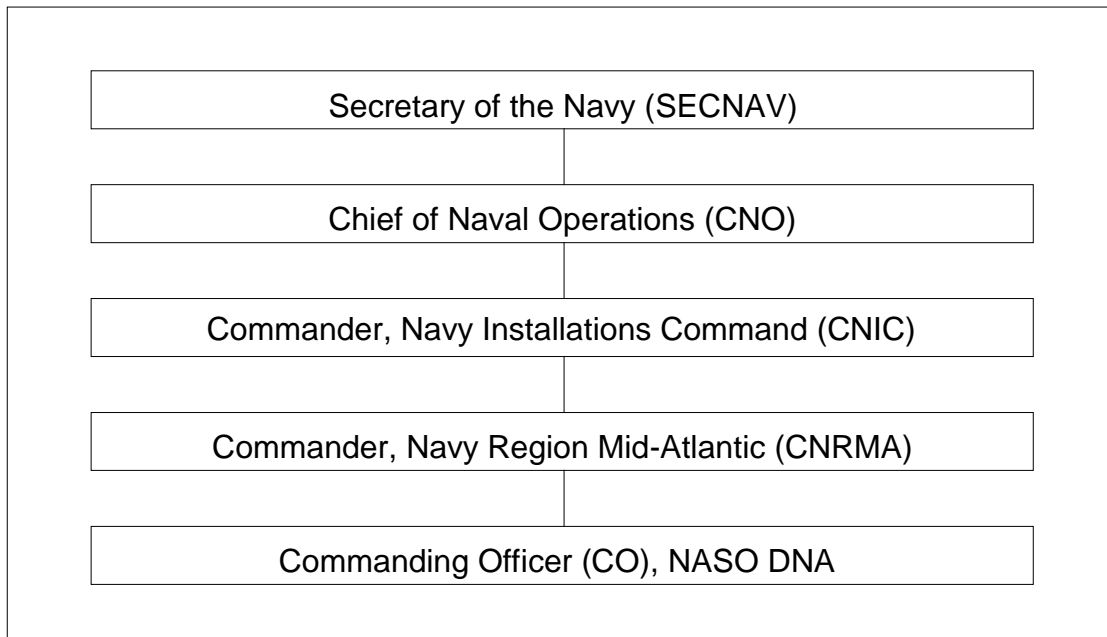


Figure 1-1. NASO DNA Command Organization.

Although these positions hold the primary responsibilities, all personnel at the Installation—public works/civil engineering personnel, legal staff, the public affairs representative, the local fire department, and the waterfront security officers—play important roles in supporting the plans and objectives identified in this INRMP, including ensuring environmental compliance within military operations. Other Installation stakeholders, including the Navy’s MWR Department, Environmental Engineers Office, Public Works Department (PWD), Navy contractors working at NASO DNA and the NASO DNA commands are responsible for sustaining natural resources for economic and recreational purposes, and/or for natural resources management and protection. Table 1-1 provides a list of stakeholders currently involved with natural resources management at NASO DNA.

Table 1-1. Stakeholders of NASO DNA Natural Resources.

Navy	
Naval Facilities Engineering Command, Atlantic	Naval Air Station Oceana Dam Neck Annex (NASO DNA) Commanding Officer
Naval Facilities Engineering Command, Mid-Atlantic	Command Navy Region Mid-Atlantic
NASO DNA Environmental Office	Major Shore Commands of NASO DNA
Morale, Welfare, and Recreation Department	Navy Recycling Program
Hampton Roads Sanitation District	Navy Personnel
Federal, State, and Local Agencies	
United States (U.S.) Fish and Wildlife Service	Virginia Department of Game and Inland Fisheries
U.S. Department of Agriculture (USDA), Natural Resources Conservation Service	USDA Wildlife Services
U.S. Geological Survey	U.S. Environmental Protection Agency
U.S. Army Corps of Engineers	City of Virginia Beach
National Oceanic and Atmospheric Administration, National Marine Fisheries Service	U.S. Forest Service
Virginia Department of Forestry	Virginia Department of Conservation and Recreation
Virginia Department of Health	
Non-Governmental Organizations and Individuals	
Department of Defense Partners In Flight	Military Retirees
The Nature Conservancy of Virginia	Dependents of Navy Personnel
National Audubon Society	Virginia Institute of Marine Science
Back Bay Watershed Partnership	Lake Christine Watershed Partnership

1.4.2 External Stakeholders

State and federal agencies, such as USFWS, NOAA NMFS, VDGIF, U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), U.S. Environmental Protection Agency (EPA), and U.S. Army Corps of Engineers (USACE) are the primary external stakeholders responsible for natural resources protection and preservation. The SAIA requires

that this INRMP be prepared in cooperation with, and reflect mutual agreement of, the USFWS, NOAA NMFS, and the VDGIF. This requirement affords them signatory authority as external stakeholders and approving officials of this INRMP. Cooperation and coordination with these agencies is an integral part of the Navy's NRP.

Other external stakeholders include non-governmental organizations (NGOs) and individuals who make use of those natural resources, such as civilian groups, including residents of the surrounding communities who have access to, or are affected by, the condition of NASO DNA natural resources, and private conservation organizations.

NASO DNA has established several partnerships with government agencies and NGOs. These are described in Section 1.12 (Partnerships and Outreach).

1.4.3 Technical Assistance

Technical assistance to implement this INRMP may be provided to the CO and NRM from the Navy or by outside agencies. Assistance from outside agencies is normally provided through individual agency requests and formal cooperative agreements, whereas assistance from within the Navy is normally less formal. During the five-year management period of this INRMP, additional cooperative agreements may be implemented. Technical assistance from organizations outside the Navy may include USFWS, VDGIF, USDA NRCS, USDA Forest Service, and The Nature Conservancy (TNC). Technical assistance from within the Navy may be provided by staff from the Installation Environmental Office, NAVFAC biologists, foresters, and soil conservationists, and additional staff, as needed and subject to funding, to be hired by the Installation to complete the continuous work to ensure successful implementation of this INRMP. Options for supplemental labor resources from outside the Navy for implementation of this INRMP include volunteers from local organizations and groups such as Boy Scouts of America, students from local public and private schools and universities, ecology clubs and conservation groups, retired and/or senior citizens. Options for supplemental labor resources also would be available from volunteer civilian and military personnel, and their dependents.

1.5 COMPLIANCE AND STEWARDSHIP

Compliance in terms of an INRMP refers to actions that must be taken in order to abide by the statutes and regulations applicable to natural resources. These are actions that an installation is legally mandated or obligated to take in order to meet current or recurring natural and cultural resources conservation management requirements, and for which it must obtain funding. Examples of compliance actions include developing, updating, and revising INRMPs; conducting biological surveys to inventory rare, threatened, and endangered species; and conducting wetland surveys for planning, monitoring, and/or permit applications. Compliance is essential, so these projects are of the utmost priority.

Stewardship is the responsibility to inventory, manage, conserve, protect, and enhance the natural resources entrusted to one's care in a way that respects the intrinsic value of those resources and the needs of present and future generations. Installations are required to recognize and balance environmental stewardship with mission readiness in retaining control and use of Navy land, sea, and air space for the purpose of maintaining the military mission. Conscious and

active concern for the inherent value of natural resources must be given in all Navy plans, actions, and programs (OPNAVINST 5090.1C Ch-1, Chapter 24). Stewardship projects and programs enhance an installation's natural resources, promote proactive conservation measures, and support investments that demonstrate Navy environmental leadership. Examples include education and public awareness projects, biological surveys or habitat protection for non-listed species, or management and execution of volunteer and partnership programs. Stewardship is an important component of the Navy's Environmental Readiness Program, and because stewardship projects can occur on an indefinite time-scale, these projects are prioritized after compliance projects.

1.6 LOCATION AND REGIONAL SETTING

NASO DNA is located in the southeastern portion of the City of Virginia Beach, Virginia (Figure 1-2) and encompasses approximately 1,900 acres (ac) (769 hectares [ha]). The Installation is bounded by the community of Sandbridge to the south; the Atlantic Ocean to the east; Hampton Roads Sanitation Division, City of Virginia Beach Properties, and private properties to the west; and Virginia Army National Guard - Camp Pendleton to the north. Several other military installations including JEB Little Creek – Fort Story and NAS Oceana are also located in Virginia Beach. NASO DNA is under the jurisdiction of CNRMA (Navy 2002a). Changes in Navy ownership of lands in the Hampton Roads area, such as from acquisitions, transfers, and establishment of easements, adjusts the total acreage under the jurisdiction of the CNRMA from year to year.

Land uses surrounding the Installation include industrial, commercial, residential, recreational, and agricultural though most of the agricultural lands are rapidly being converted to residential and recreational developments. Because of the intense level of development in the region, NASO DNA and the other coastal military installations are extremely important to the region's ecology. These installations, along with First Landing State Park (formerly Seashore State Park) to the north and Back Bay National Wildlife Refuge (BBNWR) and False Cape State Park to the south, support the few remaining tracts of undeveloped dune ecosystems along the southeastern Virginia coast. NASO DNA contains approximately 4.0 continuous miles (mi) (6.4 kilometers [km]) of primary and secondary coastal dune habitat. Recognizing and managing the beaches and dune system at NASO DNA as a contiguous ecosystem will help ensure the protection and appropriate management of this important natural resource.

1.7 HISTORICAL OVERVIEW AND MILITARY MISSION

NASO DNA was founded in November 1941 when the Navy established a training center, the Anti-Aircraft Range, Norfolk at Dam Neck to provide a live firing range to train fleet gunnery crews. This facility was located on undeveloped land south of Dam Neck Road. The Installation originally housed a firing line, one control tower, one magazine, one office, and one shop. On 04 April 1942, the activity was commissioned as the Anti-Aircraft Training and Test Center. During that year, land was acquired for rifle and pistol training ranges. Expansion continued through 1960, with construction of administrative and training facilities. During the 1980s, facilities for five new tenant commands were constructed at the south end of the Installation, and in 1988 133

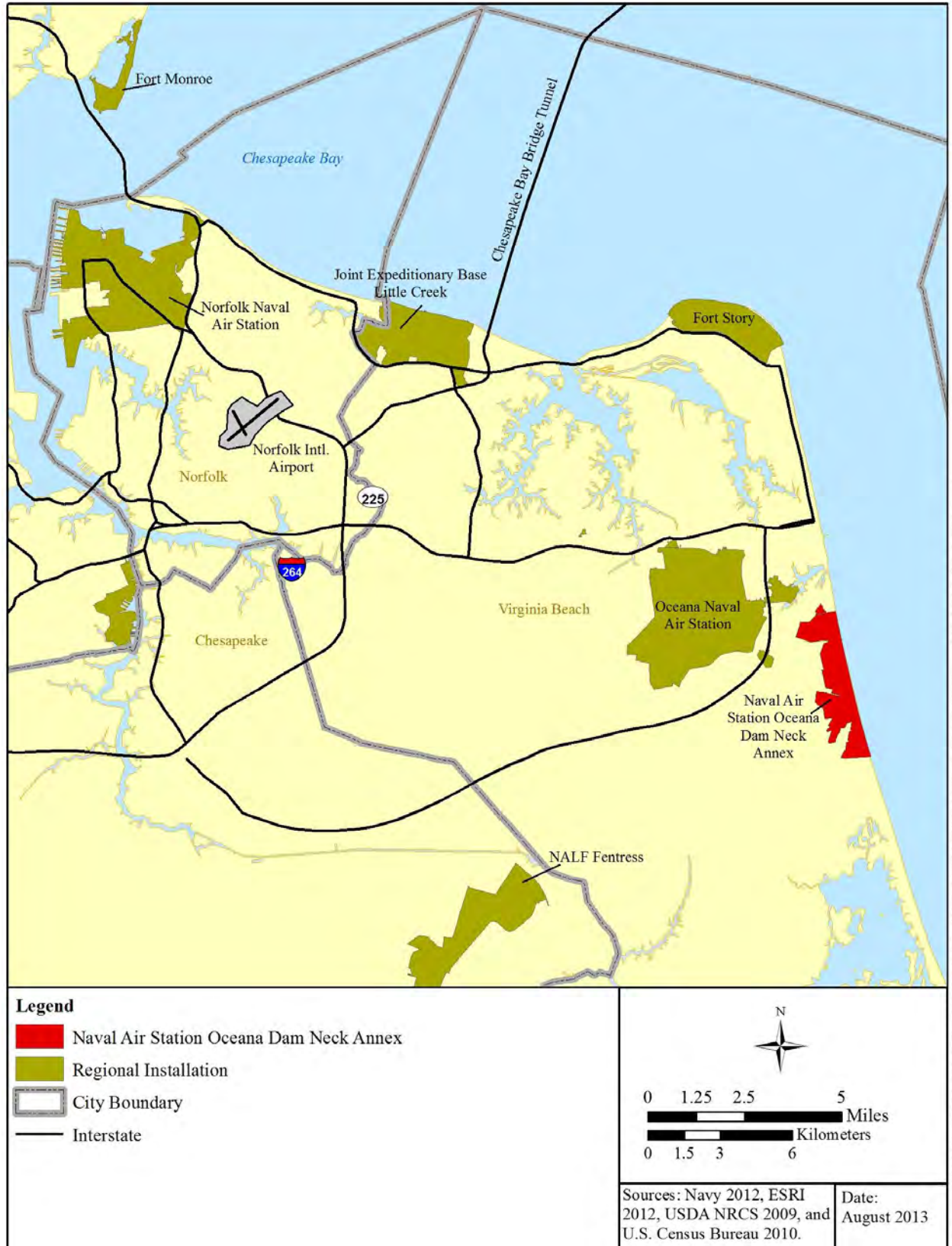


Figure 1-2. General Location of NASO DNA.

ac (54 ha) of additional land north of Dam Neck Road were acquired. This area was previously referred to as the north outparcel. In 1996 agricultural land south of Dam Neck Road was acquired to serve as a buffer zone against encroaching development and expansion space for military operations. This area, which was previously referred to as the south outparcel, added an additional 188 ac (76 ha) of land to NASO DNA.

The northernmost area of the Installation was originally acquired in 1947 by the federal government through leasehold condemnation from Virginia. Until federal acquisition, the property had been part of the adjacent Camp Pendleton State Military Reservation, which is still used by the Virginia Army National Guard. The major tenant command associated with this area of the Installation is the Marine Air Control Squadron 24 (MACS 24) compound and radar tower in the northeastern portion of the Installation, a reserve center along the northwestern border, a landing craft air cushion (LCAC) training area in the beach and dune areas, and an explosives test facility in the area north of Lovetts Marsh (Figure 1-3). The northern-most area of the Installation is used for training, testing and evaluation in special warfare, ordnance, overland assault, beach assault, and tactical air operations radar. In 2004, command of this area was transferred from Naval Amphibious Base Little Creek (now JEB Little Creek – Fort Story) to NAS Oceana. The previous terminology used to describe this parcel separately as the South Virginia Beach Annex (Camp Pendleton) is no longer utilized, as this area is managed as one contiguous installation along with the southern portion of the parcel (formerly known as Dam Neck Annex). The total Installation acreage changes periodically as parcel boundaries are changed, or parcels are added or removed. The current total Installation acreage, as provided by the Navy Real Estate Office, is 1,919 ac (777 ha). Total acreage based on Navy geographic information system (GIS) data for the Installation and used throughout this document for natural resources summary purposes, is 1,830 ac (741 ha).

Today, NASO DNA is part of NAS Oceana and is home to numerous major tenants: Commander Undersea Surveillance; Naval Education and Training Command, Center for Personal and Professional Development; Center for Surface Combat Systems Unit; NAS Oceana Dam Neck Annex Command Staff; Tactical Training Group, Atlantic; Distributed Training Center, Atlantic; Galley; Marine Air Control Squadron 24; Navy and Marine Corps Intelligence Training Center Marine Detachment; Maritime Civil Affairs and Security Training Command; Marine Corps Intelligence Schools; Medical/Dental Clinic; Maritime Intelligence Fusion Center, Atlantic; Navy Region Mid-Atlantic Fleet Readiness MWR & Child & Youth Programs; Naval Facilities Engineering Command Mid Atlantic PWD; Combat Direction Systems Activity; Navy Expeditionary Intelligence Command; Navy Exchange Service Command; Navy Federal Credit Union; Navy and Marine Corps Intelligence Training Center; Naval Ocean Processing Facility; Naval Surface Warfare Center Port Hueneme Division, Virginia Beach Detachment; Naval Special Warfare Development Group; Tactical Training Group, Atlantic; Training Support Center Hampton Roads; Naval Air Warfare Center, Aircraft Division, Atlantic Targets & Marine Operations; and Commander Navy Region Mid Atlantic Fire Station #8. The mission of the Installation is to provide quality education and training to sailors in specified combat systems operation and maintenance, specialized skills training, training systems support to operational and systems commands, and to perform other functions and tasks as directed by higher authority. Daily, over 5,600 instructors, students, and support personnel live or work at NASO DNA.

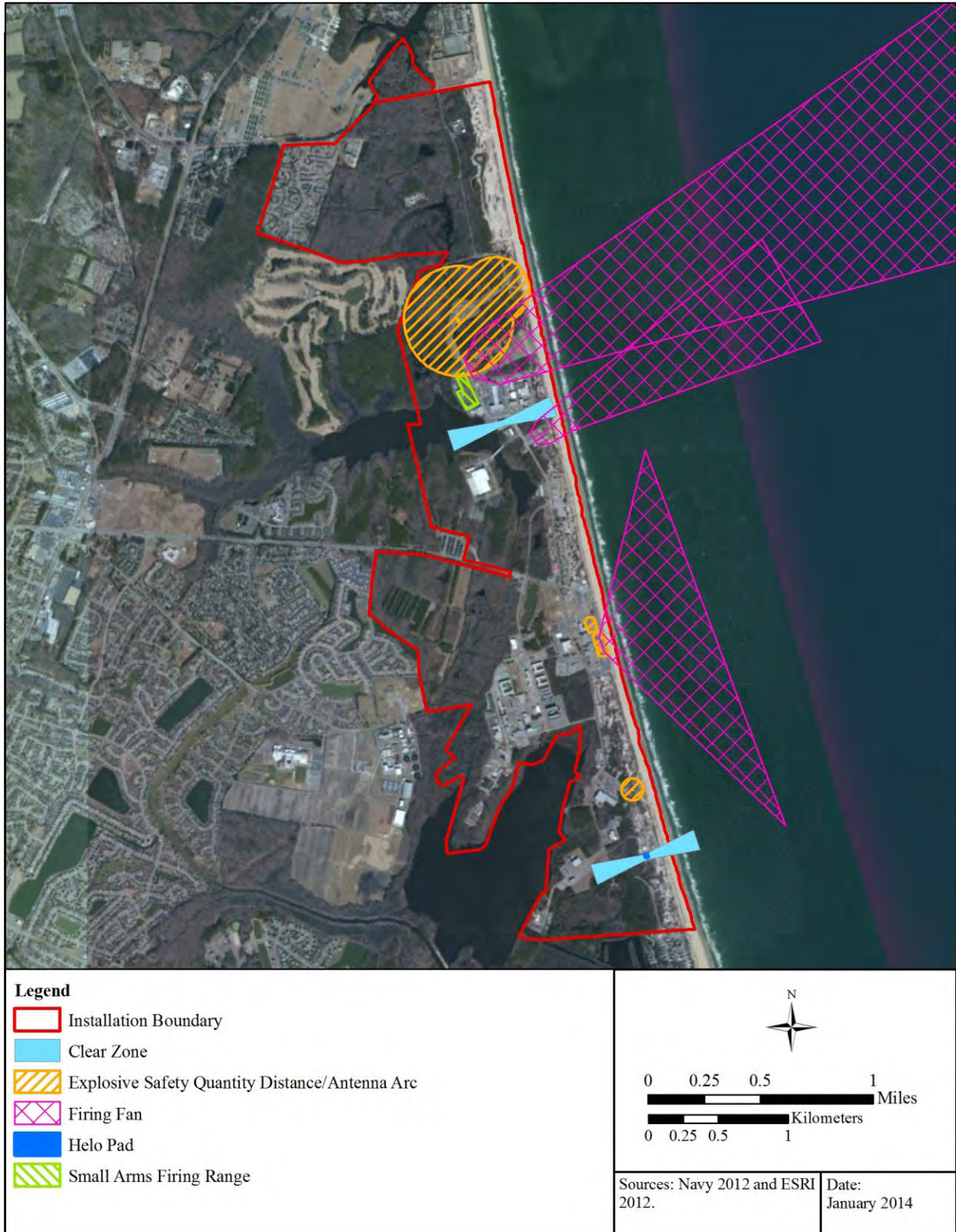


Figure 1-3. Training and Support Facilities of NASO DNA.

NASO DNA offers a number of training facilities that support the major command missions, with approximately 16,000 students trained annually in over 210 courses of instruction (MyBaseGuide 2012). Training, testing and evaluation facilities operated at NASO DNA include, but are not limited to, the following:

- **Small-Arms Firing Ranges:** The Installation's three small-arms ranges are located in the northern portion of the Installation and include a 50-yard (46-m) outdoor pistol range, a baffle range, and a 900-yard (823-m) rifle range
- **Weapons Gunline:** The weapons gunline is located in the center of the Installation on Viking Avenue. The gunline consists of concrete structures that support gun turrets and gun mounts for all weaponry currently in use. This facility is currently inactive.
- **Helicopter Pad:** NASO DNA has one helicopter pad.
- **Weapons Compound:** An 11-ac (5-ha) magazine compound stores munitions used at NASO DNA.
- **The Beach and Dune Training Areas:** Amphibious landing exercises using LCACs and other amphibious vehicles occur on the north end of the beach. The military mission of NASO DNA requires foot-traffic access to Installation dunes.

A number of these facilities have associated noise and safety buffers that constrain land use and resource management within the area. Training facilities located at NASO DNA and their associated air clear zones, firing range safety zones, and explosive safety quantity distance arcs are shown in Figure 1-3.

NASO DNA also supports military training requests from commands stationed at other installations. For example, LCAC and Explosive Ordinance Disposal detachment commands complete training at NASO DNA; however, the military personnel are stationed at JEB Little Creek – Fort Story or other installations. Additional land utilization requests from the military and public are reviewed for environmental and military mission conflicts at the time they are received.

1.7.1 Mission Impacts on the Environment

The Navy recognizes that military training and other operational activities have the potential to impact the environment and takes precautions to avoid or minimize degradation or harm to natural resources. Mission-related impacts are potentially greatest in the environmentally sensitive beach and dune areas, and wetland areas of NASO DNA.

Amphibious landing exercises involving LCACs and other amphibious vehicles are the primary training activity that impacts beach and dune areas at NASO DNA. The amphibious landing exercises, which occur up to four times per month, involve one to four amphibious vehicles maneuvering across the beach. Support personnel also dig foxholes to establish beachhead. Major impacts associated with training activities that occur in the beach and dune areas include accelerated beach and dune erosion and the loss of significant ecological communities. In the northern area of NASO DNA, nearly all of the primary and secondary dunes have been reduced

to remnant systems with little remaining dune vegetation. Military construction (MILCON) is another major source of disturbance on the beach and dune area at NASO DNA. Numerous buildings have been constructed in these fragile habitats, resulting in the loss of roughly one-third to one-half of the original dune system. Less disturbing activities include physical training, recreational activities, security patrols, and the maintenance of buried communication cables. A summary of beach operations that occur at NASO DNA is provided in Table 1-2. Beach and dune erosion resulting from these activities is an ongoing natural resources issue and has been addressed by various shoreline stabilization projects (Navy 1991 and Virginia Institute of Marine Science [VIMS] 2004). If impacts to this sensitive environment are not avoided or mitigated, beach and dune erosion will ultimately result in the loss of this unique training environment.

Wetlands are another sensitive resource that has the potential to be impacted by training and other mission-related activities. Construction and other disturbances that impact wetlands or alter hydrology are the primary causes of loss or degradation of wetlands at NASO DNA. Any action with the potential to impact wetlands is coordinated with USACE, Virginia Department of Environmental Quality (VDEQ), and when appropriate, the City of Virginia Beach Wetlands Board to obtain appropriate permits.

1.7.2 Integration of Military Mission and Sustainable Use

The Navy has taken a proactive approach towards integrating the military mission with concepts of sustainable land use by recognizing that efficient and effective land use planning supports military readiness and sustainability, while also protecting and enhancing the natural resources for multiple use, sustained yield, and biological integrity. Development and human use are inherently limited on military lands that are kept in their natural condition to support the military mission, often resulting in lands that have extremely high ecological value due to high biodiversity, an abundance of rare species, and presence of specialized habitats. As a result, DoD's land management responsibilities include acting as a steward for hundreds of our nation's rarest species and most characteristic habitats (Stein 2008) without compromising the preparedness of the Armed Forces. At the same time, using the land in a sustainable way that preserves the integrity of the ecosystem is vital to ensuring that military mission activities may continue to be conducted on these lands over the long term.

The Navy understands the role INRMPs play in identifying potential conflicts between an installation's mission and natural resources, and identifying actions necessary to maintain the availability of mission-essential properties and acreage. An INRMP balances the management of natural resources unique to the installation with military mission requirements and other land use activities affecting an installation's natural resources (DoD and USFWS 2002). The Installation is responsible for ensuring the accomplishment of the military mission in a way that sustains and enhances the natural resources on the installation. The NRM accomplishes this requirement by working in close cooperation with military operators to ensure mutual support and understanding.

The nature of military mission activities at NASO DNA does result in ground-disturbing impacts to natural resources, especially within the beach and dune areas located along the eastern boundary. Although the Installation is located in a developed, urban area, the Installation has

Introduction

Table 1-2. Beach Operations at NASO DNA.

Activity	Beach Operations	Area	Time of Day	Frequency
Command Undersea Surveillance	Rebury communications cables spanning beach	South end of NASO DNA past fishing beach	N/A	Every few years; advanced notice given
Amphibious Landing Exercises *	Over the Beach landing exercises; amphibious vehicles (1-4) and supporting personnel maneuver across beach and dig foxholes in sand to establish beachhead	North end of DNA beach	Variable; 2-4 hour blocks	Up to four times a month
U.S. Army *	Over the Beach landing exercises	South end of NASO DNA beach near Loon Ct.	Variable	Four times per year
Marine Corps (MACS 24) *	Physical training on beach	North end of NASO DNA beach	Morning, daylight	Three to four times per week
Morale, Welfare, and Recreations (MWR) **	April-November; beach cleanup and trash pickup with two pickup trucks and beach-cleaning machine	Recreational beaches: Sea Breeze Beach and Shifting Sands Beach	April-November daily (0600-1000 hrs)	Once per day
	May-September; set up 6-10 lifeguard stands, two rental trailers, volleyball nets, and wooden barricades	Recreational beaches: Sea Breeze Beach and Shifting Sands Beach	Present on beach throughout summer season	May be relocated short distances daily
Recreational Activities	May-September; swimming, surfing, beachcombing, kayaking, fishing, volleyball, etc.	Recreational beaches: Sea Breeze, Surfing, Shifting Sands, and Fishing beaches	Beach open to recreation daily (1000-1800 hrs)	Eight hours per day
Security ***	Patrols along beach	Entire NASO DNA beach	Beach patrols begin at daybreak	Continuous throughout the day during the summer season

* Beach operations for military training units limited to small unit training (≤ 40 personnel). Specialized military training geared to low visibility with minimum equipment and personnel quantity to simulate tactical combat realism. No live fire or explosives are involved.

** Recreational public beaches limited to military personnel and their families. Number of visitors may peak at 50 individuals daily on weekdays and 200 individuals daily on weekends.

*** Security patrols usually limited to one truck and one all-terrain vehicle with two to three personnel.

strived to conserve special habitats identified within the beach and dune habitats, and in other areas with natural resources value, such as wetland areas, located throughout the Installation.

1.8 OVERVIEW OF THE NATURAL RESOURCES PROGRAM

1.8.1 History and Accomplishments

Originally the southern portion of NASO DNA (formerly the Dam Neck Annex) was managed separately from the northern portion of the Installation (formerly Camp Pendleton), with the northern portion included under the management of Naval Amphibious Base Little Creek (now JEB Little Creek – Fort Story). The natural resources management program for the former Dam Neck Annex area began in 1984, when MWR hired a park technician/game warden to implement the deer hunting program. This position was moved to the Base Civil Engineering Department in 1990. With this transfer came additional job responsibilities and the park technician became the NRS. The NRP at the former Camp Pendleton portion of NASO DNA began in 1992 when a NRM was hired and stationed at JEB Little Creek. An INRMP was previously developed for the former Dam Neck Annex area (Navy 1998a), with the former Camp Pendleton parcel covered by the INRMPs prepared for JEB Little Creek – Fort Story (Navy 1997).

In 2000, under Navy reorganization, the NRP at NASO DNA became part of the CNRMA NRP, which is overseen by a Regional Environmental Compliance Group Manager. Other resource specialists within the group who helped facilitate natural resources management were the Regional Media Managers, the NAVFAC Regional Forester, and Regional Outreach Specialist. In 2007, the NASO DNA NRP reorganized again and became a part of NAVFAC Mid-Atlantic. Currently, the regional forester and regional outreach specialist positions are vacant. The Installation is currently supported by the NAS Oceana NRS/NRM, the NAS Oceana Biological Science Technician, a regional/NAS Oceana Conservation Law Enforcement Officer (CLEO)/Biological Science Technician, and NAVFAC Mid-Atlantic and NAVFAC Atlantic NR staff as requested. The NAS Oceana NRM and Biological Science Technician service NAS Oceana, NASO DNA, NALF Fentress, and Naval Security Activity Hampton Roads Northwest Annex. The NRM also provides technical assistance to additional properties assigned to the NAS Oceana PWD for oversight (i.e., Navy Dare County Bombing Range in NC and several Naval/Marine Corps Support Operating Centers located in VA, NC, and WV). The CLEO services a total of 11 installations in SE VA/NE NC. The regional NR staff (NAVFAC Mid Atlantic) provide assistance upon request to Naval Facilities from ME to NC. As discussed in Section 1.4, the daily natural resources management at NASO DNA is the responsibility of the NAS Oceana NRM.

Program areas for which NR personnel have oversight include forestry, fish and wildlife management, threatened and endangered species protection, habitat conservation and restoration, and overseeing the hunting and fishing program. Another important function of NR personnel is ensuring compliance with federal, state, and regional environmental regulations. To this end, and in accordance with 32 CFR Part 190, DoD Natural Resources Management Program, all current and planned mission activities such as master planning, construction requests, site approval requests, and training exercise plans must be coordinated, in a timely manner, through

NR personnel. An overview of program highlights and accomplishments since the inception of the NRP at NASO DNA include the following:

- receipt of letters of appreciation from multiple sources since the 1980s, including, but not limited to Boy Scouts of America (Tidewater Council), National Aquarium (Baltimore, Maryland), Virginia Aquarium and Marine Science Center, Chesapeake Bay Foundation, Old Dominion University, and various DoD military commands;
- recognition by various programs of the Virginia Beach Clean Communities Commission in 1994 and 1997;
- receipt of Tree City USA certifications from the National Arbor Day Foundation annually since 1999 (Appendix D);
- receipt of the Chief of Naval Operations (CNO) Natural Resources Conservation Award in 1996, 1998, and 2009;
- receipt of the National Public Lands Day Financial Assistance Award (Dune Restoration) 6 out of 7 years from 2006-2012;
- annual participation in Earth Day and Clean the Bay Day celebrations, and annual celebration of the NASO DNA Arbor Day celebration (held on the second Monday in April each year);
- receipt of preliminary jurisdictional wetland determinations in 2011 and 2012, resulting in wetland delineation coverage of all of NASO DNA, with the exception of a small portion south of the fenceline that is known to contain wetlands. Wetland delineations completed to date have identified approximately 922 ac (373 ha) of wetland habitats (Appendix E);
- effective management of whitetail deer (*Odocoileus virginianus*) populations through a regulated hunting program;
- annual donations of venison to “Hunters for the Hungry” and fund-raisers to raise money for processing the deer meat;
- planting of beach grasses along 4.0 mi (6.4 km) of coastal sand dune habitat, and completion of a dune restoration site in association with the Disaster Preparation Team (formerly the First Lieutenant’s Division) and volunteers;
- participation in annual sea turtle nest recognition and marine mammal stranding training;
- received concurrence from USFWS with regards to sea turtle management at the Installation and coverage of the Installation by a Biological Opinion (BO) for the BBNWR Sea Turtle Management Program, Virginia Beach, Virginia (Appendix F);
- completion of rare, threatened, and endangered species inventories; and
- protection of the state champion longleaf pine (*Pinus palustris*), which resides at NASO DNA.

1.8.2 Ecosystem Management

Since the early 1990s, federal land managers have increasingly been adopting the concept of ecosystem management. DoD has had an official policy on ecosystem management since 1994 when the Deputy Under Secretary of Defense for Environmental Security issued a memorandum promoting ecosystem management on military installations. DoD Manual 4715.03 further states that natural resources under the stewardship and control of DoD should be managed using ecosystem-based management principles and guidelines that maintains and improves the sustainability and biological diversity of terrestrial and aquatic (including marine ecosystems, as applicable) ecosystems, while supporting sustainable economies, human use, and the environments required for realistic military training operations (DoD 2013). Adopting ecosystem-based management principles and guidelines has required a shift in focus from ensuring that resource utilization is sustainable, to ensuring that the natural ecosystems themselves are sustained. DoD ecosystem-based management principles and guidelines are incorporated by the following:

- maintaining and improving the sustainability and native biodiversity of ecosystems;
- considering ecological units and timeframes;
- supporting sustainable human activities;
- developing a vision of ecosystem health;
- developing priorities and reconciling conflicts;
- developing coordinated approaches to work toward ecosystem health;
- relying on the best science and data available;
- using goals and objectives to monitor and evaluate outcomes;
- using adaptive management; and
- implementing activities through existing installation plans and programs.

1.8.3 Adaptive Management

Ecosystem-based management is best accomplished by using adaptive management techniques. Adaptive management is an iterative cycle of planning, monitoring, evaluation, and adjusting management. Unknown factors and changing conditions require management goals and prescriptions to be adaptable. Periodic reviews of management goals and practices provide the opportunity to incorporate new science and information as well as assess the performance of management actions. Prescribed actions should be considered experimental and subject to change if the expected or desired results are not achieved.

At the installation level adaptive management includes development of flexible management practices to accommodate the evolving scientific understanding of ecosystems and adjusting management practices as necessary, based on, at a minimum, annual INRMP reviews. Installations also accommodate training and test mission changes and coordinate resultant

impacts on existing ecosystem management to preserve both training/testing and conservation processes and objectives. DoD components of adaptive management includes:

- identification and assessment of military mission operations and facility requirements;
- analysis and assessment of risks to natural resources;
- completion of needs assessment surveys;
- monitoring and preparation of the needs assessment results;
- updating natural resources inventories to ensure information is current;
- reanalysis and reassessment of risks to natural resources; and
- incorporation of adjustments into the overall NRP, as necessary (DoD 2013).

1.9 CONSTRAINTS AND OPPORTUNITIES

Due to the urban nature of the Installation, traditional natural resources management (such as forestry, wildlife management, and outdoor recreation) is limited throughout the majority of the Installation area. However, opportunities for habitat improvement, wetlands and water quality protection, and urban tree care exist. Natural resources constraints on training or other mission-related activities at NASO DNA exist throughout much of the Installation.

Natural resources management issues and requirements pose the following constraints to NASO DNA's military mission and to the further development of facility land (Figure 1-4):

- limitation on new construction in wetlands, floodplains, beaches, dunes, and riparian buffer areas;
- conservation and encouragement of protected flora and fauna species habitat; and
- restrictions on allowable uses of the beach and dune habitat, especially habitat conservation and restoration areas.

The major natural resources constraints at NASO DNA include surface waters, including lakes, streams, marshes, and wetlands; floodplain areas; and beach and dune areas. Other constraints to the military mission that are not directly related to natural resources management, but which must be considered, include environmental compliance requirements, restoration activities, cultural resources, and air clear zones, firing range safety zones, and explosive safety quantity distance arcs.

Outside of the military mission, and natural resources and other constraints, the remaining areas of NASO DNA represent opportunity areas where mission activities would not be restricted by mission or natural resources management issues. Opportunities for expansion of training and development are associated with the developed and open areas of the Installation shown on Figure 1-4. In addition to limited open areas at NASO DNA, there are some possible opportunities for the Navy to leverage undeveloped habitat outside of the NASO DNA boundaries in support of the military mission via encroachment partnering (see Section 1.11).

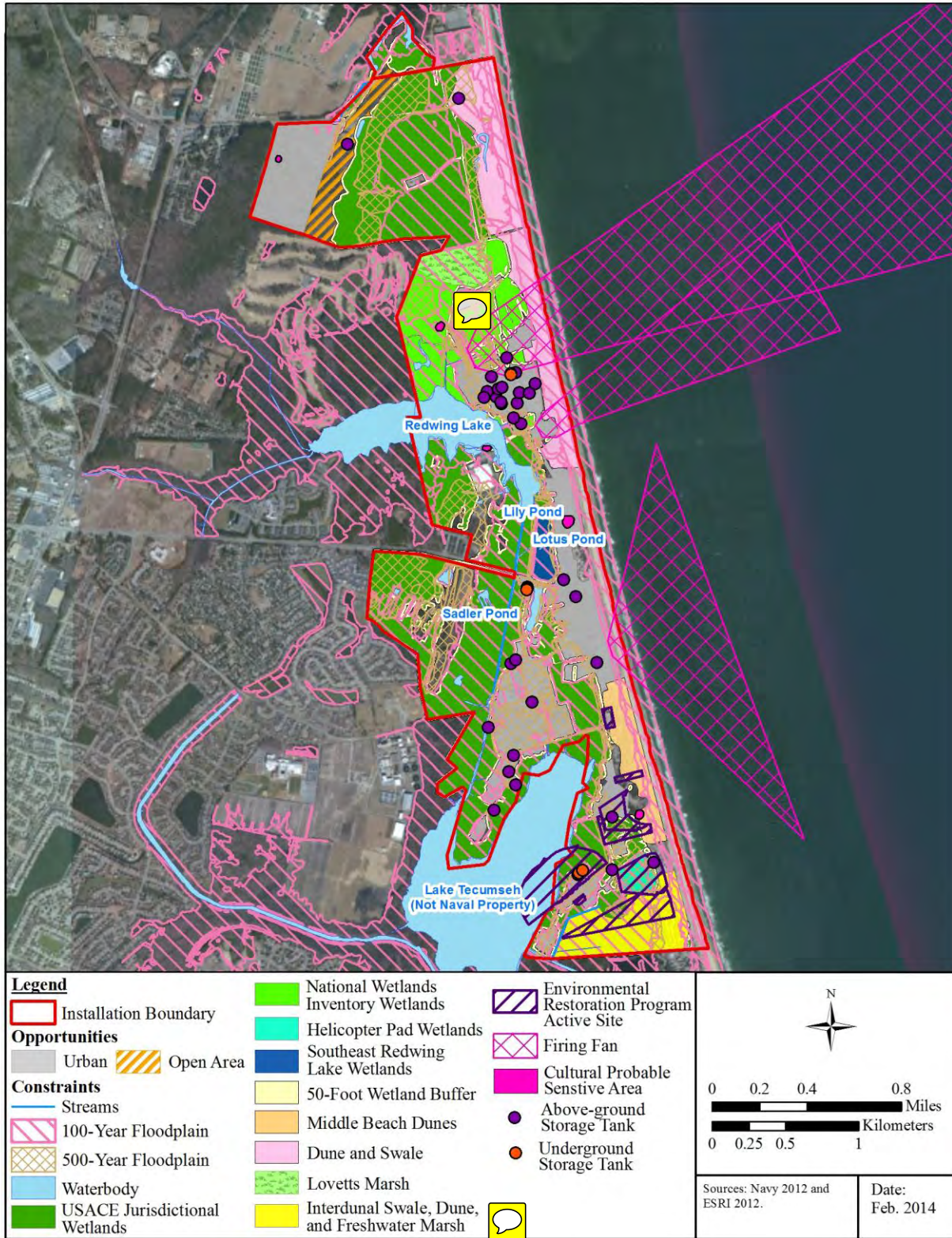


Figure 1-4. Constraints and Opportunities of NASO DNA.

1.10 INRMP INTEGRATION WITH OTHER INSTALLATION PLANS

The preparation and development of an INRMP must be coordinated with the development of other installation plans, planning processes, and National Environmental Policy Act (NEPA) documents as required by DoD guidance (Navy 2006a). Examples of these plans include installation range plans, training plans, integrated cultural resources management plans, pest management plans, and installation restoration plans.

Existing plans or programs that will be implemented in coordination with this INRMP include, but are not limited to:

- Fisheries and Aquatic Resources Management Plan for Redwing Lake, Fleet Combat Training Center – Dam Neck, Virginia Beach, Virginia (2000)
- Storm Water Pollution Prevention Plan (SWP3), Naval Air Station Oceana, Dam Neck Annex, Virginia Beach, Virginia (2012)
- NAS Oceana, NALF Fentress, and NASO DNA Prescribed Burn and Smoke Management Plan (2010)
- Spill Prevention, Control, and Countermeasures Plan and Oil Discharge Contingency Plan, Naval Air Station Oceana, Dam Neck Annex (2000)
- Regional Integrated Cultural Resources Management Plan for Naval Installations in Hampton Roads, Virginia (2012)
- Integrated Pest Management Plan (2013)
- Installation Appearance Plan (2008)
- Installation Encroachment Action Plan
- U.S. Navy Small Arms Range Study (2009)
- Virginia Capes/Northeast Range Complex Management Plan
- Small Arms Range & Explosive Range Development Plans (Draft)

Planning for training activities, other military mission requirements, MWR, natural resources, and other activities on the Installation are coordinated through each of the NAS Oceana NAVFAC PWD divisions and NAVFAC Mid-Atlantic regional personnel as appropriate. The PWD's Environmental Division provides a NRM to review such activities for natural resources concerns and recommendations. All other Environmental Medias have reach back support to NAVFAC Mid-Atlantic regional media managers to review activities for environmental concerns and recommendations between the Installation NRM and the Environmental Planning and Conservation Group. This ensures that the military mission is not compromised and that the Installation is meeting the mandated environmental regulatory requirements. Environmental resources must be considered during the planning and development of future training areas and facilities at NASO DNA, including construction of boat ramps, expansion of firing ranges, infrastructure stabilization/repair, new construction, increases in type and levels of training in existing training/testing/evaluation areas, etc. These reviews are typically conducted via three

different reviewing processes: the Environmental Checklist (Appendix A) review process submitted during the site approval process; the Work Permit review process submitted by a tenant command requesting to conduct in-house work; and the Site Work Induction Board review process where work requests have been submitted that require PWD assistance.

1.11 ENCROACHMENT AND ADJACENT LAND USE

The DoD has established an Encroachment Partnering program, which was authorized under 10 USC §2684a (Agreements to Limit Encroachments and other Constraints on Military Training, Testing and Operations). This program authorizes military services to enter into cost-sharing partnerships with states, their political subdivisions, and/or conservation minded NGOs to acquire lands from willing sellers. This serves to limit development or use of the acquired property, or preservation of habitat that supports military readiness requirements. Undeveloped habitat areas that border NASO DNA present ideal opportunities for the Navy to establish buffers to separate the Installation from encroaching development.

The DoD Readiness and Environmental Protection Initiative supports cost-sharing partnerships authorized by Congress (10 USC §2684a), between the military services, private conservation groups, and state and local governments to protect military test and training capabilities and conserve land (DoD Sustainable Ranges Initiative No date [n.d.]). This initiative enables the military to work with willing partners who help provide cost-sharing land conservation solutions to limit incompatible development and protect valuable open spaces and habitat around key test and training areas. The DoD Readiness and Environmental Protection Initiative provides funding for the military to work with state and local governments, NGOs, and willing landowners to help prevent encroachment. Successful projects have resulted in the expansion of easements and the preservation of land around DoD installations (DoD 2012a).

The City of Virginia Beach adopted a comprehensive plan in December 2009 that outlines how the physical development of the City of Virginia Beach should be directed for at least the next 20 years. As a primary employer in the City of Virginia Beach, the Navy has played an important role in the development of the city. It is critical that Navy representatives continue to participate in the joint decision making process to ensure continued compatible land use around the numerous naval stations in the Virginia Beach region (City of Virginia Beach 2009). Many of the counter-encroachment initiatives and programs which serve NAS Oceana and its satellite installations, including NALF Fentress and NASO DNA, have their genesis in the 2005 Hampton Roads Joint Land Use Study. The most significant of these are the legislative actions by the cities of Virginia Beach and Chesapeake, which incorporated the land use compatibility criteria contained in the Navy's Air Installations Compatible Use Zones (AICUZ) Instruction into the zoning ordinances for each city. The boundaries of the Virginia Beach AICUZ Overlay Zoning District and the Chesapeake Airfield Overlay District are delineated by the Hampton Roads Joint Land Use Study AICUZ Planning Map which was adopted by the cities at the conclusion of the Joint Land Use Study in 2005 (Appendix G) (Lauterbach 2013).

The Hampton Roads Joint Land Use Study also prompted aggressive action by the Navy and cities of Virginia Beach and Chesapeake under the aegis of the DoD Readiness and Environmental Protection Initiative. Referred to locally as the Encroachment Partnering Program, the effort is underpinned by a multi-year agreement for the purchase by the cities of

land located in the Interfacility Traffic Area (i.e., those portions of the cities beneath frequently-used flight tracks between NAS Oceana and NALF Fentress). Acquisitions also have occurred in an area of Virginia Beach designated as the Rural AICUZ Area (Appendix G). From monies received between fiscal year (FY) 2007 and FY 2011, 1,768 ac (715 ha) have been purchased, which have been encumbered with restrictive use easements. In all, the Navy has expended \$25.02 million in addressing encroachment issues in the area (Lauterbach 2013).

An Encroachment Action Plan for NASO DNA was completed in 2009. NASO DNA has no discrete buffer areas; however, a large portion of the Installation lies within the Virginia Beach AICUZ Overlay Zoning District, and thus is subject to development limitations contained in the ordinance. In addition, Section §15.2-2204 of the Code of Virginia requires that NAS Oceana's CO receive written notice at least 30 days before any public hearing for a proposed zoning change to, or development application for, land within 3,000 ft (914 m) of the NASO DNA property line. The NASO DNA Encroachment Action Plan is presently under revision.

A good example of an encroachment action topic is the Lake Tecumseh property, which is located immediately adjacent to NASO DNA and owned by Hampton Roads Sanitation Division. Preservation of the lake is in the best interest of the Navy from an ecosystem management perspective. The lake provides immediate access to recreational opportunities (including boating, fishing, and wildlife viewing) to military and civilians, thus supporting MWR opportunities. However, lake access also poses a security issue associated with the potential for unauthorized access to the Installation by recreationists. The USFWS, a partner agency with the Navy, has proposed acquiring Lake Tecumseh to incorporate it into the BBNWR.

1.12 PARTNERSHIPS AND OUTREACH

The diversity of natural resources found at NASO DNA creates the need for a variety of expertise and assistance in developing and implementing sound management practices. The development of partnerships with state and federal resources agencies, local colleges and universities, and local conservation groups makes such expertise available to NR personnel to accomplish set goals and objectives, and fosters good community relationships. The following is a list of groups and agencies that have formed significant partnerships with the Installation.

- VDGIF provides environmental analysis of projects or permit applications to determine likely impacts on fish and wildlife resources and habitats, and recommends appropriate measures to avoid such impacts. VDGIF provides guidance regarding the management and protection of state threatened and endangered wildlife, with the exception of listed insects. VDGIF is consulted during the INRMP update process and routinely makes valuable contributions to its development.
- The USFWS (terrestrial species and freshwater fish species) and NOAA NMFS (marine species) provides technical assistance with plans on fish and wildlife issues, identification of threatened and endangered species and critical habitat consultation under Section 7 of the Endangered Species Act (ESA) of 1973, fish and wildlife census surveys, and conservation law enforcement (CLE). The USFWS and NOAA NMFS are consulted during the INRMP update process and routinely makes valuable contributions to the development of this INRMP.

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- USFWS, Office of Fishery Assistance conducted fisheries surveys of Redwing Lake and Sadler Pond, and developed a Fisheries and Aquatic Resources Management Plan (2000).
- The Virginia Department of Conservation and Recreation, Natural Heritage Program (VDCR-DNH) has conducted threatened and endangered species surveys at NASO DNA that provide information on the occurrence of rare, threatened, and endangered species and rare natural communities and their management on the Installation.
- The Virginia Department of Forestry (VDOF) reviews and recommends recertification as a Tree City USA participant annually in support of the NASO DNA urban forest management program.
- VIMS has surveyed coastal erosion rates and is developing a shore change and dune impacts assessment for the beach and dune areas at NASO DNA.
- Virginia Aquarium Stranding Team staff and volunteers provides support in the event of strandings along the NASO DNA coast, and support the Installation's sea turtle nest watch program.
- The National Aquarium in Baltimore partners with the NRP through a Cooperative Ecosystems Studies Unit agreement to complete dune stabilization and restoration projects.
- The Disaster Preparation Team installs dune fencing and recycled Christmas trees on the dunes to protect vegetated dunes from degradation during training activities, and conducts litter cleanups in natural areas and trails.
- Various tenant commands have partnered with the NRP to host Clean the Bay Day, Clean the Base Day, Dune Restoration, and other events.
- The Chesapeake Bay Youth Conservation Corps has participated in beach and dune enhancement and restoration. Other various youth groups have assisted with dune restoration work.
- The Sportsman Quality Management Board works closely with NR personnel to assist with projects that promote ethical hunting.
- The Boy Scouts have built and installed nesting boxes, and have participated in dune restoration projects.
- Navy and non-Navy community citizens and groups from Virginia, Maryland, West Virginia, and North Carolina have volunteered to assist with dune restoration work.
- Military spouses groups and MWR have supported natural resources work on the Installation.
- NASO DNA is located in the South Atlantic Landscape Conservation Cooperative. The cooperative, established as part of the U.S. Department of the Interior's Climate Change Response Strategy, is designed to provide a partnership in which the private, state, tribal, and federal conservation community can work together to address increasing land use pressures and widespread resource threats and uncertainties amplified by a rapidly changing climate (South Atlantic Landscape Conservation Cooperative 2010).

- The Installation NRM is a representative for the Department of Defense Partners in Flight Program and provides assistance and partnering opportunities to all DoD installations within the State of Virginia and others outside of the state upon request primarily related to bird management.
- The Installation NRM was nominated in 2012 as the co-chair of the National Military Fish and Wildlife Associations' Bird/Wildlife Aircraft Strike Hazard (BASH) Working Group. This position promotes partnering and coordination amongst all groups associated with BASH concerns.

1.13 TRAINING OF NATURAL RESOURCES PERSONNEL

The SAIA states “Section 107 of the Sikes Act (16 USC 670e-2) requires sufficient numbers of professionally trained natural resources management personnel and natural resources law enforcement personnel to be available and assigned responsibility to perform tasks necessary to carry out Title I of the Sikes Act, including the preparation and implementation of integrated natural resource management plans.” The effectiveness of this INRMP is greatly enhanced by the professional development of natural resources management staff. Professional development of staff requires maintaining knowledge through training and participation in conferences and workshops.

The management of natural resources requires a specialized skill set on the part of personnel. In addition to holding science-based degrees, environmental personnel acquire skills by attending training through the Civil Engineer Corps Officers School, the Shipley Group, USFWS (National Conservation Training Center), USACE, Wetlands Training Institute, Inc., various university programs, Defense Environmental Network and Information Exchange, and other training centers or vendors as the need arises or training becomes available. Table 1-3 lists contact information for available training.

NR staff keeps current on natural resources issues by attending annual workshops or conferences held by various professional societies. Societies such as National Military Fish and Wildlife Association (NMFWA), The Wildlife Society, Society of American Foresters, and Society for Ecological Restoration all host annual meetings focused on the management of natural resources. Additionally, it is recommended that persons interested in natural resources management familiarize themselves with the natural resources that are accessible within the vicinity of the particular installation. Some options available are visits to nearby parks, reserves and other natural areas with an in-depth field guide to develop a practical sense for the area's natural history.

Table 1-3. Natural Resources Training Opportunities.

United States (U.S.) Government, U.S. Department of Defense (DoD)
<p>Defense Environmental Network and Information Exchange Training and Education Website: https://www.denix.osd.mil/conferences/</p>
<p>Navy Civil Engineer Corps Officers School Environmental Training Program 3502 Goodspeed Street, Suite 1 Port Hueneme, CA 93043-4336 Tel: 805-982-2895 Fax: 805-982-2918 Website: https://www.netc.navy.mil/centers/csfe/cecos/</p>
<p>Armed Forces Pest Management Board Training and Certification Website: http://www.afpmb.org/pubs/courses/courses.htm</p>
<p>U.S. Army Corps of Engineers Professional Development Support Center 550 Sparkman Drive Huntsville, AL 35816 Tel: 256-895-7401 Fax: 256-895-7465 Website: http://pdsc.usace.army.mil/</p>
U.S. Government, non-DoD
<p>U.S. Fish and Wildlife Service National Conservation Training Center Route 1, Box 166 Shepherdstown, WV 25440 Division of Training Tel: 304-876-7472 Aquatic Resources Tel: 304-876-7445 Environmental Conservation Tel: 304-876-7475 Wildlife Tel: 304-876-7434 Technical (e.g., geographic information system) Tel: 304-876-7456 Website: http://training.fws.gov/</p>
Non-Governmental Organizations
<p>Wetland Training Institute, Inc. P.O. Box 31 Glennwood, NM 88039 Tel and Fax: 877-792-6482 Website: http://www.wetlandtraining.com/</p>
<p>The Shipley Group P.O. Box 908 Farmington, UT 84025 Tel: 888-270-2157 Website: http://www.shipleygroup.com</p>
Universities
<p>Duke University Nicholas School of the Environment and Earth Sciences Continuing Education Program</p>

Box 90328
Durham, NC 27708-0328
Tel: 919-613-8082
Fax: 919-684-8741
Website: <http://www.nicholas.duke.edu/people/alumni/duke-environmental-leadership-program-continuing-and-executive-education>

University of Wisconsin–Madison
Gaylor Nelson Institute for Environmental Studies
Science Hall, 550 North Park Street
Madison, WI 53706-1491
Tel: 608-263-1796
Website: <http://www.nelson.wisc.edu/>

A list of core competencies has been developed by the NAVFAC Training Program Coordinator to ensure NR personnel are adequately trained in natural resources management practices. There are four phases of core competencies. Phase I training is required for new media managers, Phase II training is appropriate for existing media managers, Phase III training is required for personnel conducting compliance activities, including inspections at NASO DNA, and Phase IV training is required for general storefront compliance.

A list of required and recommended courses and training opportunities follows. A course identification number (CIN) is given for Navy environmental courses. Other information given includes locations or course providers.

PHASE I – New Media Managers

A. Civil Engineering Corps Officer's School Courses

1. Basic Environmental Law, CIN: A 4A-0058
2. Environmental Protection, CIN: A-4A-0036
3. Introduction to Cultural Resource Management Laws, CIN: A-4A-0070
4. Natural Resources Compliance, CIN: A-4A-0087
5. Ecological Risk Assessment, CIN: A-4A-0081
6. Advanced Environmental Management, CIN: A-4A-0063
7. Pesticide Applicator Training (Core) B-322 1070

B. Navy Occupational Safety and Health Courses

1. Spill Management Team Training, CIN: A-493-0088/5637

C. Other Government Offerings

1. Joint Permit Application (USACE)
2. Range Master Certification (annual)
3. CNO/NAVFAC NRMs Meeting (December, annual)

D. Public Offerings

1. Virginia

- a. Prescribed Burn Management Certification (VDOF)
- b. Land Management Certification for Soil & Erosion Control (VDCR-DNH)
- c. Marine Mammal Stranding Training (Virginia Aquarium and Marine Science Museum)
- d. Chesapeake Bay Act/Coastal Consistency Determinations (VDEQ)

2. NMFWA

- a. NMFWA Conference (March, annual)
- b. Invasive Species Control
- c. Fish and Wildlife Law Enforcement (annual)
- d. BASH
- e. Bats
- f. Climate Change
- g. CLE
- h. Fish and Wildlife Recreation
- i. Herpetology
- j. Invasive Species
- k. Pollinators

E. Other Public Offerings

1. Wetlands Regulations (Wetland Training Institute)
2. 404 Permitting (USACE)
3. NEPA (Duke University)
4. BASH Conference (annual)
5. GIS (Louisiana State University School of Forestry, continual)
6. DoD Pesticide Applicator Certification (2 weeks in Jacksonville, Florida)
7. NAVFAC sponsored courses

PHASE II – Existing Media Manager

A. Civil Engineering Corps Officer's School Courses

1. Ecological Risk Assessment, CIN: A-4A-0081
2. Natural Resources Compliance, CIN:A-4A-0087 (every 3 years)
3. Health & Environmental Risk Communication, CIN: A-4A-0072
4. Historic Preservation Law and Section 106 Compliance, CIN: A-4A-0073
5. Pesticide Re-Certification B 322 1074 (every 2 years)

B. Public Offerings/Courses

1. Wetlands Regulations (Wetland Training Institute)
2. Wetlands Delineation & Practicum (Wetland Training Institute)
3. The Wildlife Society Conference and Workshop (September/October)
4. 404 Permitting (USACE)
5. Joint Permit Application (USACE)
6. BASH Conference (annual)
7. Coastal Zone Management Act (CZMA)/Chesapeake Bay Act/Coastal Consistency Determinations

8. GIS (Louisiana State University School of Forestry, continual)
9. Invasive Species (NMFVA, continual)
10. NMFVA Conference (March, annual)
11. CNO/NAVFAC NRMs Meeting (December, annual)
12. Fish and Wildlife Law Enforcement Refresher (NMFVA, continual)
13. Coastal Ecology/Shoreline Stabilization (VIMS, continual)
14. Forestry Wetlands Permitting
15. Wetlands Construction/Mitigation
16. Society of American Foresters Conference (continual)
17. Southeast Deer Workshop (continual)
18. VDGIF Workshops – various wildlife, game management, and habitat management workshops
19. Gap Analysis (U.S. Geological Survey [USGS])
20. NAVFAC sponsored courses Partners in Flight Meetings and Workshops
21. DoD, National and Regional Partners for Amphibian and Reptile Conservation Meetings and Workshops

PHASE III – Storefront Compliance Technicians

- A. Civil Engineering Corps Officer’s School Courses
- B. Navy Occupational Safety and Health Courses
- C. Other Offerings
 1. In House Media Manager Training Checklist
 2. General Wetlands/Permit Awareness
 3. Marine Mammal Stranding Training (Virginia Aquarium and Marine Science Museum, 2 hours)
 4. National Military Fish and Wildlife Association Conference (annual)
 5. BASH Conference (annual)

PHASE IV – Storefront Compliance Requirements

- A. Environmental Awareness
 1. Provided by media managers (video)
 2. Excerpts from OPNAVINST 5090.1C Ch-1 Chapter 24 (e.g., wetlands, permits)

1.14 GEOGRAPHIC INFORMATION SYSTEMS

GIS is an integral part of natural resources and environmental protection and planning. The CNRMA’s GeoReadiness Center is the single, authoritative source and distribution point for all geospatial information within the area of responsibility of the Navy Mid-Atlantic Region and is managed by the NAVFAC Mid-Atlantic Asset Management Business Line. The GeoReadiness Center houses the most current geospatial information (including aerial photography) for the entire Navy Mid-Atlantic Region and provides access to the comprehensive data set and analysis tools to Regional and DoD decision makers/managers, sponsored contractors, and other sponsored individuals via a secure government Internet site. GIS data for NASO DNA, including

the environmental layers used for the development of this INRMP, can be accessed through the portal at:

https://portal.navfac.navy.mil/portal/page/portal/am/mid-atlantic/am_ml_au/gis.

Baseline data layers used to develop the figures for this INRMP include, but are not limited to:

- Installation boundary and site details
- Installation training facilities
- Topography
- Soils
- Aquatic resources
- Flood zones
- Ecological communities
- Rare, threatened, and endangered species and their habitats
- Regional environmentally sensitive resources
- Bird and bat box locations
- Special interest areas (SIAs)
- Prescribed burn units
- Hunting compartments
- Invasive and nonnative plant locations
- Natural resources management units

Environmental planners, project managers, engineers, and sponsored contractors are encouraged to use the portal to access GIS data for analysis, development of maps and project planning. In addition, the portal provides guidance documentation for the collection of new geospatial data.

1.15 ENVIRONMENTAL PLANNING

The proponent of any action at NASO DNA that has the potential to impact natural resources or may require federal or state permits must coordinate the proposed actions with the NAVFAC Planning Department. The NAVFAC Planning Department is responsible for initiating the Environmental Checklist (Appendix A) through the Environmental Core NEPA Group. Additional review of proposed actions also will be conducted by the Installation NRM for potential environmental impacts.

Advanced planning and coordination are required to ensure compliance with a number of environmental regulations including:

- NEPA, 42 USC §4231 et seq.;
- SAIA, 16 USC §670a-670o;

- Clean Air Act, 42 USC §7401 et seq.;
- Clean Water Act (CWA), 33 USC §1251-1387;
- CZMA, 16 USC §1451 et seq.;
- Migratory Bird Treaty Act (MBTA), 16 USC §703-712; and
- ESA, 16 USC §1531 et seq.

A summary of laws relevant to natural resources management on Navy lands is located in OPNAVINST 5090.1C Ch-1 at the Defense Environmental Network and Information Exchange website:

<http://www.denix.osd.mil/nr/LegislationandPolicy/LawsandStatutes/Index.cfm>

According to OPNAVINST 5090.1C Ch-1, Navy installations are responsible for applying for federal, state, and local permits where appropriate. Regardless of the permit holder, permits for environmental and natural resources actions at Navy installations must be coordinated with the appropriate Regional Environmental Coordinator prior to the permit being signed. Permit conditions shall be coordinated with all affected tenant commands. Examples of permits that may be held by NASO DNA include, but are not limited to, the following:

- CWA permits, including actions related to water quality, wetlands, and waters of the U.S. under the jurisdiction of USACE;
- VDEQ and City of Virginia Beach wetland and water protection permits;
- Virginia Marine Resources Commission (VMRC) permits;
- Virginia Pollutant Discharge Elimination System (VPDES) National Pollutant Discharge Elimination System stormwater permits;
- Floodplain development permits;
- Consumptive use permits for groundwater use;
- Navy NRP permits for hunting, trapping, and archery ranges; fishing; firewood cutting and collection; agricultural land use and timber harvest lease agreements; training area use permits and permissions; and natural resources research lease agreements;
- USFWS wildlife depredation and migratory bird permits for control of nuisance wildlife and birds related to BASH management;
- USFWS special purpose salvage and possession permits;
- Marine Mammal Protection Act (MMPA) permits;
- VDGIF scientific collection, salvage, and kill permits;
- VDGIF deer population reduction program permits; and
- Resource Conservation and Recovery Act (RCRA) hazardous waste permits.

These permits are discussed in greater detail as relevant in subsequent sections of this INRMP.

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2.0 EXISTING CONDITIONS

2.1 CLIMATE

An understanding of general climate patterns is important to natural resources management because of the affects that weather has on the planning and success of natural resources activities such as tree planting and pesticide application. NASO DNA is located in an area where temperature extremes are moderated by the Atlantic Ocean. The average yearly temperature is 60.0° Fahrenheit (F) (16.0° Celsius [C]). January is the coldest month with an average low of 32.6°F (0.3°C), and July is the warmest month with an average high of 87.4°F (30.8°C). The average growing season (daily minimum temperatures higher than 32.0°F (0.0°C) for a light frost) lasts approximately 250 days from 22 March to 21 November. The average annual precipitation is 45.7 inches (in) (116 centimeters [cm]) and is generally somewhat concentrated in the late summer. The prevailing wind is from the southwest in summer and northeast in winter at an average speed of 10 mi (16 km) per hour. During the hurricane season (June through September), torrential rainfall may accompany these storms with winds greater than 75 mi (121 km) per hour. The average relative humidity is 62 percent (%). The climate summary in Table 2-1 includes data recorded by the Southeast Regional Climate Center at Norfolk International Airport from 1946 to April 2012.

Table 2-1. Weather Data Recorded at Norfolk International Airport (1946–2012).

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Average Max Temp (°F)	48.9	51.0	58.3	68.2	75.9	83.6	87.4	85.6	80.0	70.3	61.4	52.4	68.6
Average Min Temp (°F)	32.6	33.5	40.2	48.5	57.6	66.2	70.9	70.1	64.8	53.6	43.8	35.7	51.5
Mean Average Temp (°F)	40.8	42.3	49.2	58.4	66.7	74.9	79.1	77.9	72.4	62.0	52.6	44.0	60.0
Average Precip. (in.)	3.49	3.14	3.65	3.12	3.62	3.88	5.37	5.48	4.49	3.24	3.06	3.14	45.68

Sources: Southeast Regional Climate Center 2012 and 2012b

*Data for 2012 included in the averages includes data available through 30 April 2012.

2.1.1 Climate Change

DoD Manual 4715.03 requires the Navy to consider climate change in the development of INRMPS to help mitigate impacts on military installations. Information that must be considered when updating climate change information in INRMPS include:

- historical regional trends and projections of future climate or sea level rise relevant to the region;
- information developed for other purposes (e.g. facilities risk assessments) that NR personnel can use to assess climate change impacts or adaptation strategies;
- discussion of sustainability in the context of climate change in the management strategies section, which should support, at a minimum, the development and updating of vulnerability assessments (identified in the INRMP and INRMP project table to ensure allocation of funding);
- information from regional collaborations to develop vulnerability assessments and adaptation strategies; and
- collaboration with DoD mission leads for comprehensive incorporation of training and test vulnerabilities related to climate change (DoD 2013).

In 2009, the U.S. Global Climate Research Program released its *Second National Climate Assessment*, which was written under the authority of the Federal Advisory Committee Act. The report identified several trends and project impacts related to climate change throughout the U.S. as well as within specific regions of the country. The annual average temperature in the southeastern U.S. has risen 2.0°F (1.1°C) since 1970 with the greatest seasonal change occurring in the winter months. There has been a 30% increase in precipitation during the fall over most the region and summer precipitation has decreased over almost the entire region. Additionally, the power of Atlantic hurricanes has increased since 1970, associated with an increase in sea surface temperature. Continued warming is projected, with a lower emission scenario projecting a 4.5°F (2.5°C) increase in average annual temperatures. Sea-level rise also is projected to increase, as will the associated threats of coastal flooding, shoreline retreat and higher intensity hurricanes (U.S. Global Change Research Program 2009).

Impacts due to climate change include more heat-related illness, declines in forest growth and agricultural crop production, declines in cattle production, increased buckling of pavements and railways, and reduced oxygen levels in streams and lakes causing fish kills and declines in aquatic species diversity. The report indicates that sea-level rise and increases in hurricane intensity will be among the most serious consequences of climate change, especially for low-lying areas along the Atlantic coast (U.S. Global Change Research Program 2009).

2.2 PHYSIOGRAPHY AND SOILS

NASO DNA is located in Virginia's outer Atlantic Coastal Plain physiographic province. This physiographic province is characterized as flat with low relief and elevations of 0–60 ft (0–18 m) above mean sea level (msl). Elevations at NASO DNA range from sea level along the beaches to approximately 20 ft (6 m) above msl on the tallest dunes (Figure 2-1). The largest portion of the Installation lies in a low basin behind the primary and secondary dunes and has an elevation of less than 5 ft (2 m) above msl.

*A list of hydric soils for Virginia is available on the USDA NRCS website:
<http://soils.usda.gov/use/hydric>.*



Figure 2-1. Elevation Contours of NASO DNA.

The USDA NRCS (formerly the Soil Conservation Service) prepared a soil survey report for Virginia Beach in 1985. The survey indicates that approximately half of the soils on NASO DNA have properties that severely constrain development. These restrictive soils include the Newhan-Duckston-Corolla association of the beaches and dunes and the very poorly drained, flood-prone Backbay-Nawney association in the marshes and swamps. The hydric soils at NASO DNA are Acredale silt loam, Backbay mucky peat, Chapanoke silt loam, Duckston fine sand, Nawney silt loam, Nimmo loam, and Tomotley loam (USDA NRCS 2009b). Hydric soils are soils that form under conditions of saturation, flooding, or ponding that last long enough during the growing season to develop anaerobic conditions in the upper part and may indicate the presence of a wetland. Fifty-nine (59%) of the soils at NASO DNA are hydric. Other soil types mapped at NASO DNA are Udorthents and Urban Land. Udorthents are soils that have been disturbed by excavation and grading and have had top soils removed. They generally occur in areas of low intensity development. Urban Land occurs in developed areas where more than 80% of the land is covered by impermeable surface such as concrete, asphalt, or buildings. Five (5) % of the soils at NASO DNA are mapped as Udorthents and 11 % are Urban Land.

The Munden and Tetotum soils are considered prime farmland. The Acredale, Augusta, Chapanoke, Dragston, Nimmo, and Tomotley soils are considered prime farmland if drained (USDA NRCS 2011). These soils, with the exception of previously built areas, are regulated under the Farmland Protection Policy Act (7 USC §4201 et seq.), which restricts actions of the federal government that would cause the irreversible conversion of prime and unique farmland to nonagricultural uses. Only a very small portion of the area at NASO DNA (2%) is prime farmland; however, 30% of the area at NASO DNA is considered prime farmland if drained (USDA NRCS 2011). Table 2-2 provides a brief description of some of the major soil characteristics associated with the Installation, and Figure 2-2 shows their location.

2.3 HYDROLOGY

2.3.1 Surface Water

Surface water that occurs on NASO DNA includes a small portion (0.5 ac [0.2 ha]) of Lake Christine, which lies almost entirely within the State Military Reservation to the north of the Installation; approximately 51 ac (21 ha) of Redwing Lake; Sadler Pond, located within the central support area; and several small ponds such as Lotus Pond and Lilly Pond, and areas of open water, which are associated with the extensive marsh system. Areas of Lovetts Marsh and a wetland mitigation site in the northern portion of the Installation may be seasonally flooded and have minimal areas of surface water. Sadler Pond (4.5 ac [1.8 ha]) was excavated in 1969 as part of the Installation picnic area to provide recreational fishing at NASO DNA. Redwing Lake is extremely shallow, and is turbid and eutrophic (Swihart 1982). Redwing Lake and adjacent Lake Tecumseh are connected through an open drainage channel and are connected to Back Bay, which is part of the USFWS National Wildlife Refuge System, through open canal. Lake Tecumseh (also known as Brinson Lake Inlet) forms the southern boundary of NASO DNA but is not a part of Navy property. In 2011, the Hampton Roads Sanitation Division (who owns Lake Tecumseh) in cooperation with the USFWS, installed a weir on Lake Tecumseh to help control sedimentation from the lake into Back Bay.

Existing Conditions

Table 2-2. General Characteristics of NASO DNA Soils.

Soil Series	Soil Type #	Acres	General Description	Drainage Class	Erosion Potential
Hydric Soils					
Acredale silt loam	1	278	Deep, nearly level (0-2% slopes), on broad inland flats, medium fertility, high available water, slow permeability, very slow surface runoff	Poorly drained	Slight
Backbay mucky peat	5	114	Deep, nearly level (less than 1% slope), in broad brackish marshes adjacent to Back Bay, moderate or slow permeability, high available (brackish) water, very slow surface runoff	Very poorly drained	–
Beaches	6	80	Long narrow areas adjacent to the Atlantic Ocean, mostly sandy material deposited by wave action and flooded daily by tides, 0-10% slopes	–	Wind and wave action
Chapanoke silt loam	8	<1	Deep, nearly level (0-2% slopes), on marine terraces on coastal plains, high available water, moderately high water movement, not flooded or ponded	Somewhat poorly drained	–
Corolla-Duckston fine sands	11	26	Deep, nearly level to gently sloping (0-4% slopes), on low flats and in shallow depressions between dunes, very low available water, very rapid permeability, slow surface runoff	Moderately well drained to poorly drained	Wind and water
Duckston fine sand	15	245	Deep, nearly level (0-2% slopes), in shallow depressions between dunes and on low flats between dunes and marshes, low fertility, low available water, very rapid permeability, slow surface runoff	Poorly drained	Slight
Nawney silt loam	21	220	Deep, nearly level (less than 1% slopes), on floodplains and in drainageways, low fertility, moderate available water, moderate permeability, very slow surface runoff	Very poorly drained	Low
Nimmo loam	24	41	Deep, nearly level (0-2% slopes), on broad inland flats, low fertility, moderate available water, moderate permeability, slow surface runoff	Poorly drained	Low
Tetotum loam	36	3	Deep, nearly level (0-2% slopes), on low ridges and side slopes, low fertility, moderate available water, moderate permeability, slow surface runoff	Moderately well drained	Slight
Tomotley loam	38	123	Deep, nearly level on broad inland flats and in shallow drainageways, low fertility, moderate available water, moderate permeability, slow surface runoff	Poorly drained	Slight
Nonhydric Soils					

Existing Conditions

Soil Series	Soil Type #	Acres	General Description	Drainage Class	Erosion Potential
Augusta loam	3	24	Deep, nearly level (0-2% slope), on low inland ridges and side slopes, low fertility, moderate available water, moderate permeability, slow surface runoff	Somewhat poorly drained	Slight
Corolla fine sand	10	10	Deep, nearly level to gently sloping (0-4% slopes), on low coastal dunes and flats, low fertility, low available water, rapid permeability, slow surface runoff	Moderately well to somewhat poorly drained	Moderate by wind
Dragston fine sandy loam	13	57	Deep, nearly level (0-2% slopes), on low ridges and side slopes, low fertility, moderate available water, moderately rapid permeability, slow surface runoff	Somewhat poorly drained	Slight
Munden fine sandy loam	19	30	Deep, nearly level (0-2% slopes), on low inland ridges and side slopes, low fertility, moderate available water, moderately rapid permeability, slow surface runoff	Moderately well drained	Slight
Newhan fine sand	22E	136	Deep, undulating to steep (2-30% slopes), on grass and shrub-covered high sand dunes in coastal areas, low fertility, very low available water, very rapid permeability, slow surface runoff	Excessively drained	Severe by wind
Newhan-Corolla fine sands	23C	46	Deep soils in coastal areas mostly behind the primary foredune (0-15% slopes); Newhan soils occur on low sand dunes and Corolla soils on flats and low knolls	Moderately well drained to somewhat poorly drained	Severe
Udorthents, loamy	40	92	Deep soil material altered by excavation or covered by earthy fill found mostly in and near urban areas and canals, available water and permeability variable, rapid surface runoff, 0-25% slopes	Moderately well drained	Severe on steep unvegetated slopes
Urban Land	42	202	More than 80% of the surface is covered by parking lots, buildings, and other impermeable surfaces, Udorthents included in this unit, 0-2% slopes	Needs site determination	Needs site determination

Source: USDA NRCS 2009b

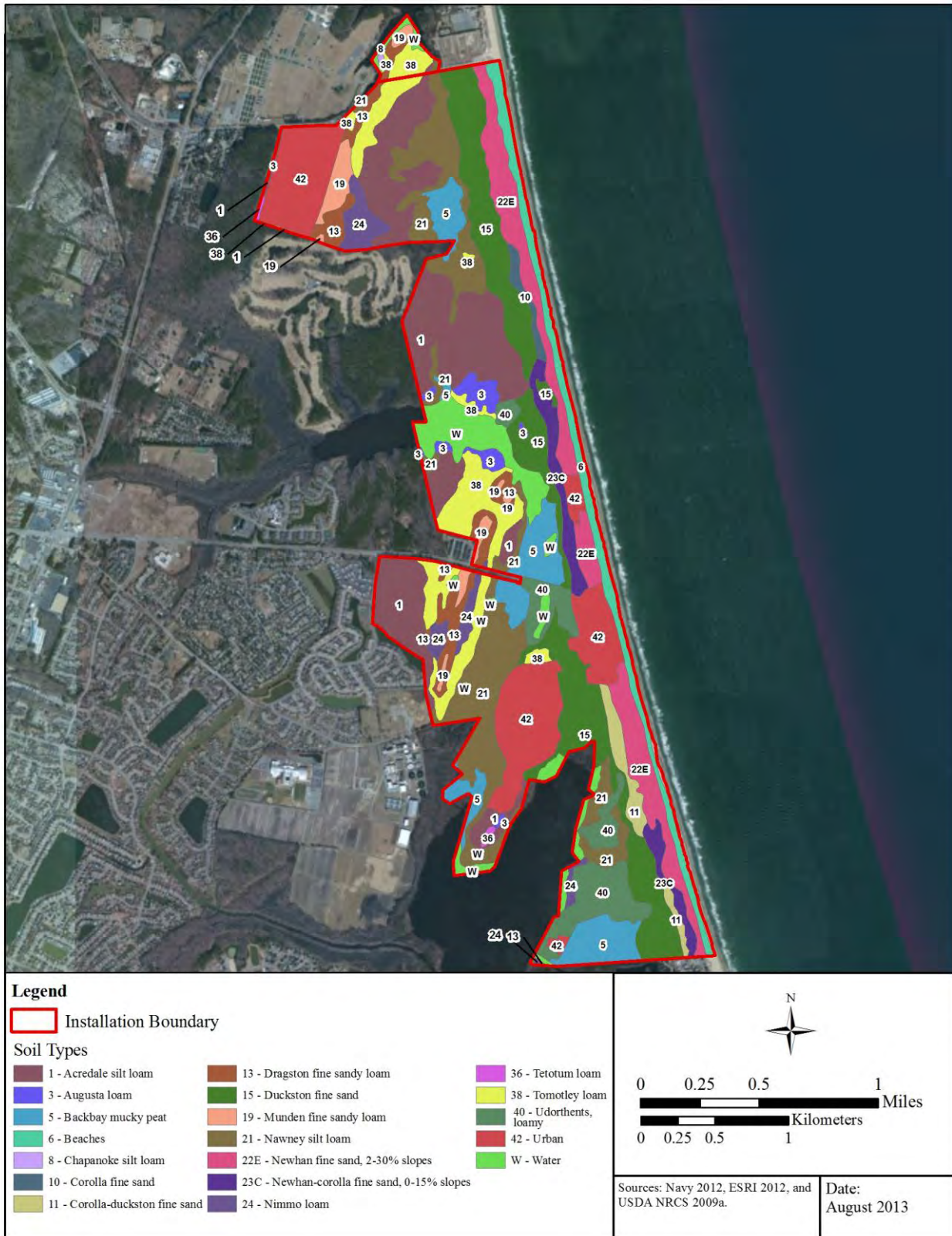


Figure 2-2. Soils of NASO DNA.

The surface waters of NASO DNA are joined to waterbodies located off-site by a number of drainage canals. Surface water flows from the northern portion of NASO DNA to the north into Lake Wesley and Rudee Inlet. Surface waters located within the southern portion of NASO DNA flow to the south into Black Gut, Back Bay, North Bay, and Shipps Bay. Surface water and other water resources at NASO DNA are shown in Figure 2-3.

2.3.2 Groundwater

The shallow aquifer system at Virginia Beach is composed of the Yorktown-Eastover aquifer, the Yorktown confining unit, and the Columbia aquifer. The Yorktown-Eastover aquifer is the principal aquifer in the Atlantic Coastal Plain. This aquifer includes the predominantly sandy deposits of the Yorktown Formation and the upper part of the Eastover Formation. In Virginia Beach, the Yorktown-Eastover aquifer generally lies 90 ft (27 m) below the surface and ranges from 100–280 ft (30–85 m) thick (Smith and Harlow 2002). Freshwater is limited to the upper part of the aquifer, and in some areas, saltwater intrusion has occurred. Other potential contaminants of the shallow aquifer come from the downward migration of nitrates, pesticides, fertilizers, and other toxic substances.

The Columbia aquifer is a water table aquifer (or unconfined aquifer, which consists of the saturated portions of the upper soil profile located above a confining layer) and includes predominantly sandy surficial deposits that lie above the Yorktown confining unit. It generally extends from the ground surface to about 20 ft (6 m) below msl, but the aquifer reaches a maximum thickness along the coast of the Atlantic Ocean in areas with large sand dunes (Smith and Harlow 2002). Groundwater tends to mound beneath the dunes from where it flows downward and outward toward tidal streams. The water table aquifer is vulnerable to contamination by various land uses and is generally used for irrigation or for heat pumps (Smith and Harlow 2002).

Because of concerns about the groundwater withdrawals and declining water levels in southeastern Virginia, the entire region, including the City of Virginia Beach, was designated a Groundwater Management Area by the state in 1976 (Smith and Harlow 2002). The Eastern Groundwater Management Area includes a portion or all of 13 counties and 11 cities located around the Chesapeake Bay and the Potomac River in the Coastal Plain Province, although more than 10 counties are currently being considered for inclusion. An additional Groundwater Management Area exists on the northeastern shore of Chesapeake Bay that includes two counties. In Virginia's two Groundwater Management Areas, the VDEQ has the authority to deny or limit requests for large groundwater withdrawals. Pursuant to the Groundwater Management Act of 1992, state permits are required for withdrawal of more than 300,000 gallons/month (1,135,624 liters/month) from wells in a designated Groundwater Management Area (VDEQ 2012).

Potable water for NASO DNA, supplied by the City of Norfolk, comes primarily from surface water resources including Lake Prince in Suffolk, Virginia and Lake Gaston on the border of Virginia and North Carolina (City of Virginia Beach 2012).



Figure 2-3. Water Resources of NASO DNA.

2.3.3 Watersheds

A majority of NASO DNA lies within the Back Bay Watershed unit of the Southern Watersheds Area. The Southern Watersheds Area, as designated by the Virginia Beach Planning Department, is a collective of the North Landing River, Northwest River, and Back Bay Watersheds in Virginia Beach and Chesapeake (City of Virginia Beach 2003). It covers approximately 325 square miles (mi²) (842 square kilometers [km²]) and is bordered by the Atlantic Ocean on the east, the Great Dismal Swamp on the west, and the North Carolina border on the south. The Southern Watersheds Area contains extensive wetlands, including a variety of rare swamp, pocosin, and marsh communities that drain into Albemarle-Pamlico Sound (VDEQ 2003). The Back Bay Watershed unit supports eight rare ecological communities and a large concentration of rare species and is an important wintering ground for a number of game waterfowl (Family Anatidae), neotropical migratory songbirds and migrating shorebirds. Three of the eight rare ecological community types are associated with the Installation and are described in Section 2.6.3. Rare, threatened, and endangered species associated with the Installation are described in Sections 2.6.1 (plants) and 2.6.2 (fish and wildlife). A small portion of the northern section of the Installation drains into Lake Christine, which drains into Rudee Inlet. This portion of the Installation is located within the Rudee Inlet/Owl's Creek Watershed (Figure 2-3).

2.3.4 Floodplains

The Federal Emergency Management Agency (FEMA) defines the 100-year flood as an area that has a 1% chance (1 year out of every 100 years) of being equaled or exceeded in any given year and is the standard used by federal agencies for floodplain management. The 500-year floodplain is an area that has a 0.2% chance (1 year out of every 500 years) of a flood in a year. Since floodplains cover much of NASO DNA, many buildings, infrastructure, and developed areas occur within floodplains.

The 2013 FEMA flood insurance rate maps (FEMA 2013) indicate a large portion of NASO DNA lies within the 100-year or 500-year floodplains associated with Redwing Lake, and the extensive network of wetlands and drainages that are present (Figure 2-3). A 100-year floodplain also is associated with Lake Tecumseh, which lies adjacent to the NASO DNA boundary to the southeast.

2.3.5 Wetlands

Wetlands delineations were recently completed at NASO DNA, for which preliminary jurisdictional determinations were received in 2011 and 2012 (Appendix E). Wetland delineations were completed pursuant to methods outlines in the 1987 Corps of Engineers Wetland Delineation Manual (1987 Manual) and *The Regional Supplement to the Wetland Delineation Manual: Atlantic and Gulf Coastal Plan Region*. The delineations provide the locations of aquatic resources under the potential jurisdiction of the USACE. After field and desktop review of the jurisdictional determination request package, the USACE has issued a preliminary jurisdictional determination in regards to these delineations in a letter dated 30 January 2012. Under the preliminary jurisdictional terms all delineated wetlands and waterbodies (Figure 2-3) are assumed jurisdictional and regulated by the CWA. Activities involving the discharge of dredged or fill material, including those associated with mechanized land clearing,

into these areas would require a USACE permit, Virginia Water Protection Permit from the VDEQ, and/or a permit from the VMRC. The preliminary jurisdictional determination may be used with USACE permit applications if impacts to these aquatic resources cannot be avoided.

Wetlands surveys have resulted in preliminary jurisdictional determinations for all of NASO DNA, with the exception of the area south of the fenceline that has not been subject to a wetland delineation, but is known to contain wetlands. These wetland delineations identified approximately 922.0 ac (373.0 ha) of wetland habitats at NASO DNA, and Appendix E includes the wetland maps and summary tables for these wetland delineations. Of the 922.0 ac (373.0 ha) of wetland habitat that have been mapped at NASO DNA, approximately 254.5 ac (102.9 ha) of wetlands are located at the northern portion of NASO DNA, and approximately 667.5 ac (270.1 ha) of wetlands are located at the southern portion of NASO DNA.

Delineated wetlands at NASO DNA were classified according to the Cowardin classification of wetlands and deepwater habitats (Cowardin et al. 1979), which groups wetlands into five major systems: marine, estuarine, riverine, lacustrine, and palustrine. Marine systems consist of the open ocean and its associated coastline. Estuarine systems are those that are periodically flooded with tidally influenced salty or brackish waters and have salinity greater than 0.5 parts per thousand (ppt). The lacustrine system includes areas of open water that are greater than 20 ac (8 ha) or deeper than 6.6 ft (2.0 m) at low water. Palustrine systems include nontidal vegetated wetlands or open freshwater habitats less than 20 ac (8 ha) or 6.6 ft (2.0 m) deep that have salinity less than 0.5 ppt. Riverine systems include natural and artificially created wetlands that are contained within a channel and are not dominated by persistent vegetation nor have salinity greater than 0.5 ppt. No riverine wetlands have been delineated at NASO DNA. Appendix E provides detailed maps and tables of the wetland types, and Figure 2-3 identifies the delineated wetlands identified for the Installation.

2.3.6 Nearshore Environment

The nearshore environment is generally defined as the area encompassing the transition from the subtidal marine habitats to associated upland systems. Nearshore environments include subaqueous lands, intertidal zones, and riparian habitats. Significant stressors to the nearshore environment include sea level rise, shoreline hardening, land development, habitat modification, and nutrient enhancement (USEPA 1998).

The Navy defines nearshore environments as: (1) all submerged lands titled to the Navy; and (2) all other submerged lands that are adjacent to installations that extend from the mean high water level, offshore to the boundary of any security areas controlled by the Navy. Security control areas for a shore installation are those waters that abut the installation shoreline that are under access control by the Installation CO or a tenant command.

A majority of the nearshore environment of NASO DNA is associated with the Atlantic Ocean and Back Bay watersheds, with a small area located in the northern portion of the Installation within the nearshore environments of Rudee Inlet/Owl's Creek Watershed (Figure 2-3). Section 2.3.3 provides a description of the Back Bay watershed, and Section 3.2.3 provides information on watershed protection at NASO DNA. The NASO DNA nearshore environment encompasses important habitat such as wetlands and beach and dune habitats, which are vital stopover areas for migrating and wintering bird species. A study of the nearshore environment is scheduled to

be funded in FY 2015 that will generate detailed data of the flora, fauna, and ecological community types associated with the NASO DNA nearshore environment, and will focus on in-water species and habitats.

CFR Part 334 established danger zones and restricted areas for locations along the Atlantic seaboard, including designated areas located off the coast of NASO DNA. The purpose of this regulation is to:

- (a) Prescribe procedures for establishing, amending and disestablishing danger zones and restricted areas;
- (b) List the specific danger zones and restricted areas and their boundaries; and
- (c) Prescribe specific requirements, access limitations and controlled activities within the danger zones and restricted areas.

Sections of CFR Part 334 that are applicable to NASO DNA include §334.380 (Atlantic Ocean south of entrance to Chesapeake Bay off Dam Neck, Virginia; naval firing range); §334.390 (Atlantic Ocean south of entrance to Chesapeake Bay; firing range); and §334.400 (Atlantic Ocean south of entrance to Chesapeake Bay off Camp Pendleton, Virginia; naval restricted area) (Figure 2-3).

The NASO DNA danger zone identified in §334.380 includes all of the water within a sector extending seaward a distance of 7,500 yards between radial lines bearing 35° true and 92° true, respectively, from a point on the shore at latitude 36°47'33" north, longitude 75°58'23" west. The NASO DNA danger zone identified in §334.390 includes a section extending seaward for a distance of 12,000 yards between two radial lines bearing 030° true and 083° true, respectively, from a point on shore at latitude 36°46'48" north, longitude 75°57'24" west; and an adjacent sector extending seaward for a distance of 15 nautical miles between two radial lines bearing 083° true and 150° true, respectively, from the same shore position. Vessels in these areas are instructed to proceed with caution and shall remain therein no longer than necessary for purpose of transit. When firing is in progress during daylight hours, red flags are displayed at conspicuous locations on the beach. When firing is in progress during periods of darkness, red flashing lights are displayed from conspicuous locations, which are visible from the water a minimum distance of four (4) nautical miles. If any vessel is observed within the danger zone firing on the ranges is suspended until the area is observed to be clear of vessels. Lookout posts are manned by the activity or agency operating the firing range at Fleet Combat Center. After darkness, night vision systems are utilized by lookouts to aid in locating vessels transiting the area. During periods of low visibility which would prevent the recognition of a vessel (to a distance of 7,500 yards) which is properly displaying navigational lights, or which would preclude a vessel from observing the red range flags or lights, no firing is permitting on the ranges (U.S. Government Printing Office 2014). These two regulations are enforced by the NASO DNA Fleet Combat Training Center CO, and other such agencies as he/she may designate.

The NASO DNA restricted area identified in §334.400 includes the area beginning at a point on the shore at (former) Camp Pendleton at latitude 36°48'19" north, longitude 75°57'49" west;

thence easterly 200 yards to latitude 36°48'20" north, longitude 75°57'42" west; thence northerly 400 yards to latitude 36°48'32" north, longitude 75°57'45" west; thence westerly 200 yards to latitude 36°48'31" north, longitude 75°57'53" west; and thence southerly 400 yards along the shore to the point of beginning. Persons or vessels, other than those vessels owned and operated by the U.S. shall not enter the area except by permission of the JEB Little Creek CO, Norfolk, Virginia. This regulation is enforced by JEB Little Creek CO, and such agencies as he may designate.

2.3.7 Wetlands Mitigation and Restoration

Several wetland mitigation and restoration efforts have been undertaken at NASO DNA, including:

- Establishment of a 13.2-ac (5.3-ha) mitigation site in the early 1990s as compensation for wetland losses resulting from construction of enlisted personnel housing and the operator's specialist "A" facility. This mitigation site adjoins a preexisting emergent marsh located on the north side of Redwing Lake. Monitoring completed at this mitigation site indicates the site is developing into a complex of emergent and forested wetland habitats with areas of open water.
- Creation of 0.1 ac (0.05 ha) of vegetated drainage ditch in 1991 adjacent to existing wetlands located in the northern and western areas of the Installation to satisfy mitigation requirements associated with the construction of the medical/dental center. An additional 0.07 ac (0.03 ha) of drainage ditch were created in 1991 to satisfy mitigation requirements associated with construction of the Naval Special Warfare Development Group P-335 auxiliary facilities.
- Establishment of a 2.4-ac (0.98-ha) mitigation site in 1994 in the northern portion of NASO DNA as compensation for impacts to wetlands disturbed by construction of the MACS 24 radar compound. Mitigation actions consisted of removing fill material and recontouring a previously disturbed wetland site that had been used for sandblast disposal. The site was monitored for three years to meet permit requirements and to ensure that mitigation goals were achieved (Navy 1998b).
- Establishment of approximately 5.1 ac (2.1 ha) of wetlands (commonly referred to as the Lovetts Marsh mitigation site) in 1996 to satisfy mitigation requirements associated with construction of the Naval Special Warfare Development Group's operations facilities, which resulted in impacts to a portion of wetlands located north of Lovetts Marsh. Lovetts Marsh was historically an open freshwater marsh, but was invaded by red maple (*Acer rubrum*) as a result of extensive alteration of drainage ditches, which altered the natural hydrologic regime (Buhlmann et al. 1992). As part of mitigation requirements a water control weir was installed. Post-construction restoration monitoring determined that the constructed weir was insufficient to restore the historical native habitat, as documented by the continued hardwood invasion. In 2001, the existing weir was modified with a flashboard riser type of water control structure to increase the flooding elevation (Navy 2001a). Subsequent management included maintaining water levels at 3.5 ft (1.1 m) for two years to kill the existing hardwoods. When adequate control is achieved, the water level may be drawn down in the growing season to stimulate

reproduction of emergent marsh vegetation. Monitoring is ongoing to determine when hardwood control is achieved and to assess the need for additional manipulation of water levels to achieve the desired restoration results.

- Preservation of 7 ac (3 ha) of wetlands in 2003 at a site located on Navy land south of the main gate off of Dam Neck Boulevard as part of wetland mitigation requirements associated with expansion of the NAS Oceana golf course.

Additional acreage that could be used for wetland mitigation is located directly southwest of the main gate of Dam Neck Boulevard. Wetland restoration or creation projects could be accomplished in this area by plugging one or two of the main drainage ditches to allow the hydrology of the site to return to pre-disturbance conditions.

2.4 FLORA

NASO DNA is located in an ecoregion classified as the Virginian Barrier Islands and Coastal Marshes, which is part of the Middle Atlantic Coastal Plain ecoregion. The Middle Atlantic Coastal Plain ecoregion is a low, nearly flat plain, with many swampy or marshy areas that extend northeast from Georgia to New Jersey. The Virginian Barrier Islands and Coastal Marshes ecoregion is characterized by beaches, dunes, low terraces, beach ridges, and barrier islands that are fringed by lagoons, bays, tidal salt marshes, mudflats, tidal channels, and ocean. This ecoregion is composed of mostly northern prairie cordgrass (*Spartina pectinata*) and unwooded dunes with hickory-pine forest occurring in better drained, higher areas (Bailey 1995).

Other than the developed areas associated with the MACS 24 compound and the explosives test facility, which comprise about 21 ac (9 ha), the northern portion of NASO DNA remains largely undeveloped and is dominated by forested wetlands. In the northern portion of the Installation hardwood forests (145 ac [59 ha]) are most abundant, followed by areas of mixed hardwood/pine (53 ac [21 ha]) and pine/hardwood (45 ac [18 ha]). Planted pine occurs on about 23 ac [9 ha]. The beaches and dunes complex occupies 71 ac (29 ha), and very small amounts of marsh (5 ac [2 ha]) and open water (2 ac [1 ha]) occur.

In the southern portion of NASO DNA a large portion (approximately 386 ac [156 ha]) of the Installation has been developed and now has an urban landscape that consists of impermeable surface, mowed lawn, shade trees, and ornamental trees and shrubs. Most of the remaining landscape has forested wetlands that are dominated by a mix of hardwood species (181 ac [73 ha]) or a mix of pine and hardwood (121 ac [49 ha] pine/hardwood and 116 ac [47 ha] hardwood/pine). Nonforested communities in the southern portion of NASO DNA include marshes (70 ac [28 ha]), which are equivalent to the palustrine emergent and scrub-shrub wetland classifications, and fallow agricultural fields (68 ac [28 ha]).

A project to develop a forest inventory, which will include Fire Loading information, will be conducted in 2013–2015 at NASO DNA. The results of this inventory will be included in future INRMP updates and in Appendix H once available.

A number of coastal maritime communities also occur at NASO DNA within the beaches and dunes system. The dune communities include beaches and foredunes, maritime dune woodlands,

maritime evergreen forests, maritime dune grasslands, maritime scrub, and interdune ponds. A primary and secondary dune delineation was completed in 2013. A copy of the final report will be included in Appendix H when available.

A cumulative list of plant species encountered during vegetation surveys at NASO DNA is provided in Appendix I. Figure 2-4 illustrates the locations of these vegetative communities at the Installation and Table 2-3 provides a summary of vegetative community acreages.

Table 2-3. Vegetative and Other Communities at NASO DNA.

Community Type	Acres ¹
Urban/Developed	407
Hardwood	326
Beaches and Dunes	277
Pine	176
Hardwood/Pine	170
Pine/Hardwood	166
Marsh	75
Open Water	72
Early Successional (Old Field)	68
Total	1,737

¹ This table does not include areas excluded from the original natural resources survey (Buhlmann et al. 1992).

Areas not coded as a vegetative community on Figure 2-4 were not included in the original natural resources survey (Buhlmann et al. 1992) and are not included in Table 2-3. A Vegetative Community Characterization Mapping survey of NASO DNA is scheduled to be conducted in July–October 2014. Vegetation plot data will be collected and communities will be classified according to the U.S. National Vegetation Classification Standard. Survey results will be included in Appendix H once available. An overlay of the Installation boundary with National Classification NatureServe GIS data in 2011 identified the following ecosystems that may be present: Northern Atlantic Coastal Plain Maritime Forest; Southern Atlantic Coastal Plain Dune and Maritime Grassland; Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh; Northern Atlantic Coastal Plain Tidal Salt Marsh; Northern Atlantic Coastal Plain Dune and Swale; Marine Nearshore; and Central/Southern Atlantic Coastal Plain Nonriverine Swamp and Wet Hardwood Forest.

A description of the ecological communities that occur at NASO DNA follows. Rare ecological communities that occur at the Installation are discussed in Section 2.6.3.

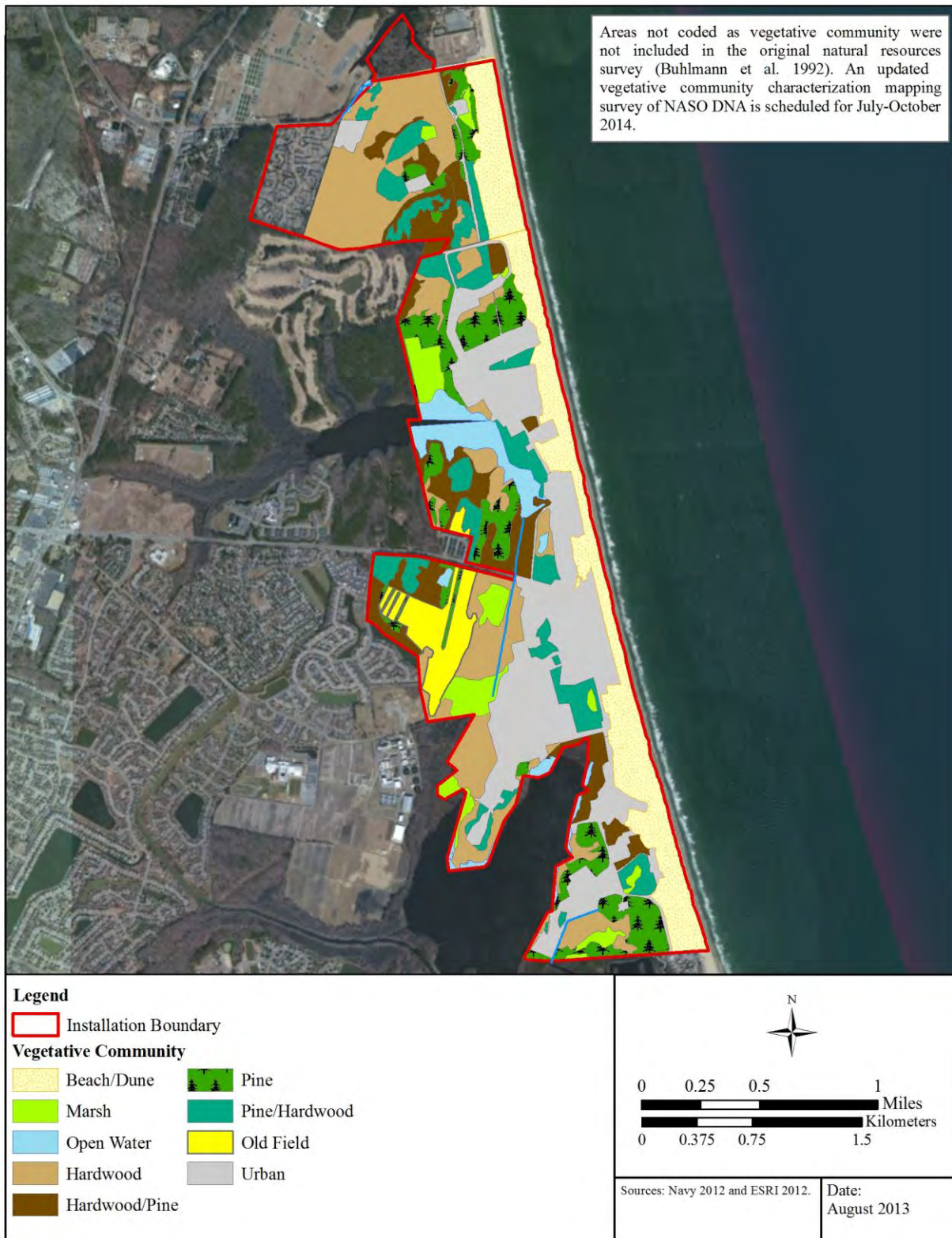


Figure 2-4. Vegetative Communities of NASO DNA.

2.4.1 Beach and Foredune Communities

The upper limit of the beach is marked by flotsam deposited by storm-lashed surf and spring tides. Fragments of vegetation, driftwood, and other debris form the wrack line. No large plants have adapted to the beach community; however, marine phytoplankton are abundant in the subtidal and intertidal portions of sand beaches. The beach of NASO DNA is 4.0 mi (6.4 km) long and covers approximately 277 ac (112 ha). Foredune vegetation consists of plants that are adapted to the harsh conditions, including coastal panic grass (*Panicum amarulum*), sea oats (*Uniola paniculata*), American sea rocket (*Cakile edentula*), and bushy seaside tansy (*Borrchia frutescens*). A primary and secondary dune delineation was completed at NASO DNA in 2013. The final report and maps will be included in Appendix H when available.

2.4.2 Maritime Dune Woodlands

Dune woodlands form the stable leeward side of the dunes and are generally well vegetated. Live oak (*Quercus virginiana*) is the dominant tree species although other trees such as bluejack oak (*Q. incana*) and loblolly pine (*Pinus taeda*) may be present. Black cherry (*Prunus serotina*), sassafras (*Sassafras albidum*), and American holly (*Ilex opaca*) often occur as small tree or shrub species. Wax myrtle (*Morella cerifera*), redbay (*Persea borbonia*), and winged sumac (*Rhus copallinum*) are shrub species frequently found in this community, and greenbrier (*Smilax* spp.), eastern poison ivy (*Toxicodendron radicans*), and muscadine grape (*Vitis rotundifolia*) are common vine species.

2.4.3 Maritime Evergreen Forests

Maritime evergreen forests develop on stabilized dunes located behind foredunes that are large enough to provide sufficient protection from storm exposure. Maritime evergreen forests represent the last phase of vegetative succession on dunes. It is an upland, xeric-to-mesic community that is well drained to excessively well drained and subject to moderate-to-light salt spray. Live oak and loblolly pine are the dominant tree species. Associated trees include black cherry, sassafras, southern red oak (*Quercus falcata*), and turkey oak (*Q. laevis*). American holly and wax myrtle dominate the understory. Highbush blueberry (*Vaccinium corymbosum*), redbay, and winged sumac are shrub species frequently found. Greenbrier, eastern poison ivy, evening trumpetflower (*Gelsemium sempervirens*), Virginia creeper (*Parthenocissus quinquefolia*), and muscadine grape are common vine species. Ground cover is sparse, consisting of scattered herbaceous species such as narrowleaf silkgrass (*Pityopsis graminifolia*), longbranch frostweed (*Helianthemum canadense*), and seedlings of a number of overstory and midstory trees.

2.4.4 Maritime Dune Grasslands

Maritime dune grasslands occur along primary dunes and in the dunes and swales inland of the primary dunes. Salt spray limits the vegetation to salt-tolerant species including coastal panic grass, sea oats, American beachgrass (*Ammophila breviligulata*), and American sea rocket. American sea rocket is a common annual plant that is among the first species to flower and set seed. Although annual plants make a minimal direct contribution to dune building and stabilization, they hold the sand long enough for perennial plants to get established and, through their decomposition, provide nutrients needed by other species. Perennial grasses contribute

significantly to dune building and stabilization. Vertical rhizomes, as deep as 30 ft (9.1 m) below the top of the dune, may develop in some grass species in response to sand burial. Coastal panic grass has a deep fibrous root system that makes it suitable for dune stabilization. Seaside goldenrod (*Solidago sempervirens*) is a common non-grass species of the dune grasslands that is particularly important to migrating monarch butterflies (*Danaus plexippus*).

2.4.5 Maritime Scrub Communities

Maritime scrub communities occur in recently disturbed areas in the beaches and dunes area. Strong winds and salt spray have sculpted dense wedge-shaped canopies. The toxic effects of salt spray kills the tender terminal buds, but the more protected lateral buds survive and develop to form the characteristic wind-swept shape. Live oak and wax myrtle form impenetrable thickets that protect each individual plant from salt and wind damage. The shrub canopy height reaches only 15 ft (5 m). Vines such as eastern poison ivy, Virginia creeper, muscadine grape, and greenbrier intertwine with the shrubby vegetation.

2.4.6 Interdunal Wetlands

Interdunal wetlands are depressions in active or relict dunes that are permanently flooded to intermittently exposed by groundwater or rainwater. They are protected from salt spray and wind shear by adjacent dunes, and support a greater variety of plants and animals than the dry dunes. Except for precipitation, these wetlands are often the only source of freshwater in the coastal environment and support major groups of animals such as frogs, salamanders, water snakes, turtles, aquatic birds, and aquatic mammals. Amphibians, in particular, are directly dependent on the freshwater wetland habitat. Emergent aquatic vegetation that occurs in these communities includes several species of rushes (Family Juncaceae) and sedges (Family Cyperaceae), club mosses (*Lycopodiella* spp.), sphagnum moss (*Sphagnum* sp.), and other herbaceous species. Trees and shrubs associated with interdunal swales include red maple, black gum (*Nyssa sylvatica*), buttonbush (*Cephalanthus* sp.), and highbush blueberry. Maritime wet grasslands, maritime shrub swamps, and interdune ponds are specific community types of interdunal wetlands (Fleming and Patterson 2012).

2.4.7 Hardwood Forests

Much of the forested area at NASO DNA is forested wetland. The wettest of these sites are dominated by hardwood species such as bald cypress (*Taxodium distichum*), red maple, sweetgum (*Liquidambar styraciflua*), and black gum. Shrub species can include wax myrtle, highbush blueberry, and large gallberry (*Ilex coriacea*). Ground cover is generally sparse, consisting of a few scattered ferns except in areas with a giant cane (*Arundinaria gigantia*) cover.

2.4.8 Mixed Forests

Many of the inland forests have been ditched and consist of pine and mixed hardwoods. These habitats may be dominated by loblolly pine with red maple and sweetgum interspersed throughout. The understory includes red maple and sweetgum saplings, as well as wax myrtle, sweetbay (*Magnolia virginiana*), and redbay. Greenbrier, Japanese honeysuckle (*Lonicera japonica*) (an invasive species), and eastern poison ivy are prevalent vines.

2.4.9 Pine Forests

A number of stands dominated by loblolly pine also occur at NASO DNA. These stands were planted as part of reforestation efforts during the 1970s. They largely consist of dense monocultures of pine with very little shrub or herbaceous vegetation occurring in the shrub and herbaceous layers. A long row of longleaf pine was planted as a windrow along Pine Road prior to Navy acquisition of this area of the Installation. Longleaf pine is rare in the region and adds diversity as well as aesthetic value to the Installation flora.

2.4.10 Early Successional Habitat

The abandoned agricultural fields in the northern and southern portions of the Installation provide early successional (old field) habitat not found elsewhere at NASO DNA. The area has not been actively farmed since 1998, and a variety of grasses, forbs (broadleaf herbaceous species), trees, and shrubs now occupies the fields.

2.5 FAUNA

NASO DNA is located in the Virginia Barrier Islands and Coastal Marshes ecoregion. This ecoregion provides unique habitats for wildlife including several of Virginia's rarest birds and sea turtles that nest on the barrier island beaches (Bailey 1995). The diverse assemblage of forested, wetland, and coastal ecological communities at NASO DNA provides habitat that supports a wide variety of fauna.

Faunal surveys at the Installation have primarily consisted of observations made by VDCR-DNH during threatened and endangered species inventories (Buhlmann et al. 1992, Van Alstine et al. 2001, Evans and Belden 2010, and VDCR-DNH 1990) and incidental observations made by biologists during other field surveys (Navy 1998a and 1998b). Bird observations also have been made by individuals involved with the Back Bay Bird Club. A Monitoring Avian Survivorship and Productivity program also was conducted at NASO DNA between 1995 and 2003. The program used constant effort mist netting to provide additional information on land bird populations (Institute for Bird Populations 1999). Marine resources were assessed in a comprehensive marine resources assessment of the region (Navy 2003). An overview of survey results for each faunal group follows, and a list of fish and wildlife species compiled from these studies is in Appendix I. This section of the INRMP describes the general fauna associated with NASO DNA. Fauna associated with the Installation that are considered rare, threatened or endangered are described in Section 2.6.2 (Rare, Threatened, and Endangered Fish and Wildlife). Appendix I also includes a list of fish and wildlife species identified as Species of Greatest Conservation Need for the Mid-Atlantic Coastal Plain in the Virginia State Wildlife Action Plan (SWAP).

2.5.1 Mammals

A total of 19 mammal species have been observed at the Installation (Appendix I) (Buhlman et al. 1992, Evans and Belden 2010, Van Alstine et al. 2001, and VDCR-DNH 1990). Large and medium-sized mammals observed include whitetail deer, gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), nutria (*Myocastor coypus*), muskrat (*Ondatra zibethica*), Virginia

opossum (*Didelphis virginianus*), eastern gray squirrel (*Sciurus carolinensis*), and eastern cottontail (*Sylvilagus floridanus*). Smaller mammals captured in pitfall traps include least shrew (*Cryptotis parva*), southern short-tailed shrew (*Blarina carolinensis*), southeastern shrew (*Sorex longirostris longirostris*), eastern harvest mouse (*Reithrodontomys humulus*), white-footed mouse (*Peromyscus leucopus*), meadow vole (*Microtus pennsylvanicus*), woodland vole (*M. pinetorum*), pine vole (*M. pinetorum*), eastern mole (*Scalopus aquaticus*), and marsh rice rat (*Oryzomys palustris*). A complete list of mammal species observed at the Installation is provided in Appendix I.

Marsh rabbit (*Sylvilagus palustris*) and Pungo white-footed mouse (*Peromyscus leucopus easti*) are two rare mammal species that also occur, and these are discussed in Section 2.6.2 along with the other rare, threatened, and endangered mammals associated with the Installation. Nuisance species such as nutria and coyote (*Canis latrans*) are discussed in more detail in Section 3.12.1.

2.5.2 Birds

The avifaunal community at NASO DNA is diverse and reflects the wide variety of habitats available. A total of 171 species has been observed during various bird surveys conducted on the Installation (Appendix I). A bird monitoring study was completed at NASO DNA that included winter monitoring conducted in February 2013, breeding bird monitoring conducted in April and May 2013, summer monitoring conducted in June and July 2013, and fall monitoring conducted in September and October 2013 (Appendix H). Prior to conducting the survey, Navy, USFWS, VDGIF, USGS, VDCR-DNH, and NCWRC were consulted regarding appropriate field methods and necessary permits. A plan is currently being developed that follows the guidance and protocols of the DoD Coordinated Bird Monitoring Program. The plan will include a comprehensive list of bird species observed at NASO DNA and will be designed to facilitate repeat data collection efforts to maintain and update the list of bird species that occur at the Installation.

NASO DNA is located in the Atlantic migratory flyway and provides important stopover areas for neotropical migrants during spring and fall migration. The forested areas at NASO DNA serve as foraging and resting habitat for a number of species including black-throated blue warbler (*Dendroica caerulescens*) and blackpoll warbler (*Dendroica striata*). Forest-dwelling birds that stay through the summer and are known to nest on the Installation include eastern wood-pewee (*Contopus virens*), pine warbler (*Dendroica pinus*), brown thrasher (*Toxostoma rufum*), ovenbird (*Seiurus aurocapillus*), red-eyed vireo (*Vireo olivaceus*), white-eyed vireo (*V. griseus*), blue-gray gnatcatcher (*Polioptila caerulea*), and various woodpeckers (Family Picidae).

Familiar birds of open areas and urban settings include northern mockingbird (*Mimus polyglottos*), American robin (*Turdus migratorius*), northern cardinal (*Cardinalis cardinalis*), brown-headed cowbird (*Molothrus ater*), house sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), rock dove (pigeon) (*Columba livia*), mourning dove (*Zenaidura macroura*), purple martin (*Progne subis*), and European starling (*Sturnus vulgaris*).

Several birds of prey utilize various habitats at NASO DNA, including red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*B. lineatus*), merlin (*Falco aesalon*), sharp-shinned hawk

(*Accipiter velox*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), osprey (*Pandion haliaetus*), and bald eagle (*Haliaeetus leucocephalus*).

The shoreline and aquatic habitats at NASO DNA provide important bird habitats, and are used extensively by waterfowl, shorebirds, seabirds, and other waterbirds. Waterfowl known to occur at the Installation include several species of geese and a large number of ducks. Of these, only four, Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), wood duck (*Aix sponsa*), and American black duck (*Anas rubripes*), are known or are likely to nest at NASO DNA. The remainder are continental migrants that spend summers in the northern part of the continent and winter along the mid-Atlantic coast. Shorebirds known to occur at NASO DNA include sandpiper (*Actitis* spp. and *Calidris* spp.), sanderling (*Calidris alba*), plover (*Charadrius* spp. and *Pluvialis* spp.), and other shorebird species. As with waterfowl, most shorebird species use the Installation as a feeding area during migration to and from nesting areas in the far north. Killdeer (*Charadrius vociferous*) is the only shorebird known to nest on the Installation. Waterbirds that have been observed at the Installation include grebes (Family Podicipedidae), pelican (*Pelecanus occidentalis*), cormorant (*Phalacrocorax* spp.), herons and egrets (Family Ardeidae), loons (*Gavia* spp.), rails (Family Rallidae), and gulls and terns (Family Laridae). Common summer or permanent resident waterbirds that are known or likely to nest on the Installation include great blue heron (*Ardea herodias*), green heron (*Butorides virescens*), little blue heron (*Florida caerulea*), and a large number of gulls and terns.

Rare, threatened, and endangered birds associated with the Installation are discussed in Section 2.6.2. A list of Species of Greatest Conservation Need identified for the Mid-Atlantic Coastal Plain in the Virginia SWAP is included in Appendix I.

2.5.3 Herpetofauna

The extensive wetlands, lakes, and wooded areas at NASO DNA provide habitat for a number of reptile and amphibian species. A total of 14 amphibian and 23 reptile species have been observed at the Installation, including four salamanders, 10 frogs and toads, eight turtles, 11 snakes, and four lizards (Appendix I) (NAVFAC Mid-Atlantic 2013, Buhlmann et al. 1992, Evans and Belden 2010, Van Alstine et al. 2001, and VDCR-DNH 1990). Herpetofauna that occur in and around the freshwater lakes and inundated wetlands include turtles such as the red-eared slider (*Trachemys scripta* ssp. *elegans*), yellow-bellied slider (*T. s.* ssp. *scripta*), and eastern mud turtle (*Kinosternon subrubrum* ssp. *subrubrum*); frogs such as American bullfrog (*Lithobates catesbeiana*), northern green frog (*L. clamitans melanota*), and southern leopard frog (*L. sphenoccephalus*); and several snakes including northern water snake (*Nerodia sipedon sipedon*), brown water snake (*N. taxispilota*), eastern ribbon snake (*Thamnophis sauritus sauritus*), and eastern cottonmouth (*Agkistrodon piscivorus piscivorus*). Species occurring in forested areas adjacent to temporary or isolated wetlands include two species of salamanders, red-backed salamander (*Plethodon cinereus*) and Atlantic coastal slimy salamander (*P. chlorobryonis*); Cope's gray treefrog (*Hyla chrysocelis*); southern toad (*Anaxyrus terrestris*); Fowler's toad (*A. woodhousii*); and eastern box turtle (*Terrapene carolina*). Upland areas on the Installation are home to several other species of snakes, including eastern rat snake (*Elaphe obsoleta*) and eastern hognose snake (*Heterodon platirhinos*), and a number of lizards including common five-lined skink (*Eumeces fasciatus*), eastern fence lizard (*Sceloporus undulatus hyacinthinus*), and little brown skink (*Scincella lateralis*). In addition to the 40 species observed, 35 additional

herpetofaunal species have the potential to occur in habitat located at NASO DNA (NAVFAC Mid-Atlantic 2013). A complete list of herpetofauna known to occur at NASO DNA is provided in Appendix I.

The DoD Partners in Amphibian and Reptile Conservation program is currently updating amphibian and reptile species lists for the approximately 80 Navy installations that have INRMPs (NAVFAC Mid-Atlantic 2013). To date, Navy installations within the NAVFAC Field Engineering Command Washington, Mid-Atlantic, Mid-West, and Northwest areas of responsibility have been updated. Once all the updated species lists are completed, they will be entered into a database that will be stored on the Navy Environmental Portal (<https://eprportal.cnrc.navy.mil/eprwebnet/logon.aspx>). The database will serve to fill numerous needs in the community, as many installations lack an accurate and up-to-date list of amphibian and reptile species found therein. With data calls, INRMP updates, and other relevant planning documents needed to support Navy projects and missions, it is essential that the most accurate species occurrence data be available on which to base natural resources management decisions. This database was reviewed during the development of this INRMP update for NASO DNA and the species list provided in Appendix I reflects herpetofauna observations for the Installation obtained from this database.

Rare, threatened, and endangered herpetofauna associated with the Installation are discussed in Section 2.6.2.

2.5.4 Fish

The ichthyofauna of NASO DNA include a number of native coastal plain freshwater fish, such as gizzard shad (*Dorosoma cepedianum*), common carp (*Cyprinus carpio*), eastern mudminnow (*Umbra pygmaea*), brown bullhead (*Ictalurus nebulosus*), bowfin (*Amia calva*), black crappie (*Pomoxis nigromaculatus*), banded sunfish (*Enneacanthus obesus*), and bluespotted sunfish (*E. gloriosus*), as well as a number of sport fishes that have been introduced into Redwing Lake and Sadler Pond for recreational fishing. Introduced sport fish include largemouth bass (*Micropterus salmoides*), pumpkinseed (*Lepomis gibbosus*), and bluegill (*L. macrochirus*) (Galvez and Swihart 2000).

A large number of saltwater species also are known to occur in the coastal waters offshore of NASO DNA. Because the area is in a transition zone between temperate and subtropical regions, fish fauna is extremely diverse, with approximately 685 species known to occur (Navy 2003). The NOAA NMFS has designated essential fish habitat (EFH) for fish species of particular economic or ecological importance in the area. The Magnuson-Stevens Fishery Conservation and Management Act requires that EFH be identified for all fish which are federally managed. Federal agencies are required to consult with NMFS whenever a construction or funded project, permit, or other action may adversely affect EFH. There are currently 22 fish species for which the Mid-Atlantic Fishery Management Council has designated EFH (NOAA NMFS 2010). Fish species with designated EFH in the nearshore waters adjacent to NASO DNA are identified in Appendix I, and Appendix F contains a summary of EFH and general habitat parameters for federally managed fish species. The EFH information is provided for species that have the potential to occur in the vicinity of the NASO DNA nearshore environment, and not all fish species with EFH identified in Appendix F and Appendix I are known to occur at NASO DNA.

Fish surveys and habitat assessments of selected NASO DNA streams and ponds, including unnamed waterbodies, Redwing Lake, and Sadler Pond, are scheduled to be completed in 2014.

Rare, threatened, and endangered fish associated with the Installation are discussed in Section 2.6.2.

2.6 RARE, THREATENED, AND ENDANGERED SPECIES AND SIGNIFICANT ECOLOGICAL COMMUNITIES

NASO DNA is located within the Atlantic Ocean, Rudee Inlet/Owl's Creek Watershed, and the Back Bay Watershed unit of the Southern Watersheds Area (see Section 2.3.3). The Back Bay Watershed unit supports eight rare ecological communities as well as 40 rare plant occurrences, and 10 rare animals, including the state-listed least bittern (*Ixobrychus exilis*), state-listed canebrake rattlesnake (*Crotalus horridus* ssp. *atricaudatus*), state-listed eastern glass lizard (*Ophisaurus ventralis*), federally-listed loggerhead sea turtle (*Caretta caretta*), and federally-listed Kemp's ridley sea turtle (*Lepidochelys kempii*). Rare plant and animal observations and identification of rare ecological communities for the Installation is based on data collected during rare, threatened and endangered plant and animal surveys, and significant ecological communities surveys completed at the Installation since 1968. The next inventory for rare, threatened and endangered species at NASO DNA is planned for 2014, and includes a rare, threatened, and endangered insect survey, and a bat survey.

A number of species that are considered rare or are listed as threatened or endangered in Virginia, also have been documented at NASO DNA. These species were identified during several inventories of rare, threatened, and endangered species conducted at NASO DNA from 1968 through 2010 (Buhlmann et al. 1992, Corning 1968, Evans and Belden 2010, Galvez and Swihart 2000, Geo-Marine Inc. 2003, Swihart 1982, USFWS, Office of Fishery Assistance 1985 and 1988, Van Alstine et al. 2001, and VDCR-DNH 1990).

Because the status of state and federal threatened and endangered species changes over time, careful tracking and periodic field surveys are needed to confirm the occurrence of rare species on the Installation. The VDCR-DNH tracks the current status of natural heritage resources in a database that is available on its website.

2.6.1 Rare, Threatened, and Endangered Plants

No federally listed plant species have been identified at NASO DNA; however seabeach amaranth (*Amaranthus pumilus*) is a federally threatened plant species that has the potential to occur at NASO DNA, based on the presence of suitable habitat. Seabeach amaranth is an annual plant that grows on sandy beaches along the Mid-Atlantic coast of the U.S. (USFWS 2003). Between 2001 and 2005 populations identified from Maryland and Virginia steadily declined due to habitat destruction, poor timing of beach nourishment projects, beach raking, and outdoor recreational vehicle use (USFWS 2007a).

Several species considered as rare plants in Virginia were identified at NASO DNA during inventories of rare, threatened, and endangered species (Buhlmann et al. 1992, Evans and Belden 2010, Van Alstine et al. 2001, and VDCR-DNH 1990). State-rare plants identified in surveys of

NASO DNA conducted to date include American halfchaff sedge (*Lipocarpa maculata*), Long Beach primrose-willow (*Ludwigia brevipes*), black-fruited spikerush (*Eleocharis melanocarpa*), saltmarsh umbrella-sedge (*Fuirena breviseta*), spoonleaf sundew (*Drosera intermedia*), early white-top fleabane (*Erigeron vernus*), bluejack oak, fasciculate beaksedge (*Rhynchospora fascicularis* var. *fascicularis*), tall horned beaksedge (*R. macrostachya* var. *macrostachya*) glossy-seeded yellow star-grass (*Hypoxis sessilis*, formerly *H. longii*), Elliott’s rush (*Juncus elliotii*), and seaside marsh-elder (*Iva imbricata*). Several other plant species found at NASO DNA that were considered rare at the time of the 1990 survey are no longer tracked by VDCR-DNH, including smooth sawgrass (*Cladium mariscoides*), Virginia pinweed (*Lechea maritima* var. *virginica*), creeping primrose-willow (*Ludwigia repens*), American spongeplant (*Limnobium spongia*), round-headed rush (*Juncus validus* var. *validus*), and Carolina fimbry (*Fimbristylis caroliniana*). The round-headed rush, spoon-leaved sundew (*Drosera spatulata*), and Virginia pinweed are still considered state watch list species by VDCR-DNH (Townsend 2012). Table 2-4 lists the rare plants that have been confirmed at NASO DNA.

2.6.2 Rare, Threatened, and Endangered Fish and Wildlife

Three federally listed wildlife species are known to occur at NASO DNA, including piping plover (*Charadrius melodus*), Kemp’s ridley sea turtle, and loggerhead sea turtle. Loggerhead sea turtle is known to nest at NASO DNA; however, piping plover has not been documented nesting on the Installation. A federal candidate for listing, the red knot (*Calidris canutus*), also has been documented at the Installation, as well as several Virginia rare and state listed species as described below and listed in Table 2-4.

Table 2-4. Rare, Threatened, and Endangered Terrestrial Species and Significant Ecological Communities that Occur at NASO DNA.

Scientific Name	Common Name	Global Rank ²	State Rank ³	Federal Status ⁴	State Status ⁴	Last Observed
Flora						
<i>Drosera intermedia</i>	Spoonleaf sundew	G5	S3	None	None	Not available
<i>Eleocharis melanocarpa</i>	Black-fruited spikerush	G4	S2	None	None	1996
<i>Erigeron vernus</i>	Early white-top fleabane	G5	S2	None	None	1989/1990
<i>Fuirena breviseta</i>	Saltmarsh umbrella-sedge	G5	SH	None	None	1996
<i>Hypoxis sessilis</i>	Glossy-seeded yellow star-grass	G4	SH	None	None	1990
<i>Iva imbricata</i>	Seaside marsh-elder	G5?	S1S2	None	None	1990
<i>Juncus elliotii</i>	Elliott’s rush	G4G5	S1S2	None	None	2000
<i>Juncus validus</i> var. <i>validus</i>	Roundhead rush	G5T3T5	SNA	None	None	Not available
<i>Lechea maritima</i> var. <i>virginica</i>	Virginia pinweed	G5T3Q	S3	None	None	Not available
<i>Lipocarpa maculata</i>	American halfchaff sedge	G5	S1	None	None	2010
<i>Ludwigia brevipes</i>	Long Beach primrose-willow	G2G3	S2	None	None	2010

Scientific Name	Common Name	Global Rank ²	State Rank ³	Federal Status ⁴	State Status ⁴	Last Observed
<i>Ludwigia repens</i>	Creeping primrose-willow	G5	SNA	None	None	1989
<i>Quercus incana</i>	Bluejack oak	G5	S2	None	None	1990
<i>Rhynchospora fascicularis</i> var. <i>fascicularis</i>	Fasciculate beaksedge	G5T3T5	S1	None	None	1990
<i>Rhynchospora macrostachya</i> var. <i>macrostachya</i>	Tall horned beaksedge	G4TNR	S3	None	None	2010
Fauna						
<i>Calidris canutus</i>	Red knot	G4T2	S2N	C	None	Not available
<i>Charadrius melodus</i>	Piping plover	G3	S2B/S1N	T	T	2013
<i>Cicindela trifasciata</i>	S-banded tiger beetle	G5	S1	None	None	2010
<i>Clemmys guttata</i>	Spotted turtle	G5	Tier III	None	None	Not available
<i>Haliaeetus leucocephalus</i>	Bald eagle	G5	S3S4B/S3 S4N	None	None	2013
<i>Heterodon platirhinos</i>	Eastern hog-nosed snake	G5	Tier IV	None	None	Not available
<i>Chelydra serpentina</i> <i>serpentina</i>	Common snapping turtle	G5	None	None	None	None
<i>Rallus elegans</i>	King rail	G4	S2B/S3N	None	None	1990
<i>Siren lacertina</i>	Greater siren	G5	S3, Tier IV	None	None	1990
<i>Thamnophis sauritus sauritus</i>	Common ribbon snake	G5	Tier IV	None	None	Not available
Ecological Community Groups						
Maritime upland forest ⁴		N/A ⁵	N/A ⁵	None	None	2003
Maritime dune woodland		N/A ⁵	N/A ⁵	None	None	2003
Interdune pond		N/A ⁵	N/A ⁵	None	None	2000

¹ G1 = Critically imperiled; G2 = Imperiled; G3 = Vulnerable; G4 = Apparently secure; G5 = Secure; G_T = Intraspecific taxa; signifies the rank of a subspecies or variety; G_? = Inexact numeric rank (Fleming and Patterson 2012)

² S1 = Critically imperiled; S2 = Imperiled; S3 = Vulnerable; S_N = Nonbreeding status; S_B = Breeding status; SH = Possible extirpated, known only from historical occurrences but still some hope of rediscovery; SNA = Not applicable, conservation status rank is not applicable because the species is a not a suitable target for conservation activities (Roble 2010)

³ T = threatened; E = endangered; C = candidate; Tier III (State Wildlife Action Plan [SWAP]) – high conservation need; Tier IV (SWAP) – moderate conservation need;

⁴ Ecological community type changed to align with Fleming and Patterson 2012 (Natural Communities of Virginia: Ecological Groups and Community Types)

⁵ Rarity rankings exist at the community type level, not at the ecological community group (Fleming and Patterson 2012).

Sources: Evans and Belden 2010, Fleming and Patterson 2012, Navy 2006b, Roble 2010 and 2013, Townsend 2012, Van Alstine et al. 2001, and VDGIF 2005.

2.6.2.1 Mammals

Several federal and state listed rare, threatened, and endangered mammals occur or have the potential to occur on the Installation, including various bat species, marine and terrestrial mammals, and birds as described in this section.

2.6.2.1.1 Bats

Populations of several bat species with ranges along the eastern U.S. have succumb to significant declines in recent years due to white-nose syndrome, a fungus that can infect hibernacula and significantly impact overwintering populations. White-nose syndrome has spread from the northeastern to the central U.S. at an alarming rate, and since the winter of 2007–2008, millions of insect-eating bats in 22 states and five Canadian provinces have died from this devastating disease (USGS National Wildlife Health Center 2013). The disease is named for the white fungus, *Geomyces destructans*, which infects skin of the muzzle, ears, and wings of hibernating bats. As a result, the USFWS has initiated reviews of several bat species to determine if population declines and threats from white-nose syndrome warrant ESA listing.

The USFWS initiated a 90-day review on 29 July 2011 to determine if federal listing of eastern small-footed bat (*Myotis leibii*) is warranted. As of August 2013, listing determination of this species was still under review by USFWS. Summer roosts of the eastern small-footed bat typically are within talus (a slope of accumulated rock debris) areas associated with rocky ridge-tops, but they also are known to roost on buildings and bridges, and behind loose bark on trees. Overwintering hibernacula of eastern small-footed bats, includes caves and abandoned mines. Eastern small-footed bats are nocturnal foragers, foraging primarily over streams, ponds, or other waterbodies that have high concentrations of nocturnal insects. They are considered generalist feeders, feeding primarily on soft-bodied prey that they capture during flight, or that they glean from surfaces.

The USFWS initiated a 90-day review on 29 July 2011 to determine if federal listing of northern long-eared bat (*Myotis septentrionalis*) is warranted. On 02 October 2013 USFWS published their proposal to list the northern long-eared bat as endangered throughout its range under the ESA (78 FR 191). On 06 January 2014 the USFWS published their Interim Conference and Planning Guidance that addresses immediate information needs for Section 7 consultations and conservation planning for this species, should it be officially listed as endangered (USFWS 2014).

**USFWS' Northern Long-eared Bat Interim Conference and Planning Guidance
(06 January 2014) is available online:**
<http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf>.

Preferred summer roosts of the northern long-eared bat are generally associated with old-growth forests composed of trees 100 years old or older, and this species is dependent on intact interior forest habitats that have a low edge-to-interior ratio (76 Federal Register [FR] 38095-38106). Relevant late-successional forest features include a high percentage of old trees, uneven forest

structure, single and multiple tree-fall gaps, standing snags, and woody debris. This species appears to favor small cracks or crevices in cave ceilings for hibernation. Northern long-eared bats are opportunistic insectivores, obtaining prey both in flight and by gleaning from surfaces. Prey includes small insects, such as moths, flies, leafhoppers, and beetles. Forested hillsides and ridges are their preferred foraging habitat, with the presence of mature forest stands thought to play an important role in their foraging behavior. Foraging occurs at dusk over small ponds and forest clearings under the forest canopy, or along streams.

The USFWS has not initiated a formal review for the potential listing of little brown bat (*Myotis lucifugus*). Little brown bat reproductive females form maternity colonies in barns, attics, tree cavities, and other places that remain dark throughout the day (Kunz and Reichard 2011). Females tend to have high roost fidelity, returning to their natal roosts each year. Little brown bats also are opportunistic in their selection of roost sites, and are known to quickly exploit new roost sites once identified. Winter hibernacula are typically within caves or mines located 180–620 mi (290–998 km) from summer roosts. Little brown bats forage in flight on insects, often feeding over open water or along the margin of waterbodies and forest habitat. Juveniles tend to forage in clearings or open areas, whereas adults are known to regularly forage in more cluttered environments, as well as open areas.

Acoustic and mist netting surveys for listed bat species will be conducted in the near future dependent on available funding.

2.6.2.1.2 Marine Mammals

Marine mammals include dolphins, porpoises, whales and seals, of which various species occur in the Chesapeake Bay and offshore from NASO DNA. In addition to any federal ESA listings, all marine mammals are protected by the MMPA, although some species are protected under the MMPA, but not the federal ESA.

Due to the coastal location of NASO DNA, a number of marine mammal species are known, or have the potential, to occur along the shore and within the adjacent offshore/nearshore environment. The primary species of marine mammals in the nearshore region of the mid-Atlantic include bottlenose dolphin (*Tursiops truncatus*), harbor porpoise (*Phocoena phocoena*), North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), killer whale (*Orcinus orca*), and, rarely, the West Indian manatee (*Trichechus manatus*). Harbor seal (*Phoca vitulina*) and gray seal (*Halichoerus grypus*) also have been documented utilizing NASO DNA beaches. Occurrence of these species fluctuates by season. Whales are most common during the winter months and dolphins are most common in the summer. Harbor porpoise sightings and fisheries by-catch are most common in the winter, although strandings occur most frequently in the spring and summer. The rare sightings of manatees have been recorded in all but the winter months (Navy 2001b and 2003). Several of the marine mammals that have the potential to occur in the offshore/nearshore environment of NASO DNA are listed as federal endangered species, including blue whale (*Balaenoptera musculus*), fin whale (*B. physalus*), sei whale (*B. borealis*), and sperm whale (*Physeter macrocephalus*) (Table 2-5). The western North Atlantic coastal stock of bottlenose dolphin is considered “depleted” under the MMPA. With the exception of the West Indian manatee, which is under the jurisdiction of

USFWS, all of the marine mammals that have the potential to occur offshore of NASO DNA are managed under the jurisdiction of NOAA NMFS.

Table 2-5. Rare, Threatened, and Endangered Marine Species Known to Occur in Waters Adjacent to NASO DNA.

Scientific Name	Common Name	Global Rank ¹	State Rank ²	Federal Status ³	State Status ³	Last Observed ⁴
Reptiles						
<i>Caretta caretta</i>	Loggerhead sea turtle	G3	S1B/S1N	T	T	2013 (stranding); 2002 (nesting)
<i>Chelonia mydas</i>	Green sea turtle	G3	SNA	T	T	-
<i>Dermochelys coriacea</i>	Leatherback sea turtle	G2	SNA	E	E	-
<i>Eretmochelys imbricata</i>	Atlantic hawksbill sea turtle	G3	SNA	E	E	-
<i>Lepidochelys kempii</i>	Kemp's ridley sea turtle	G1	S1N	E	E	2012 (nesting)
Marine Mammals						
<i>Eubalaena glacialis</i>	North Atlantic right whale	G1	SNA	E, MMPA	E	-
<i>Halichoerus grypus</i>	Gray seal	G4G5	N/A	MMPA	N/A	2012
<i>Megaptera novaeangliae</i>	Humpback whale	G4	S1N	E, MMPA	E	-
<i>Orcinus orca</i>	Killer whale	G4G5	N/A	MMPA	N/A	-
<i>Phoca vitulina</i>	Harbor seal	G5	N/A	MMPA	N/A	2014
<i>Phocoena phocoena</i>	Harbor porpoise	G4G5	N/A	MMPA		-
<i>Trichechus manatus</i>	West Indian manatee	G2	SA	E, MMPA	E	-
<i>Tursiops truncatus</i>	Bottlenose dolphin	G5	N/A	MMPA Depleted (Western North Atlantic Coastal population)	N/A	-

¹ G1 = Critically imperiled; G2 = Imperiled; G3 = Vulnerable; G4 = Apparently secure, G5 = Secure

² S1 = Critically imperiled; S_N = Nonbreeding status; S_B = Breeding status; SA = State accidental, not a regular member of the Virginia fauna but recorded in the state at least once; SZN = Long distance migrant whose occurrences outside of the breeding season are not monitored or a species whose wintering populations are transitory and usually do not occur regularly at specific localities; N/A = Not applicable

³ T = threatened; E = endangered; MMPA = Marine Mammal Protection Act; MMPA Depleted = any case in which (1) the Secretary, after consultation with the Marine Mammal Commission and the Committee of Scientific Advisors on Marine Mammals established under MMPA title II, determines that a species or population stock is below its optimum sustainable population; (2) a State, to which authority for the conservation and management of a species or population stock is transferred under section 109, determines that such species or stock is below its optimum sustainable population; or (3) a species or population stock is listed as an endangered species or a threatened species under the ESA; N/A = not applicable

⁴ - = information of last observation not available

Source: Roble 2013

2.6.2.1.3 Terrestrial Mammals

Two state rare mammal species are known to occur at NASO DNA, including marsh rabbit and Pungo white-footed mouse (S1, extremely rare and critically imperiled). The marsh rabbit is restricted to the Coastal Plain of the southeastern U.S. In Virginia, the species is found in several counties in the southeastern portion of the state and is most abundant in the Dismal Swamp. Preferred habitat for the species includes undisturbed marsh, primarily freshwater. The greatest threat to the marsh rabbit's existence is loss of habitat (VDGIF n.d.a). The Pungo white-footed mouse is found from Cape Henry, Virginia south along the barrier beach to Oregon Inlet, North Carolina. Preferred habitat for the species includes thickets of myrtle and poison ivy at the marsh edge, behind dunes (VDGIF n.d.b).

2.6.2.2 Birds

Several federal and state listed rare, threatened, and endangered birds occur or have the potential to occur on the Installation, including the federally listed piping plover, red knot, and roseate tern (*Sterna dougallii* sp. *dougallii*) as described in this section.

As part of the 1988 amendment to the Fish and Wildlife Conservation Act (Public Law 100-653), the USFWS is required to identify species, subspecies, and populations of migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA (USFWS 2008). The USFWS published the most recent list of Birds of Conservation Concern (BCC) in 2008, which identified specific species within 37 Bird Conservation Regions across North America. The goal envisioned by the USFWS in identifying these BCC species is to stimulate the implementation of coordinated, proactive management and conservation actions among federal, state, tribal, and private partners to prevent these species from being listed under the ESA. Additionally, the Bird Conservation Region lists are intended to assist federal land-managing agencies and their partners in their efforts to abide by the bird conservation principles embodied in the MBTA and EO 13186 *Responsibilities of Federal Agencies to Protect Migratory Birds* (USFWS 2008). NASO DNA is located within Bird Conservation Region 30, the New England/Mid-Atlantic Coast. Appendix I contains a list of birds that have been observed at NASO DNA, 18 of which are USFWS BCC species for Bird Conservation Region 30.

In addition to identification of BCC species, Appendix I also identifies the federal, state, or SWAP status for the bird species that occur at NASO DNA. Piping plover is the only federally listed bird species that occurs at NASO DNA, and in addition to being federally threatened, it is listed as threatened in Virginia. Red knot is the only federal candidate species for listing that is known to occur at NASO DNA. Wilson's plover (*Charadrius wilsonia*) is a Virginia endangered species that is known to occur. In addition, 12 bird species that occur at NASO DNA are considered Virginia species of concern (Appendix I). Four (4) bird species that occur at NASO DNA are considered Virginia SWAP Tier I species, indicating those species that have critical conservation need. Eight (8) bird species of NASO DNA are considered Tier II species, which are those species identified as having a very high conservation need; three (3) bird species occur that are identified as high conservation need; and 35 bird species that occur at NASO DNA are identified as having moderate conservation need (Appendix I). A complete list of all fish and

wildlife species identified as Species of Greatest Conservation Need for the Mid-Atlantic Coastal Plain in the Virginia SWAP is included in Appendix I.

2.6.2.2.1 Bald Eagle

The bald eagle was removed from the federal list of threatened and endangered wildlife on 07 July 2007 (USFWS 2007b). Due to increased populations of bald eagles documented in the state, Virginia removed the bald eagle from their threatened and endangered species list on 01 January 2013 (VDGIF 2013). In 2011 the breeding population of bald eagles in coastal areas of Virginia was more than 730 pairs and surveys by VDGIF in the Piedmont and Mountain regions of Virginia also documented increases in nesting in these areas as well. At NASO DNA bald eagles are known to feed, hunt, or loaf; however, this species has not been documented nesting at the Installation (Navy 2013). Two bald eagles were observed on the Installation during the April 2013 bird survey (Schaeffer 2013). Guidelines established for the protection of bald eagles are discussed in Section 3.10.4.

2.6.2.2.2 Piping Plover

The piping plover is a federally threatened species that has been observed along the beaches of NASO DNA, most recently on 08 April 2013; however, there is no documentation of this species nesting at NASO DNA (Beatty 2003 and Schaeffer 2013).

Piping plover is a small shorebird that inhabits open sandy beaches and salt flats. It is listed as threatened throughout its range with the exception of individuals belonging to the Great Lakes watershed population, which are federally listed as endangered. Those with the potential to occur at NASO DNA belong to the Atlantic coast population, and are therefore federally threatened. The Atlantic coast population of piping plover was estimated at 1,782 pairs in 2010 (USFWS 2011a). A review of survey data collected in 2011 by VDGIF indicated that the closest population of piping plover occurs at Cedar Island, approximately 14 mi (32 km) southeast of the Installation, where 38 nesting pairs have been observed (VDGIF 2012). General characteristics for piping plover are provided in Table 2-6.

Table 2-6. Piping Plover Characteristics.

Attribute	Description
Size	Approximately 7.25 in (18 cm) in length
Identification	<p>During warmer times of year: pale brown above, lighter below; black band across forehead, orange bill with black tip, orange legs, white rump. Males will have a complete or incomplete black band that encircles the body at the breast, and females will have a paler head band, and incomplete breast band.</p> <p>During the winter: bills are black and all birds will lack black bands on the breast and head.</p>
Nesting	Plovers nest high on the beach, close to dunes. The nest is a simple depression in the sand, and is sometimes lined with small stones or shell fragments. Eggs are very well camouflaged and may be easily missed. When predators or intruders approach a nest or young plover, the parents may attempt to attract attention by feigning a broken wing.

Source: USFWS 2012a

More information on the piping plover is available from VDGIF at:
<http://www.dgif.virginia.gov/wildlife/birds/piping-plovers/>

More information on the piping plover is available from USFWS at:
<http://www.fws.gov/northeast/pipingplover/>



Piping plover (*Charadrius melodus*)

Source: Wikipedia Commons 2013a

2.6.2.2.3 Red Knot

Red knot is a federal candidate species for listing that is known to utilize tidal flat areas of NASO DNA as a stopover point during their migration. Incidental sightings and Christmas Bird Count records indicate that the red knot is a fairly regular, if infrequent, visitor to the Tidewater area (National Audubon Society 2012). This species conducts one of the longest migrations, travelling more than 9,300 mi (15,000 km) between their nesting grounds located in the Arctic, to their wintering grounds located in southern coastal areas of Chile and Argentina in South America (USFWS Northeast Region 2011).

Red knot is a medium-size shorebird that occupies intertidal habitats, especially those located near coastal inlets and bays. Flocks of red knots converge on staging areas along the entire Atlantic coast and are faithful to specific sites, returning to the same location year after year. The spring migration is timed with the release of horseshoe crab eggs, which provide quick, essential and easily found food for red knots along the Atlantic coast.

One of the primary threats to the red knot population is the increased take of horseshoe crabs for bait in commercial fisheries, as well as habitat degradation along their migratory route. Recent surveys in South America and the southeastern U.S. and at Delaware Bay indicate a substantial decline in red knot populations as compared to baseline information from the 1980s (USFWS 2005). In October 2011 the USFWS made a determination that a listing priority number of 3 should be maintained based on imminent threats of high magnitude (76 FR 66392). General characteristics for red knot are provided in Table 2-7.

Table 2-7. Red Knot Characteristics.

Attribute	Description
Size	Approximately 9–11 in (25–28 cm) in length
Identification	<p>Adults in spring: above finely mottled with grays, black and light ochre, running into stripes on crown; throat, breast and sides of head cinnamon-brown; dark gray line through eye; abdomen and undertail coverts white; uppertail coverts white, barred with black.</p> <p>Adults in winter: pale ashy gray above, from crown to rump, with feathers on back narrowly edged with white; underparts white, the breast lightly streaked and speckled, and the flanks narrowly barred with gray.</p> <p>Adults in autumn: underparts of some individuals show traces of the red markings of spring.</p>
Nesting	Shallow, lined scrape on tundra.

USFWS 2012b



Red knot (*Calidris canutus*)

Source: Wikipedia Commons 2013b

2.6.2.2.4 **Roseate Tern**

~~Although it has not been documented at the Installation,~~ roseate tern is a federally listed species that has ~~the potential~~ to occur at NASO DNA. It is listed as threatened throughout the western hemisphere with the exception of individuals belonging to the northeastern U.S. nesting populations, including Virginia, which are classified as endangered. Roseate tern is strictly a coastal bird species that forages in nearshore surf habitat. In the northeastern U.S., roseate terns nest on beaches, and barrier and offshore islands, with open sandy beaches that are isolated from human activity representing optimal nesting habitat (USFWS n.d.). Substrates used for nesting include pea gravel, open sand, and overhanging rocks, as well as salt marshes. Populations in northeastern North America almost always nest in colonies along with common terns (*Sterna hirundo*). Roseate terns arrive in coastal areas of the western Atlantic during the spring, and nest on coastal beaches and islands from Nova Scotia to New York (USFWS 2012c); they winter off the coast of South America. Roseate tern is most likely to occur at NASO DNA during the migration period in late August to early September, when the species migrates from the northeastern U.S. to waters located off Trinidad and northern South America (USFWS 2011b).



Roseate tern (*Sterna dougallii dougallii*)

Source: Wikipedia Commons 2013c

Roseate tern is a medium-sized bird that nests on small barrier islands and spends most of its life offshore and along the Atlantic coast. Roseate tern populations declined greatly due to hunting in the late 19th century. Currently populations remain in the low range of 2,500–3,300. Primary threats to roseate tern include habitat disruption and development along sensitive barrier island habitats the species relies on for nesting (USFWS 2011b). General characteristics for roseate tern are provided in Table 2-8.

Table 2-8. Roseate Tern Characteristics.

Attribute	Description
Size	Approximately 15.75 in (40 cm) in length
Identification	Light-gray wings and back. First three or four primaries are black, along with cap. The rest of the body is white, with a rosy tinge on the chest and belly during the breeding season. The tail is deeply forked, and the outermost streamers extend beyond the folded wings when perched. During the breeding season the basal three-fourths of the otherwise entirely black bill and legs turn orange-red.
Nesting	Roseate terns nest on small barrier islands, often at ends or breaks, in hollows or under dense vegetation, debris, or rocks to hide from predators. Roseate terns almost always nest in colonies with common terns.

USFWS 2011b and 2012d

2.6.2.3 Herpetofauna

Several federal and state listed rare, threatened, and endangered herpetofauna occur or have the potential to occur on the Installation, including federally listed marine sea turtles discussed in this section. In addition to the sea turtle discussed in the following section, other state rare reptile and amphibian species that are known to occur in freshwater habitats at NASO DNA include greater siren (*Siren lacertina*), documented in 1990 (Roble 2010); and common snapping turtle (*Chelydra serpentina serpentina*) (NAVFAC Mid-Atlantic 2013).

2.6.2.3.1 Sea Turtles

The federally endangered Kemp’s ridley and federally threatened loggerhead sea turtles have had successful nesting attempts on NASO DNA beaches. In 2002, VDGIF began maintaining a statewide sea turtle nesting database, which includes all reported nesting events on the state’s southern mainland beaches and barrier islands (VDEQ 2007). A review of VDGIF, USFWS, and Navy data indicates that two loggerhead sea turtle nests, one Kemp’s ridley sea turtle nest, and four loggerhead sea turtle crawls were documented at the Installation between 1970–2013. A loggerhead sea turtle nest observed in 1992 was successfully relocated to a protected hatchery site within the BBNWR. The loggerhead sea turtle nest identified at the Installation in 2002 was dug up by a bulldozer and the intact eggs were reburied at the BBNWR nursery site. Loggerhead sea turtle crawls were observed in 1992 and 2002 (three) (VDGIF n.d.c). Loggerhead sea turtles are the most common sea turtle in the area.

Most recently a Kemp’s ridley sea turtle nest was observed at the Installation on 15 June 2012 and was wired in place (left in situ). This successful nesting attempt by Kemp’s ridley sea turtle represents the first nesting record for this species in Virginia. Kemp’s ridley sea turtles are observed relatively frequently in the nearshore areas of NASO DNA.

Three other federally listed sea turtles species have been recorded in offshore areas of NASO DNA, and have the potential to occur on the Installation beaches. These include leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), and Atlantic hawksbill (*Eretmochelys imbricata*) sea turtles. Leatherback sea turtles have been observed relatively frequently, whereas very few Atlantic hawksbill or green sea turtles have been sighted in the area. Green turtles have been documented nesting on beaches located north and south of the Installation, and leatherback

sea turtles have been successfully nesting in North Carolina in recent years. Although sea turtles have the potential to occur year-round in the NASO DNA area, they are most likely to occur during the summer months. Observations of these five sea turtle species on the Installation have occurred as a mix of live and dead strandings.

2.6.2.4 Fish

No rare, threatened, or endangered fish species have been identified at the Installation; however, several federally listed fish species and fish species that have designated EFH have the potential to occur within the offshore/nearshore environment (Appendix F and Appendix I). Federally listed fish species that have the potential to occur include the endangered shortnose sturgeon (*Acipenser brevirostrum*), the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) (Chesapeake Bay distinct population segment), and scalloped hammerhead shark (*Sphyrna lewini*), which are federal candidate species for listing. All of these fish species are under the management jurisdiction of NOAA NMFS.

2.6.2.4.1 American Eel

American eel (*Anguilla rostrata*) has been identified on the Installation. This species was petitioned for listing under the federal ESA in 2010. In 2011, the USFWS issued a finding that listing of the species may be warranted, and initiated a status review to determine if listing of this species is warranted (76 FR 60431-60444). As of December 2013, the USFWS has not issued a ruling on the listing of American eel.

2.6.2.5 Invertebrates

One state-rare insect, the s-banded tiger beetle (*Cicindela trifasciata*), has been documented at NASO DNA; however, weather conditions at the time of the 2001 survey may have affected survey results (Van Alstine et al. 2001). This survey also noted the presence of habitat that could support two other state-rare insect species, ghost tiger beetle (*Cicindela lepida*) and comet darner (*Anax longipes*). Future surveys for s-banded tiger beetle, ghost tiger beetle and comet darner should be conducted at the Installation.

2.6.3 Significant Ecological Communities

Several of the ecological communities that occur on the Installation are considered significant, rare natural communities in Virginia. The maritime wet grasslands, maritime upland forests, maritime dune woodlands, and interdune swales that occur in the beach and dune area are rare natural communities that are severely threatened by coastal development throughout their natural range. The maritime wet grassland communities at the northern portion of NASO DNA are not considered significant because of the high degree of disturbance that has occurred in this area. Table 2-4 lists species and natural communities of NASO DNA that are currently listed as rare, threatened, or endangered and the date of the last recorded observation by VDCR-DNH. VDCR-DNH descriptions of the ecological community groups identified at NASO DNA in surveys conducted in 1992, 2001, and 2010 (Buhlmann et al. 1992, Van Alstine et al. 2001, and Evans and Belden 2010) are provided in the following sections.

2.6.3.1 Maritime Upland Forest

Maritime upland forest are pine-dominated maritime forest that are distributed along the length of the outer Coastal Plain maritime zone and barrier islands of Virginia in oceanside and bayside dunes and sand flats that are generally protected from salt spray. Overstories contain variable mixtures of southern red oak, water oak (*Quercus nigra*), post oak (*Q. stellata*), hickories (*Carya glabra*, *C. pallida* and *C. alba*), and black cherry, with some loblolly pine usually present. Understory layers of drier stands may be very sparse, whereas more mesic stands often contain American holly, sweetleaf (*Symplocos tinctoria*), devilwood (*Osmanthus americanus*), American beautyberry (*Callicarpa americana*), and “bay” species such as southern bayberry (*Myrica cerifera* var. *cerifera*) and redbay. The herb layer is often covered with dense tangles of common greenbrier (*Smilax rotundifolia*) and muscadine grape; true herbs are typically sparse. All community types in this group are considered globally rare because of restricted ranges, narrow habitat requirements, and threats from coastal development (Fleming and Patterson 2012).

2.6.3.2 Maritime Dune Woodland

Maritime dune woodlands are deciduous, coniferous, and broadleaf evergreen woodlands that occur on back dunes that are protected from regular salt spray. Compared to maritime upland forests, these woodlands are more localized and restricted to xeric dune systems. Along the southeastern Virginia coast, live oak, bluejack oak, and sassafras dominate stands, with loblolly pine, black cherry, and Hercules’ club (*Zanthoxylum clava-herculis*) as less abundant species. Scattered herbaceous plants that occur in these woodlands include seabeach needlegrass (*Aristida tuberculosa*), cottony golden-aster (*Chrysopsis gossypina*), yellow thistle (*Cirsium horridulum* var. *horridulum*), oval-leaved panic grass (*Dichanthelium ovale* var. *ovale*), coast bedstraw (*Galium hispidulum*), longbranch frostweed, woolly ragwort (*Senecio tomentosus*), dune ground-cherry (*Physalis walteri*), eastern jointweed (*Polygonella articulata*), and narrow-leaved golden-aster (*Pityopsis graminifolia* var. *latifolia*). All communities in this group are considered globally and state rare (Fleming and Patterson 2012).

2.6.3.3 Interdune Swales

Interdune ponds are highly variable in composition, which makes them difficult to classify because of seasonal changes in flora, succession of stands over time, temporal hydrological variation, and rapid geomorphic changes in dynamic dune systems. Interdune ponds are the most permanently and deeply flooded interdune wetlands, encompassing both freshwater ponds, in which rainwater and groundwater quickly dilutes infrequent salt-water inputs, and slightly brackish ponds subject to more frequent salt water inputs. Seasonally flooded, freshwater ponds usually contain large cover of bulrushes (e.g., *Scirpus cyperinus*, *Schoenoplectus pungens* var. *pungens*, *S. tabernaemontani*), grasses (e.g., *Panicum virgatum* var. *virgatum*, *P. rigidulum* var. *condensum*, *Spartina patens*), or squarestem spikerush (*Eleocharis quadrangulata*). The marginal zones of some freshwater ponds may be dominated by nearly pure stands of twig rush (*Cladium mariscoides*). Seasonally flooded oligohaline ponds may be dominated by narrow-leaved cattail (*Typha angustifolia*), eastern rose-mallow (*Hibiscus moscheutos* ssp. *moscheutos*), or saltmarsh bulrush (*Scirpus robustus*). Semi-permanently flooded oligohaline ponds are dominated by coastal water-hyssop (*Bacopa monnieri*), white spikerush (*Eleocharis albidum*), and sago pondweed (*Potamogeton pectinatus*). All community types within the group are uncommon to rare, small-patch communities existing in fragile settings. They also support

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several state rare insects including tiger beetles (*Cicindela* spp.) and comet darner. As with most maritime communities, threats to this group include development and sea-level rise (Fleming and Patterson 2012).

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3.0 NATURAL RESOURCES MANAGEMENT ISSUES

3.1 COASTAL ZONE PROTECTION

The CZMA encourages states to preserve, protect, and, where possible, restore or enhance valuable coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as fish and wildlife. Virginia's coastal management area includes the entire Tidewater region. Although federal lands are excluded from state coastal zones, activities on federal lands that are reasonably likely to affect use of lands, waters, or natural resources of Virginia's coastal zone must be consistent, to the maximum extent practicable, with the enforceable policies of Virginia's Coastal Resources Management Program. Federal activities affecting Virginia's coastal zone are subject to consistency review by the VDEQ and other Virginia agencies responsible for the Coastal Resources Management Program. Federal activity affecting Virginia's coastal zone must be fully consistent with Virginia's enforceable policies unless other provisions of federal law prohibit full consistency.

An outline of Virginia's federal consistency review process is available on the VDEQ website:

<http://www.deq.state.va.us/Programs/EnvironmentalImpactReview/FederalConsistencyReviews.aspx>

Enforceable policies of Virginia's Coastal Resources Management Program include the following:

- *Subaqueous Lands Management.* This program establishes conditions for granting or denying permits to use state-owned bottomlands based on considerations of potential effects on marine and fisheries resources, wetlands, adjacent or nearby properties, anticipated public and private benefits, and water quality standards established by the VDEQ, Water Division. The program is administered by the VMRC (Code of Virginia §28.2-1200 through §28.2-1213).
- *Tidal and Nontidal Wetlands Management.* This program preserves tidal wetlands, prevents their despoliation, and accommodates economic development in a manner consistent with wetlands preservation. The Virginia Water Protection Permit Program administered by the VDEQ includes protection of wetlands, both tidal and nontidal. This program is authorized by Code of Virginia §62.1-44.15.5 and the Water Quality Certification requirements of Section 401 of the CWA of 1972. The Tidal Wetlands Program is administered by the VMRC (Code of Virginia §28.2-1300 through §28.2-1320).
- *Nonpoint Source Pollution Control.* Virginia's Erosion and Sediment Control Law requires that soil-disturbing projects be designed to reduce soil erosion and decrease inputs of chemical nutrients and sediments to the Chesapeake Bay, its tributaries, and other waters of the State. This program is administered by VDCR (Code of Virginia §10.1-560 et seq.).

- *Point Source Pollution Control.* The point source program is administered by the State Water Control Board pursuant to Code of Virginia §62.1-44.15. Point source pollution control is accomplished through the implementation of the National Pollutant Discharge Elimination System permit program established pursuant to Section 402 of the CWA and administered in Virginia as the VPDES permit program.
- *Coastal Lands Management.* This program regulates activities within the Chesapeake Bay Resource Management Areas and Resource Protection Areas within 84 localities in Virginia's coastal zone. It is a state-local cooperative program administered by the Chesapeake Bay Local Assistance Department and the 84 localities in Tidewater, Virginia, established pursuant to the Chesapeake Bay Preservation Act (Code of Virginia §10.1-2100 through §10.1-2114) and the Chesapeake Bay Preservation Area Designation and Management Regulations (9 Virginia Administrative Code [VAC] 10-20-10 et seq.).
- *Fisheries Management.* This program stresses the conservation and enhancement of finfish and shellfish resources and the promotion of commercial and recreational fisheries to maximize food production and recreational opportunities. This program is administered by the VMRC (Code of Virginia §28.2-200 through §28.2-713) and the VDGIF (Code of Virginia §29.1-100 through §29.1-570).
- *Shoreline Sanitation.* The purpose of this program is to regulate the installation of septic tanks, set standards concerning soil types suitable for septic tanks, and specify minimum distances that tanks must be placed away from streams, rivers, and other waters of the State. This program is administered by the Department of Health (Code of Virginia § 32.1-164 through § 32.1-165).
- *Air Pollution Control.* This program implements the federal Clean Air Act to provide a legally enforceable State Implementation Plan for the attainment and maintenance of the National Ambient Air Quality Standards. This program is administered by the State Air Pollution Control Board (Code of Virginia § 10-1.1300).

With an expansive and low-lying coastline, the Virginia coast, which includes the nearshore environment at NASO DNA, is severely threatened by the effects of climate change, including higher average air and water temperatures, rising sea level, and more extreme weather events such as floods, droughts and heat waves. Significant change in relative sea level has been documented in numerous places along the Chesapeake Bay, with many places experiencing a 1-ft (0.3-m) increase over the last century, half of which is attributed to climate change and the other half to natural subsiding coastal lands. The Lower Tidewater Region, including the cities of Norfolk and Virginia Beach, is projected to lose 79% of ocean beach by 2100, without extensive beach re-nourishment. One example of the potential impact from projected sea level rise is the conversion of coastal brackish marsh habitats to less ecologically diverse salt marsh or open water. Hundreds of species that rely on nearshore environment in and around the Chesapeake Bay will be affected by lost habitat and widespread shifts in ecosystem composition and the regional food web (National Wildlife Federation 2008).

Sea level rise caused by climate change has the potential to affect existing coastal infrastructure critical to the DoD. DoD facilities located on the coast, such as NASO DNA, are expected to experience significant changes to environmental resources and man-made infrastructure. The DoD's Strategic Environmental Research and Development Program (SERDP) is currently conducting several vulnerability and impact assessments for coastal installations that are threatened by climate change issues such as rising sea-levels. Project RC-1701, Risk Quantification for Sustaining Coastal Military Installation Assets and Mission Capabilities, is examining approaches that can quantify potential impacts to critical infrastructure and mission performance at Naval Air Station Norfolk, Virginia. Project RC-1701 will develop an integrated, multi-criteria, multi-hazard risk assessment framework that will be used to evaluate changes in risks to coastal military installations and mission capabilities in the Hampton Roads region due to global climate change (SERDP n.d.). Although the study is specifically focused on Norfolk Naval Station, the assessment framework will help policymakers and NRMs develop strategies that support mission adaptation and long-term sustainability at DoD installations throughout the Hampton Roads region (SERDP 2013).

Assessing the impacts of climate change is best approached by identifying an environmental baseline for the future that considers the differences in landscape form and function caused by climate change and other stressors on the landscape (Commander, Navy Installations Command [CNIC] 2012). Therefore, NR staff at NASO DNA and other DoD installations in the Hampton Roads region should continue to pursue partnerships with SERDP, South Atlantic Landscape Conservation Cooperative, Society for Ecological Restoration International, and other regional conservation partners in an effort to assess impacts from climate change and develop appropriate adaptation strategies to protect natural resources in the region. Other ongoing and planned projects that will contribute valuable information towards managing coastal resources includes a survey of primary and secondary dune habitats completed in 2013, and a survey of the nearshore environment (funded for FY2015) (Appendix H).

As a federal facility NASO DNA is exempted from inclusion in the state-designated coastal zone; however management of coastal zone resources does occur across the Installation. All Installation activities are reviewed for their potential impact to coastal zone resources and their compliance with the state's enforceable policies of the CZMA. The Navy strives to avoid and minimize impacts to coastal zone resources to the extent practicable when conducting activities that have the potential to impact these resources. Management actions include monitoring non-point source pollution, marine fish and wildlife species and habitat, and wetlands. The Installation has implemented numerous management practices that benefit the coastal zone and nearshore environment, including protection of stormwater quality (see Section 3.2.4), erosion and sediment controls (see Section 3.2.5), riparian buffer restoration (see Section 3.2.3), and measures to protect marine resources (see Section 3.6). These management techniques directly and indirectly benefit plant and wildlife species, water resources, and habitat that exist in the nearshore environment at NASO DNA.

Implementation of shoreline stabilization projects is under the purview of the NAS Oceana PWD, aside from specific measures that are conducted annually to reduce beach erosion and enhance dune stabilization and restoration.

3.2 WETLANDS AND WATER QUALITY PROTECTION

Due to their importance to the health of the ecosystem and the human environment, a large number of state, federal, and local laws regulate land uses and actions that have the potential to impact wetlands and water quality. Executive Order (EO) 12088, *Federal Compliance with Pollution Control Standards*, and the CWA require federal facilities to comply with all substantive and procedural requirements applicable to point and nonpoint sources of pollution. Accordingly, activities at NASO DNA must coordinate with the CRNMA to obtain certifications and permits required by federal and state pollution control laws applicable to federal agencies. To help facilitate wetland identification and the permitting process, regional and Installation NR personnel must receive wetland delineation and regulatory training in preparing joint permit applications.

The VDGIF recommends conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents re-entry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures. Due to future maintenance costs associated with culverts, and the loss of riparian and aquatic habitat, the VDGIF advises that stream crossings are constructed as clear-span bridges. However, if this is not possible, the VDGIF recommends countersinking any culverts below the streambed at least 6 in (15 cm), or use of bottomless culverts, to allow passage of aquatic organisms. The VDGIF also recommends the installation of floodplain culverts to carry bankfull discharges (VDGIF 2007a).

3.2.1 Wetlands Protection

Waters of the U.S., including tidal and non-tidal wetlands, are protected under federal and state laws. As a result efforts to avoid wetland impacts are the first step to wetland protection. However, instances when impacts to wetlands are unavoidable, the Navy will coordinate with the appropriate regulatory agencies to obtain permits prior to activities that will result in disturbance.

Regulatory agencies that have jurisdiction over wetlands in Virginia include USACE, VDEQ, VMRC, and the local wetlands board. Depending on the wetlands impacted, a permit may be required from one or more of the different regulatory agencies. Concurrent federal and state review is made through a Joint Permit Application process. A number of USACE Nationwide Permits and Regional Permits may be used to streamline the permitting process for activities that have minimal adverse effects on aquatic environments. Compensatory mitigation for unavoidable impacts to wetlands and waters of the U.S. may be required.

*Detailed information regarding current regulatory programs of the USACE
is available at:*

<http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx>

The Virginia Water Protection Permit Program (9 VAC 25-210) requires state permits for any impacts to state waters and wetlands, including isolated wetlands. Activities requiring a permit include dredging, filling, or discharging pollutants into or adjacent to surface waters; otherwise altering the physical, chemical, or biological properties of surface waters; excavating in wetlands; or conducting any of the following activities in wetlands:

- new activities that cause draining which significantly alters or degrades existing wetland acreage or functions;
- filling or dumping;
- permanent flooding or impounding; and
- new activities that cause significant alteration or degradation of existing wetland acreages or functions.

Information on individual and state permit requirements and application procedures is available on the VDEQ website:
<http://www.deq.state.va.us/Programs/Water/WetlandsStreams/PermitsFeesRegulations.aspx>

MILCON and other projects with the potential to disturb wetlands are reviewed individually with regard to wetland impacts, and individual permits are sought as needed. Although permits may be obtained that allow for the filling of wetlands, in accordance with EO 11990, *Protection of Wetlands*, federal agencies may do so only after finding no practicable alternative. Compensatory mitigation for unavoidable impacts to nontidal water and wetlands are generally at the following ratios:

- 2:1 ratio for forested wetlands,
- 1.5:1 for scrub-shrub wetlands,
- 1:1 for emergent wetlands, and
- 1:1 for streams.

3.2.2 Floodplain Protection

Per Executive Order 11988, Floodplain Management requires Federal agencies to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplain development wherever there is a practicable alternative. The EO instructs federal agencies to restore and preserve floodplains and to reduce the risk of flood-related loss by not building in floodplains. Proposed actions should be evaluated to determine if they occur within a floodplain. If the proposed actions are determined to be located within a floodplain the action must comply with applicable FEMA approved floodplain management requirements. If floodplain disturbance is unavoidable, appropriate permits and NEPA documentation must be obtained before any ground-disturbing activities are undertaken.

3.2.3 Watershed Protection

Watersheds associated with the Installation include the Back Bay Watershed and the Rudee Inlet/Owl's Creek Watershed (Figure 2-3), both of which flow into the Atlantic Ocean. The Back Bay Watershed is located within the Southern Watersheds Unit area, which contains some of the most valuable wetland habitat in the region and is recognized as one of the most biologically diverse regions in the state (City of Virginia Beach 2003). The area is particularly important for protecting water quality for the cities of Virginia Beach and Chesapeake. Under the direction of the Hampton Roads Planning District Commission, the cities of Virginia Beach and Chesapeake cooperate in an effort to protect and enhance natural resources, sensitive lands, and water supplies under the Southern Watershed Area Management Program (SWAMP). The mission of the SWAMP, which was developed in 2000, is to protect and enhance natural resources, sensitive lands, and water supplies through a system of cooperative planning and management strategies. A key component of SWAMP is the development of conservation corridors, which provide connectivity for wildlife between primary natural habitats that could otherwise become isolated due to unplanned land use development patterns. The Conservation Plan for the Southern Watershed Area identifies 37 conservation sites throughout the area, some of which are currently protected conservation lands. These sites are prioritized according to site location, size, contribution to SWAMP goals, management needs, vulnerability and immediate or long-term threats, and ecological significance (Erdle et al. 2001). Within the Southern Watershed Area, development activities are regulated through the enforcement of design criteria for sediment control and septic system management and groundwater withdrawal restrictions. At the Installation, development and vegetation clearing within 50 ft (15 m) of any wetland or shoreline will be minimized to the maximum extent practicable.

*An interactive map of the Southern Watersheds Area is available on the website
<http://www.vbgov.com/dept/planning/emc/watershed.asp>*

None of the Installation waterbodies have been identified as impaired by the state; however, several impaired waterbodies are associated with the Back Bay and Rudee Inlet/Owl's Creek Watershed. The Navy supports the protection of watersheds through initiatives such as establishing or enhancing riparian forest buffers along unprotected waterways. Reducing the frequency of mowing or establishing no mowing zones along wetland edges to increase vegetative filters and planting appropriate native trees, shrub, and ground cover vegetation as wetland buffers are effective methods of establishing riparian buffers.

3.2.4 Stormwater Quality

Stormwater management is an important part of water quality protection. The stormwater drainage systems at NASO DNA collect runoff from impermeable surfaces throughout the developed areas of the Installation, which can inadvertently facilitate the transport of pollutants into stormwater drains. Industrial stormwater discharges are regulated by the VPDES and require a permit, and NASO DNA currently is covered by the VPDES stormwater permit that is held for NAS Oceana (expires in 2014).

The NASO DNA SWP3 (Navy 2012) describes the stormwater outflow areas and management standards, stormwater management controls, and best management practices (BMPs) used at NASO DNA to maintain and protect water quality. The only regulated industrial activities on NASO DNA are the boat repair facility in Building 354 and military support activities within the urban warfare compound located in the southern portion of the Installation, which discharges stormwater runoff through Outfall 001. Nonpoint source pollution is monitored at this outfall under the conditions set forth in the Installation's VPDES permit. There are no regulated outflows located in the northern portion of NASO DNA.

To be effective in improving stormwater quality, BMPs must prevent outfall scour, dissipate the erosive energy of concentrated flows, and slow channel flow to help trap sediment and promote infiltration. Sediment basins, pervious pavers, riprap armoring, and rock check dams are useful structural BMPs that may be used. Nonstructural BMPs such as establishing vegetative filters in ditches and on ditch banks are an additional cost-effective way to improve stormwater quality.

Currently the NASO DNA SWP3 does not cover the northern-most area of the Installation (the former Virginia Army National Guard Camp Pendleton and Naval Amphibious Base Little Creek South Virginia Beach Annex portions of the Installation, previously known as Camp Pendleton). The next SWP3 update will be revised to cover stormwater management and BMPs for the northern-most area of the Installation.

The Navy has adopted other practices and participates in programs designed to reduce stormwater runoff and impacts, including applying low impact development (LID) practices and participating in the Leadership in Energy and Environmental Design (LEED) program. LID is an approach to land development that works with nature to manage stormwater as close to its source as possible. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. The LEED program is a series of rating systems that encourages building owners and operators to be environmentally responsible and maximizes resource efficiency.

More information on LID practices is available at: <http://water.epa.gov/polwaste/green/>

More information on LEED program requirements is available at: <http://www.usgbc.org/leed>

3.2.5 Erosion and Sediment Control

NASO DNA's relatively flat topography results in a low potential for erosion and sedimentation. However, activities that remove vegetation and disturb the soil increase the risk of erosion and sedimentation, and require measures to protect water quality. Proposed construction projects that disturb 1.0 ac (0.4 ha) or more must obtain authorization under a VPDES Storm Water Discharge Permit for Construction Activities. Site-specific SWP3s that address runoff control during and after construction activities must be prepared for all construction projects at the Installation. As with SWP3s for industrial discharges, SWP3s for construction sites must be updated as necessary

to remain consistent with any changes needed to protect surface water resources. Sediment basins are a structural control requirement for sites 3.0 ac (1.2 ha) or more. On sites less than 3.0 ac (1.2 ha), sediment basins are encouraged, but other control methods may be employed. Additional guidance on erosion and sediment control will be available in the erosion control plan that is currently being prepared. A copy of this document will be included in Appendix H once available.

Erosion can also be attributed to wildlife damage. Nuisance wildlife, such as nutria, damage streambanks via burrowing and vegetation removal, which can exacerbate erosion within these systems. A management plan is currently under development for the control and management of nuisance species based on a nuisance wildlife inventory completed in 2013. This plan will be provided in Appendix H once available.

The Virginia Erosion and Sediment Control Handbook (2011) is available online at:
<http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/Publications/ESCHandbook.aspx>

Additional erosion and sediment control is provided by the Virginia Erosion and Sediment Control Law (Code of Virginia §10.1-560). This law requires that an erosion and sedimentation plan be written and approved for any land-disturbing activity equal to or exceeding 10,000 square feet (ft²) (929 square meters [m²]) in area. Land-disturbing activities include, but are not limited to, clearing, grading, excavating, transporting, and filling of land. Regulated land-disturbing activities must comply with minimum standards outlined in the Virginia Erosion and Sediment Control Handbook (VDCR-DNH 2011). NR staff must be familiar with standards and specifications in the handbook and perform frequent site visits during construction to help ensure compliance with erosion and sediment control plans and that appropriate BMPs are being implemented. The VDCR provides training and certification in erosion and sediment control, which would assist the NR staff in enforcing erosion and sediment control plans.

Adherence to LID and LEED practices, as discussed in Section 3.2.4, can minimize problems associated with erosion and sediment control.

3.3 ENVIRONMENTAL RESTORATION PROGRAM

The Navy recognizes that adverse impacts to the natural resources addressed in this INRMP may result from the release of hazardous substances, pollutants, and contaminants into the environment. The Navy Environmental Restoration Program (ERP) manages the Environmental Restoration sites, which consist of chemical hazardous waste, and Munitions Response Program (MRP) sites, including hazards associated with munitions and their chemical constituents. The ERP is responsible for identifying such sites, considering their risks, and assessing the impacts to human health and the environment. This assessment must consider endangered species, migratory birds, and biotic communities. The ERP must develop and select response actions when it is likely that a release could result in an unacceptable risk to human health and the

environment. As of July 1998, environmental restoration activities have been accomplished under the Comprehensive Environmental Response, Compensation, and Liability Act under a Consent Order. MRP sites and Potentially Responsible Party sites are managed under their own programs, with state oversight only. The Armed Forces Bill (10 USC 2701) codifies the Defense Environmental Restoration Account, the funding mechanism for installation restoration.

A final decision document was signed in 1999 for two ERP sites at NASO DNA. The sites included an inactive landfill (Site 1) just south of Regulus Avenue and a former pesticide shop (Site 6) on the same site as the current pesticide shop (Building 613) (Figure 3-1). Based on investigation of site conditions, review of data, and assessment of associated risk, the sites pose no threat to human health or the environment and the Navy does not plan to take further action at the sites (Navy 1999). Four other ERP sites (Sites 1-4) also are inactive (Blackwell 2004).

As of June 2012, there are three active sites in the MRP at NASO DNA. The former Skeet and Trap Range, located on the southwestern portion of NASO DNA on the eastern shore of Lake Tecumseh, composed four skeet ranges and four trap ranges, and encompasses approximately 39 ac (16 ha), with approximately half of the former range area extending into Lake Tecumseh. A Site Investigation (SI) conducted in 2011 found potential unacceptable risks associated with polynuclear aromatic hydrocarbons and lead, and recommended remedial investigation to delineate the extent of soil contamination, evaluate the limited potential risks, establish site-specific background levels for the contaminant, and assess risks. It is anticipated that the site will move into the Remedial Investigation phase in FY 2013 (CH2M HILL 2012).

The Moving Target/Mortar Range-South is located in the southeastern portion of NASO DNA, east of the intersection of Regulus Avenue and Bullpup Street. Approximately 17 ac (7 ha) of the range is eligible for the MRP. An SI conducted in 2011–2012 recommended further investigation and identified several mortar fragments. Remedial Investigation activities will be required at the range and may be initiated in FY 2013. Currently, land use controls restrict and/or prevent unauthorized access to this area (CH2M HILL 2012).

The Mortar Impact Area is a cone-shaped area located in the southernmost portion of NASO DNA. Approximately 24 ac (10 ha) of the area is eligible for the MRP. An SI conducted in 2011–2012 identified several anomalies but no mortar fragments. The area will be recommended for No Further Action. Currently, land use controls restrict and/or prevent unauthorized access to this area (CH2M HILL 2012).

The NRM will coordinate with the ERP manager to obtain up-to-date ERP information and recommendations for any natural resources activities that are proposed in the vicinity of any of the NASO DNA ERP sites.

3.4 OIL AND HAZARDOUS SUBSTANCES

The RCRA of 1976 is the primary federal law governing the disposal of solid and hazardous wastes. RCRA regulations are contained in Title 40 of the CFR, Parts 239–299, and include regulations for solid waste (40 CFR Parts 239–259) and for hazardous waste (40 CFR Part 260–279). Virginia regulations solid waste are described in 9 VAC 20-81, and regulations related to hazardous waste are described in 9 VAC 20-60.



Figure 3-1. Former ERP Sites of NASO DNA.

Oil and hazardous substances (OHS) are managed in accordance with the *Hazardous Materials Reutilization, Hazardous Waste Minimization and Disposal Guide*, which was developed to communicate regulatory requirements and management procedures relevant to the utilization of hazardous materials, and minimization and disposal of hazardous waste for several Hampton Roads installations, including NASO DNA. This guide is provided in Appendix H.

OHS are not stored in significant quantities at NASO DNA; however, the prevention of OHS spills is still important for the protection of natural resources and environmentally sensitive areas. Information on the storage and handling of OHS is provided in detail as part of the Spill Prevention, Control, and Countermeasures Plan (SPCCP) and Oil Discharge Contingency Plan (ODCP) for NASO DNA (Navy 2011b). The SPCCP was prepared in accordance with the provisions of 40 CFR Part 112 and OPNAVINST 5090.1C Ch-1. The purpose of the SPCCP is to prevent the discharge of oil from onshore facilities into or upon the navigable waters of the U.S. or adjoining shorelines as well as to ensure early detection and quick response in the event of a discharge of oil. The ODCP was prepared in accordance with Commonwealth of Virginia Oil Discharge Contingency Plan Requirements (9 VAC 25-91-170) and OPNAVINST 5090.1C Ch-1. This type of plan is required for all installations that have a total aboveground oil storage or handling capacity greater than 25,000 gallons (94,635 liters). The goals of the ODCP are to ensure that the Installation can respond to the threat of an oil discharge, as well as contain, clean up, and mitigate an oil spill within the shortest feasible time. These plans contain an inventory and description of each oil storage tank facility, information regarding environmentally sensitive areas, spill notification and response procedures, assessments of worst-case discharge, and post-discharge review procedures. The northern portion of NASO DNA was not included in the SPCCP/ODCP, and is not likely to require one based on OHS storage capacity. Future updates to the SPCCP/ODCP will be prepared in accordance with OPNAVINST 5090.1C, or the current version of this instruction.

To help identify and prioritize the protection of natural resources and sensitive areas, the NOAA Office of Response and Restoration has developed an Environmental Sensitivity Index that illustrates sensitive coastal areas (NOAA Environmental Sensitivity Index 2005). Natural resources identified on ESI maps include shoreline types; the presence of shellfish beds; nesting areas for various types of birds; common local shellfish, finfish, and bird species; and known locations of threatened and endangered species.

ESI maps may be ordered online from <http://response.restoration.noaa.gov/maps-and-spatial-data/download-esi-maps-and-gis-data.html>.

In the event of an oil spill on or near NASO DNA, environmentally sensitive resources in the region (Figure 3-2) that are given protection priority because of their intrinsic value include the following:

- groundwater used for public and private wells;
- marshes, swamps, and other wetlands;
- streams and rivers with high levels of recreational fishing;

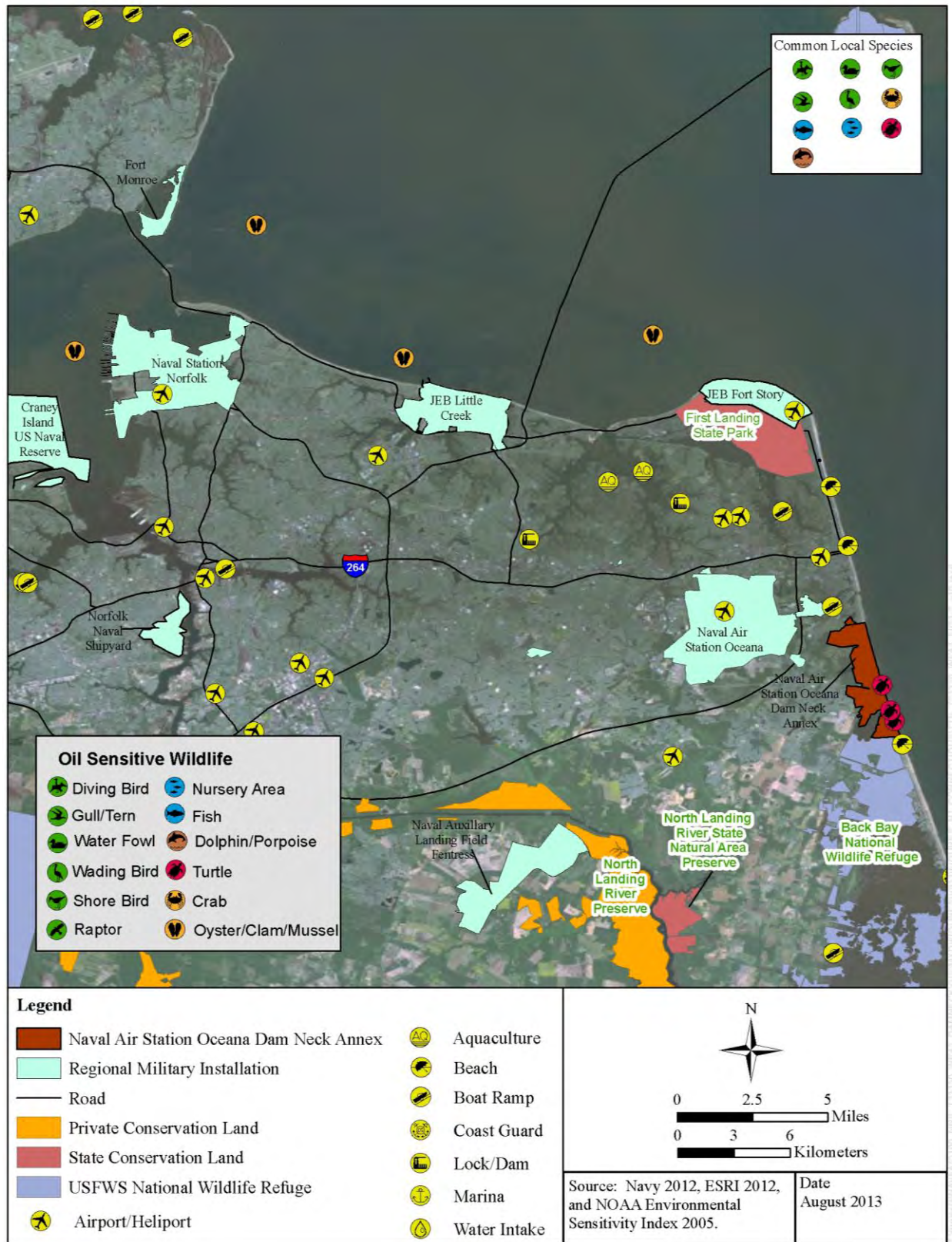


Figure 3-2. Regional Environmentally Sensitive Resources.

- rare, threatened, and endangered species habitats;
- blue crab (*Callinectes sapidus*) habitat;
- waterfowl wintering areas;
- wildlife refuges and sanctuaries;
- SIAs designated by the state of Virginia;
- parks and other recreational areas; and
- residential neighborhoods.

Sensitive areas and resources identified by NOAA within the Installation region are mapped in Figure 3-2.

3.5 THREATENED AND ENDANGERED SPECIES PROTECTION

The primary regulatory protection for threatened and endangered species on military installations is the federal ESA. The federal ESA requires all federal agencies to ensure that any action undertaken is not likely to jeopardize the continued existence of a federally listed threatened or endangered species. Section 7 of the federal ESA requires federal agencies to formally consult with the USFWS (terrestrial species or freshwater fish) or NMFS (marine species) if a proposed action has the potential to affect a listed species. Section 9 of the ESA prohibits the taking of any endangered species without special exemption. The Virginia ESA gives the VDGIF regulatory authority over federally or state-listed fish or wildlife species in Virginia. Therefore, coordination with the USFWS, NOAA NMFS, and/or VDGIF is required when actions have the potential to affect federal or state listed fish and wildlife species.

The Endangered Species Consultation Handbook provides guidance on conducting consultation and conference activities under Section 7 of the federal ESA with USFWS and NMFS and is available on the USFWS website: <http://www.fws.gov/endangered/esa-library/index.html#consultations>.

In 2012, the Navy prepared and issued a Biological Assessment to the USFWS for a shoreline protection project at NASO DNA. The USFWS issued a BO on 03 November 2012 (Appendix F), which contained an update to the 13 July 2011 BO issued to BBNWR to cover NASO DNA. The USFWS concurred with the Navy's determination that the project "may affect, but is not likely to adversely affect" roseate tern and seabeach amaranth. The USFWS determined it was unlikely that piping plover would utilize the Installation; therefore, at the time the USFWS concurred with the Navy's determination of "may affect, but is not likely to adversely affect" for this species. (Note: piping plover has subsequently been documented at NASO DNA.) The USFWS also concurred with the Navy's "no affect" determination for impacts to leatherback and Atlantic hawksbill sea turtles, as no records of nesting attempts by these species have been documented in Virginia. The USFWS requested that the Navy address concerns regarding proposed management for loggerhead, Kemp's ridley, and green sea turtles, and piping plover.

The 13 July 2011 BO includes sea turtle nest monitoring and management protocols. If a loggerhead, Kemp's ridley, or green sea turtle nest is observed at the Installation, it will be left in situ, except in the case when operational uses of the beach would result in the take of a nest. In these cases, the Navy will coordinate with the USFWS BBNWR in accordance with the 13 July 2011 BO. Sea turtle protection is discussed in greater detail in Section 3.5.1.

As discussed in Section 2.6.2.1.1, the USFWS is currently reviewing eastern small-footed bat, northern long-eared bat, and little brown bat for potential listing under the ESA. Management for this species, including protection of potential habitat and conducting surveys for these three species at NASO DNA, is an important component of threatened and endangered species protection at the Installation. The Installation also contains several bat boxes that were installed as part of the Installation Nest Box Program (see Section 3.10.5).

Projected climate change impacts to natural resources, as described in Section 2.1.1 and Section 3.1, could result in significant impacts to threatened and endangered species and their habitats. The effects of climate change on fish and wildlife are highly variable, including geographic range shifts, changes in relative species abundance, phenology, and other ecological aspects of their biotic communities. There is already evidence of disruptions in community dynamics, such as predator-prey and plant-insect interactions, alterations in biogeochemical cycles, and increased disease, pest, and non-native species invasions. The rapid pace of recent environmental change has increased the threat of extinction, as species are not able to adapt to changing environments quickly enough. Specific climate change stressors that can impact threatened and endangered species include increases in sea level; increases in surface and ocean temperatures; increases in carbon dioxide concentrations; changes in precipitation; increases in diseases, pests, and non-native species; and increases in the frequency and severity of storm events (Society for Ecological Restoration International 2009). To address potential impacts to listed species from climate change, the Navy is working with the South Atlantic Landscape Conservation Cooperative to address increasing land use pressures and widespread resource threats and uncertainties amplified by a rapidly changing climate (South Atlantic Landscape Conservation Cooperative 2010). Additionally, as described in Section 3.1, the DoD's SERDP is currently conducting several vulnerability and impact assessments for coastal installations that are threatened by climate change issues such as rising sea-levels, including a project that is examining approaches that can quantify potential impacts to critical infrastructure and mission performance to installations located in the Hampton Roads region.

An update to the rare, threatened, and endangered species inventory of NASO DNA is scheduled for 2014.

3.5.1 Sea Turtle Protection

Five species of sea turtles, including loggerhead, Kemp's ridley, leatherback, Atlantic hawksbill, and green sea turtles are known to occur in the Atlantic Ocean off the coast of NASO DNA. Loggerhead and Kemp's ridley sea turtles have been documented nesting on the beaches of NASO DNA. Green sea turtles have been documented nesting on Virginia beaches located north and south of NASO DNA. Since 2008, beach monitoring has been conducted daily from 15 May through 31 August, when sea turtles are most likely to nest in the area. The monitoring protocol, as described in the Standard Operating Procedures for sea turtles at NASO DNA (Appendix F)

consists of making several passes up and down the approximately 4.0-mi (6.4-km) stretch of beach in an all-terrain vehicle. The vehicle's headlights are covered with a red filter to reduce disturbance to turtles and other wildlife encountered. All observed sea turtle activity including false crawls, attempted nesting, and successful nesting are noted and global position system (GPS)-located by NR personnel and reported to the USFWS and VDGIF. Successful nest sites are marked to alert beachgoers of their existence, and protected with a wire cage to prevent predation. Nests are monitored throughout the incubation period for storm damage, hatching activity, and predation. Nest success evaluations are conducted for all nests subsequent to hatching, predation, or 100 days post-deposition. Nests will only be moved if operational uses of the beach would result in the take of a nest. In such cases, the Navy will coordinate with USFWS, VDGIF, and BBNWR. Nest relocation will be conducted in accordance with the methods outlined in the 13 July 2011 BO (Appendix F).

NR personnel that conduct turtle monitoring and nest relocation are trained by USFWS, VDGIF, and/or NAVFAC personnel in the identification of turtle crawls and the subsequent protection of nests. NR personnel record all sea turtle strandings (alive and dead) that occur on NASO DNA and coordinate with the Virginia Aquarium's Stranding Team. Annual stranding data is obtained from the Virginia Aquarium's Stranding Team and cross-referenced with the Navy's records annually. The consolidated list of strandings is kept in a marine resources stranding database (Appendix F). Data entered into the database includes a Virginia Aquarium and Marine Science Center identification number, species, size, gender, location (in latitude and longitude), and condition of stranding (alive, fresh, moderately decomposed, severely decomposed, etc.).

Stranding information that is applicable to sea turtles and marine mammals is discussed in Section 3.6.

3.5.2 Piping Plover, Red Knot and Roseate Tern Protection

If a piping plover, red knot, or roseate tern is encountered at NASO DNA, the observer should gather as much information as possible, but should not approach the bird. It is a federal violation to harass or otherwise disturb a listed species, or any migratory bird. Gather location (GPS if possible) and time, photograph, and notate the conditions and the bird's behavior. This information should be forwarded immediately to the NAVFAC Mid-Atlantic NR staff at (757) 341-0495 or Michael Wright at (757) 433-4361.

Protective measures for protected bird species known or with the potential to occur at NASO DNA include:

- maintaining at least a ¼-mile (0.4 km) buffer around nesting sites to minimize human disturbance to nesting birds, and avoiding noise and disturbance during the nesting season (late April to late July for piping plover; 15 May through 15 August for roseate terns);
- respecting fenced or posted wildlife protection areas;
- keeping pets, people (other than NRMs), or boating activity away from foraging and resting areas, and seabird nesting islands (roseate tern) during the nesting season—if the birds flush, you are too close;

- keeping pets leashed and cats indoors;
- controlling predators, including but not limited to, gulls, mink (Family Mustelidae), and raccoons;
- disposing of trash and food scraps in appropriate receptacles in beach or dune areas, as garbage can attract predators, which may prey on protected birds, or their eggs or chicks (if nesting);
- managing native vegetation at nest sites and controlling exotic vegetation;
- using artificial nest sites to provide additional cover at some nesting islands (roseate tern); and
- establishing and maintaining an emergency response plan for oil and chemical spills.

3.6 MARINE RESOURCES PROTECTION

Marine resources, including marine mammals, sea turtles, snakes, fish, and shellfish, that occur or have the potential to occur in the nearshore environment and off the coast of NASO DNA, are protected by several federal and state laws and EOs. Regulations such as the MMPA (16 USC §1361 et seq.), the Magnuson-Stevens Fishery Conservation and Management Act (16 USC §1801-1884), and the ESA require the Navy to coordinate with the NMFS and USFWS prior to implementing actions that will impact managed and/or protected species. The MMPA established a moratorium, with certain exceptions, on the “taking” of marine mammals in U.S. waters and by U.S. citizens on the high seas, and on the importing of marine mammals and marine mammal products into the U.S. The NMFS administers NOAA’s programs, which support the domestic and international conservation and management of living marine resources. To these ends, several marine mammal stranding centers were established to assist and aid stranded or beached animals.

Shore patrols and other units that may occasionally encounter stranded marine mammals or sea turtles should adhere to the protocol established by the CNO (OPNAVINST 3100.6H REF A, Special Incident Reporting) Environmental Readiness Division, as outlined in the recommendations provided below and the stranding procedures included in Appendix F, Enclosure 1. These recommendations apply to any stranded marine mammal that appears to be injured, disoriented, or dead:

- The Installation CO will immediately contact the NMFS Regional Stranding Coordinator in the event of a live or dead marine mammal or sea turtle stranding at the Installation, with notification to CNO Environmental Readiness Division (OPNAV N45) occurring immediately thereafter. The NMFS Regional Stranding Coordinators for the Northeast Region, including Virginia, are Mendy Garron and Lani Hall, who can be reached at (978) 282-8478.
- In addition to contacting the NMFS Regional Stranding Coordinator and notifying CNO Environmental Readiness Division (OPNAV N45), the Northeast Region Marine Mammal and Sea Turtle Stranding & Disentanglement Network will be contacted, which is authorized by federal law to respond to marine mammal and sea turtle strandings. The

Virginia Aquarium and Marine Science Center responds to marine mammal and sea turtle strandings in the vicinity of NASO DNA when available and should be contacted immediately in the event of a stranding. The NOAA Fisheries Hotline contact information has been provided as an alternate contact, if necessary.

Virginia Aquarium and Marine Science Center Stranding Hotline
Virginia Beach, VA
(757) 385-7576

NOAA Fisheries Marine Mammal and Sea Turtle Stranding and Disentanglement Hotline
(866) 755-NOAA (6622)

- Monitor the stranded animal from a minimum distance of 100 yards (91 m). Crowding the animal is unsafe for the observer as well as the animal. Do not touch any live or dead animals, as wild animals can carry diseases, parasites, and bacteria, which can be transmitted to humans. Do not attempt to push the animal back into the water and if it goes back into the water on its own, do not attempt to follow after or swim with it.
- Carefully observe the animal's position and monitor its breathing. Wait for responders from NMFS and/or the Northeast Stranding Network to arrive and direct them to the animal. Relay all observations to the responders so that they can provide the best possible care for the stranded mammal or sea turtle.

The VIMS Sea Turtle Stranding Program, established in 1979, responds to strandings in the Chesapeake Bay region. Turtles that require rehabilitation are transported to the Virginia Aquarium's Stranding Program Rehabilitation Center in Virginia Beach. In the event that that Virginia Aquarium is unavailable, the Sea Turtle Stranding Coordinator can be reached at (804) 684-7313.

Dead or injured marine mammals that are sighted offshore should be reported to NR staff who will act as the liaison between the activity and regulatory agency representatives. As a further effort to protect marine resources, NR personnel must receive training in the identification of marine mammals and sea turtles, and should be available to assist other Installation personnel in their identification when needed.

The Virginia Aquarium, formerly the Virginia Marine Science Museum, has studied the large populations of bottlenose dolphins which inhabit the waters of NASO DNA from spring to autumn. The Aquarium is an excellent resource for marine mammal questions concerning habitat and management. The NRM should coordinate with the Virginia Marine Science Museum regarding concerns related to marine mammals at NASO DNA.

To report a stranded marine animal to the Virginia Aquarium's Stranding Response Team, call (757) 385-7576. These lines are open 24 hours a day. More information is available on the Virginia Aquarium website:

<http://www.virginiaaquarium.com/research-conservation/pages/report-a-stranding.aspx>

In accordance with the MMPA, and NAVFAC's Interim Environmental Policy No. 10-001, MMPA Compliance for In-Water Construction (February 2011), the Installation should evaluate any action that produces sound in water where marine mammals are present to determine if a "take" authorization is required in the form of an Incidental Harassment Authorization or a Letter of Authorization from the NMFS Office of Protected Resources. Accordingly, all in-water Installation activities that impact marine mammals will be coordinated with OPNAV N45. Permits, if necessary, will be obtained through the appropriate federal agencies.

EO 13547, *Stewardship of the Ocean, Our Coasts, and the Great Lakes*, adopts the recommendations of the Interagency Ocean Policy Task Force, except where otherwise provided in the order, and directs executive agencies to implement those recommendations under the guidance of a National Ocean Council. This EO establishes a national policy to ensure the protection, maintenance, and restoration of the health of ocean, coastal, and Great Lakes ecosystems and resources, enhance the sustainability of ocean and coastal economies, preserve maritime heritages, support sustainable uses and access, provide for adaptive management to enhance understanding of and capacity to respond to climate change and ocean acidification, and coordinate with our national security and foreign policy interests. This order also provides for the development of coastal and marine spatial plans that build upon and improve existing federal, state, tribal, local, and regional decision-making and planning processes. These regional plans will enable a more integrated, comprehensive, ecosystem-based, flexible, and proactive approach to planning and managing sustainable multiple uses across sectors and improve the conservation of the ocean, our coasts, and the Great Lakes.

The marine resource assessment completed in 2003 for the Cherry Point and Southern Virginia Capes inshore and estuarine areas (Navy 2003) describes the habitat types and species that could be impacted by training and operations that occur on the beaches and nearshore areas of NASO DNA. A habitat assessment and species inventory of the nearshore area will provide information on marine resources within this environment, and will identify rare, threatened, and/or endangered species. The nearshore assessment will assist with natural resources management decisions within this habitat.

3.7 HABITAT CONSERVATION AND RESTORATION

The Navy recognizes the importance of conserving species at risk before they become critically imperiled, requiring protection by the federal ESA. Therefore, conservation and restoration of significant natural habitats that support rare and unusual species at NASO DNA are a key focus of the NRP. Additionally, habitat and conservation efforts at NASO DNA should account for projected impacts from climate change which could result in altered habitat, especially along the coast.

The VDCR-DNH has recognized several SIAs at NASO DNA (Figure 3-3 and Table 3-1) whose protection will help protect such resources as well as enhance biodiversity on the Installation. Site descriptions and management recommendations summarized from VDCR-DNH reports for NASO DNA (Buhlmann et al. 1992, Evans and Belden 2010, Van Alstine et al. 2001, and VDCR-DNH 1990) follow.



Figure 3-3. Special Interest Areas of NASO DNA.

Table 3-1. Special Interest Areas of NASO DNA.

Special Interest Area	Acres
Dune and Swale	143
Lovetts Marsh	129
Interdunal Swale, Dune, and Freshwater Marsh	75
Middle Beach Dunes	43
Southeast Redwing Lake Wetlands	15
Helicopter Pad Wetlands	13

3.7.1 Dune and Swale Special Interest Area

The Dune and Swale SIA at NASO DNA contains the Installation’s most significant maritime forest community, a small interdunal swale, and includes a number of state-rare plant species, including bluejack oak, American halfchaff sedge, Long Beach primrose-willow, fasciculate beaksedge, and early white-top fleabane. Bluejack oak, Long Beach primrose-willow, and early white-top fleabane are both imperiled (S2) and fasciculate beaksedge and American halfchaff sedge are critically imperiled (S1) in Virginia (Townsend 2012). The entire area encompasses approximately 135 ac (54 ha), and consists of an approximately 1.75-mi (1.2-km) long, approximately 0.2-mi (0.3 km) wide section of beach, dunes, and interdune. An interdune pond, which is a significant natural community, occurs immediately south of the MACS 24 radar station. The pond, although apparently altered by dredging and impoundment by a road, supports an interesting assemblage of native vascular plant species, which differs from other interdune ponds of Virginia and indicates the need for further study. The interdunal pond is under increasing pressure from encroaching patches of the invasive species common reed (*Phragmites australis*) (Evans and Belden 2010) (see Section 3.12.1). One state-rare animal, the s-banded tiger beetle, also has been documented at this site.

Past disturbances that have threatened the integrity of the dune and swale system include intensive military training exercises, roadwork, and construction activities, such as the MACS 24 radar site, the remnants of old roadbeds within the interdune areas, and the LCAC access path running from the south end of the Installation to the turnaround area near the center of the site. These activities have eliminated much of the vegetation of the primary and secondary dunes as well as impacted the interdune swales on the site. Navy efforts to prevent further loss of habitat are detailed in the shoreline erosion stabilization plan developed by NAVFAC Atlantic (Navy 1991) and updated in 2010. Restoration of the dunes and shoreline include a variety of infrastructure management, including beach replenishment and dune restoration activities. Specific activities include rebuilding beach contours by relocating and importing sand, placement of Christmas trees to stabilize dunes, installation of sand fences to build dunes and prevent blowouts, planting of beach and dune vegetation to stabilize the dunes, and placement of benchmarks to monitor sand levels. Realignment of the road system in 1993–1994 in the southern portion of the Installation, and removal of concrete from the old roadbed is allowing recovery of the interdune swale system.

Uses of the site that continue to present threats to the rare plants and their habitats are off-road vehicles and training that cut through the dune systems, and a LCAC turnaround area in the center of the protection area. Development of the urban warfare compound adjacent to this SIA resulted in some loss of habitat in the dune and swale systems. Development and off-road vehicle use, including LCAC training, are the primary threats to the integrity of this protected area. To protect these significant natural resources, future development of this area should be avoided, and amphibious training should be restricted to designated training areas. The dune delineation report is currently being developed and should be reviewed once finalized to develop recommendations for prioritizing restoration efforts to prevent further damage to the remaining intact dunes. Additionally, greater stabilization efforts would help build existing dunes.

3.7.2 Lovetts Marsh Special Interest Area

The Lovetts Marsh SIA is approximately 124 ac (50 ha) and contains what remains of an isolated emergent marsh documented on 1891 topographic maps as the only site of its kind from Cape Henry to the North Carolina border. The VDCR-DNH report (Van Alstine et al. 2001) states that open areas of marsh were evident on aerial photographs as late as 1965, and that later ditching and development lowered the water table, increased the drainage rate, and resulted in the succession from open marsh to forested wetland. State-rare plants fasciculate beaksedge and saltmarsh umbrella-sedge also have been reported to occur within the boundaries of this SIA. Fasciculate beaksedge is critically imperiled (S1) in Virginia and saltmarsh umbrella-sedge is possibly extirpated (SH) (Townsend 2012). Developments within the site boundary include roads and the urban warfare compound.

Based on the historical basis for the presence of a freshwater marsh at this site and plot data collected in 2000, VDCR-DNH determined that a significant interdune pond community and the presence of two state-rare plant species, fasciculate beaksedge and saltmarsh umbrella-sedge, at this site were worthy of protection. The boundary of the SIA includes the significant community, rare plants, and the surrounding buffer area needed to protect the hydrology of the site. Current threats to the site include road building, roadwork, and troop activity in the vicinity of the protected area. The interdunal pond is also under increasing pressure from encroaching patches of common reed (Evans and Belden 2010) (see Section 3.12.1).

As described in Section 2.3.7, efforts were undertaken in 1996 to control invading hardwoods by restoring the hydrology of Lovetts Marsh to pre-disturbance conditions. The water level at the site will continue to be maintained at approximately 3.5 ft (1.1 m) until hardwood control is achieved. Some tree canopy removal also may be undertaken if the current hydrological manipulations do not reduce the red maple canopy.

In 2011 the USFWS installed a weir on the southern portion of Lake Tecumseh in an attempt to restore the watershed's hydrology back to more natural conditions (conditions that existed prior to creation of ditches that connected Lake Tecumseh to Back Bay). The installation of the Lake Tecumseh weir is showing positive results upstream, which also is assisting the Navy to achieve their management goals for Lovetts Marsh. The USFWS is tracking the effects of the Lake Tecumseh weir project throughout the watershed and periodically provides collected data for this project to the NRM.

3.7.3 Southeast Redwing Lake Wetlands Special Interest Area

The Southeast Redwing Lake Wetlands SIA provides habitat for the greater siren, a former state watch list species and a Tier IV (Moderate Conservation Need) species identified in the Virginia SWAP. Sewage and stormwater runoff from the NASO DNA housing area located adjacent to this wetland area may be impacting this SIA. Additional site investigations are required to determine special management needs for this SIA.

3.7.4 Middle Beach Dunes Special Interest Area

The Middle Beach Dunes SIA encompasses an extensive area of vegetated primary and secondary dunes and areas of interdunal swale wetlands. The dune system in this protected area is relatively undisturbed and supports a large area of maritime dune woodland, which is considered a significant natural community by the VDCR-DNH. Currently, few roads bisect the area and development has only encroached around the edges. Restricting vehicle use within the dune system and continuing to protect the area from development are the only management actions necessary for maintaining this habitat and its native species.

3.7.5 Helicopter Pad Wetlands Special Interest Area

The Helicopter Pad Wetlands SIA was designed to protect a wetland community that contains American spongeplant and greater siren habitat. The greater siren is currently a Tier IV (Moderate Conservation Need) species in the Virginia SWAP, and is a former state watch list species. The American spongeplant is no longer tracked by the VDCR-DNH; however, it is in the Navy's best interest to continue to protect the habitats of these fairly rare species in order to maintain their current population levels and prevent them from becoming state or federally protected. Special management consideration for this area is needed due to the attractiveness of this habitat to birds and wildlife, which has the potential increase the BASH risk in the vicinity of the helicopter pad located within this SIA.

3.7.6 Interdunal Swale, Dune, and Freshwater Marsh Special Interest Area

The Interdunal Swale, Dune, and Freshwater Marsh SIA in the southern portion of NASO DNA contains the most significant example of interdunal swale wetlands at the Installation. Although this swale is bisected by Regulus Avenue and has been partially filled, it is a unique habitat type that supports two state-rare plant species: the early white-top fleabane, imperiled (S2), and fasciculate beaksedge, critically imperiled (S1). The swale wetland and its unique vegetation extend to the west side of Regulus Avenue to an area that was planted with loblolly pines during the 1970s.

A network of drainage ditches in the western portion of the protected area is promoting succession from open marsh community to swamp forest and pine intrusion from the planted pines. Plugging these ditches would likely increase flooding in the surrounding area and is not considered a management option. Pine removal was recommended by VDCR-DNH (Buhlman et al. 1992) if it can be accomplished without detriment to the existing herbaceous vegetation. In 2003, Hurricane Isabel destroyed a portion of the standing timber, although a storm damage assessment was not conducted. A report is currently under preparation for the dune delineation completed at NASO DNA in 2013. This report should be reviewed once finalized to identify

recommendations for prioritizing restoration efforts within the dune and swale areas of the Installation. A copy of the finalized report will be included in Appendix H once available.

3.7.7 Dune Protection

The NASO DNA dune systems are part of an important natural ecosystem that is being lost to development throughout much of its original range. Dune protection is especially critical at NASO DNA because of the unique training opportunities they support and the protection from storm surges and wave action they provide to the Installation and infrastructure. The dune system and its habitats are extremely sensitive to human disturbances such as vehicular and foot traffic and development. In an effort to protect these significant resources, beach and dune access at NASO DNA is limited to a small number of boardwalks and all beach traffic must be authorized. Appropriate NEPA documentation and a federal coastal consistency determination may be required prior to conducting training or other activities that have the potential to impact the dune area.

In accordance with ecosystem management principles and as a component of habitat conservation, dune restoration projects, such as planting vegetation, posting signs, and installing fences is conducted as needed at NASO DNA. Efforts to reduce erosion and stabilize dunes include a variety of beach replenishment and dune restoration activities, including the placement of sand fencing and recycled Christmas trees around dune bases. The sand fencing and Christmas trees serve to trap windblown sand, discourage disturbance, and encourage the natural growth of new vegetation on the dunes. Clean Christmas trees with no tinsel or ornaments are brought to collection sites. The Disaster Preparation Team installs the Christmas trees and sand fencing in coordination with NR personnel who are trained in coastal ecology and shoreline stabilization.

Planting beach grasses and other appropriate dune vegetation in areas where sand has accumulated would further serve to stabilize the dunes and contribute to dune restoration. Appropriate plant species include American beachgrass, sea oats, coastal panic grass, seaside marsh-elder, and seaside goldenrod. Dune sand is relatively low in plant nutrients, and although dune plants are adapted to this condition, the addition of small amounts of fertilizer, primarily nitrogen and phosphorus, is useful for promoting rapid establishment of transplants and encouraging existing vegetation. Fertilizers however, should not be used indiscriminately in the beach and dune area, and should not be used on well-established dune vegetation. Excess nutrients may encourage non-native, invasive species and increase the occurrence of plant diseases. Excess nitrogen also may leach through beach sand and pollute groundwater (Broome 2004).

Monitoring of dune stabilization and restoration efforts is important to the success of dune protection. Monitoring would best be accomplished through aerial photo interpretation as changes in vegetative cover are easily observable between historic and current aerial imagery. Changes in vegetative cover can be mapped over time including recent changes, which can be correlated to dune stabilization efforts. Specific stabilization activities such as grass sprigging, fertilization, fencing, Christmas tree placement, and sign posting would have to be documented in order to assess their effectiveness. The dune delineation report is currently being prepared and should be reviewed once finalized to identify and prioritize additional dune protection measures that should be implemented. Copies of reports for the Dune Sustainability (Dune Surveys and

Plantings) 2010 survey, and the Cooperative Ecosystems Studies Unit Dune Restoration 2012 survey conducted at NASO DNA are included in Appendix H, and a copy of the dune delineation report will be included in Appendix H once finalized.

3.7.8 Shoreline Stabilization

Shoreline stabilization is another ongoing natural resources issue at NASO DNA. Training facilities and Installation infrastructure that are located along the shoreline or that breach the dune system are particularly vulnerable to storm damage and must be protected through shoreline stabilization and restoration. To date, two major shoreline stabilization and restoration projects have been implemented at NASO DNA: the Bachelors Officers Quarters (BOQ) and Shifting Sands Club beach restoration on the middle portion of NASO DNA, and the LCAC training area in the northern portion of the Installation (Navy 1991).

The shoreline stabilization project in the BOQ area at NASO DNA was implemented to protect the BOQ, the Shifting Sands Club, and the weapons gunline from beach erosion and storm surge damage. The project included the construction of an artificial dune that extends from the BOQ approximately 5,280 ft (1,609 m) along the beach to Building 127, which is south of the weapons gunline on Viking Avenue. Initial dune restoration and beach nourishment was completed in June 1996. The constructed sand dune consists of two sections with natural stone cores that are 37 ft (11 m) wide by 9 ft (2.7 m) high. The stone core was covered by sand to create a dune that is a total of 98 ft (30 m) wide and 22 ft (6.7 m) high. The top of the dune was sprigged with a combination of American beach grass, Atlantic coastal panic grass, sea oats, and bitter panic grass to help stabilize the sand.

The beach in front of the constructed dune was replenished to provide additional storm protection. Approximately 680,000 cubic yards of sand were used for the beach restoration. Periodic beach replenishment using approximately 635,000 cubic yards of beach quality sand will occur on a six-year cycle. In 2003, Hurricane Isabel caused extensive erosion and exposed the rock core of the constructed dune. The beach was refilled in the winter of 2004. Future beach nourishment should be implemented contingent on the results of beach monitoring, and should only proceed after appropriate state and federal permits are obtained.

The shoreline stabilization project in the LCAC training area was designed to repair a breach in the dunes and a severely eroded roadway, and protect significant dune and interdunal swale wetlands. The shoreline and dunes were restored to original contours by relocating and importing sand. Christmas trees were collected from regional Navy installations and were placed to help stabilize the dunes and sand fencing was installed to help build the dunes and prevent wind blowouts. Beach grasses also were planted to further stabilize the dunes. Benchmarks were installed to facilitate future monitoring of sand levels. The project was completed in 1995. Recent surveys of the LCAC training area show that, although some habitat recovery was accomplished, accelerated erosion rates are still critical problems in the area (VIMS 2004).

Copies of reports for the Dune Sustainability (Dune Surveys and Plantings) 2010 survey, and the Cooperative Ecosystems Studies Unit Dune Restoration 2012 survey conducted at NASO DNA are included in Appendix H.

3.7.9 Pollinators

The Navy has recognized the important ecological role played by pollinators, and encourages installations to foster pollinator habitats. As a group, pollinators are threatened worldwide by habitat loss and fragmentation, pesticides, disease, and parasites (USDA NRCS n.d.). According to the USDA NRCS native pollinators are attracted to diverse, colorful floral sources that provide a succession of flowers. Providing flowers of different shapes and sizes will attract pollinators with different body sizes and mouthparts. Use of native plants is preferable since these are usually adapted to Virginia's growing conditions and native pollinators have evolved with these plants.

More information on habitat development for pollinators, including recommended plant species for the Mid-Atlantic Region, is available at <http://www.xerces.org/fact-sheets/>.

3.8 SHADE TREE AND URBAN FOREST MANAGEMENT

Shade tree and urban forest management is an important issue at NASO DNA because of the level of development and large number of people that work and live at the Installation. Shade tree and urban forest resources at NASO DNA, however, are very limited and the dominant urban landscape features are mowed lawn and open field. Improving shade tree and urban forest resources through participation in programs such as Tree City USA and implementation of the Tree Preservation and Replacement Instruction for Navy Region, Mid-Atlantic Installations (Appendix D) is a high priority of the NRP.

Tree City USA certification is awarded to communities with urban forestry programs that meet several qualification criteria. Specifically, the community must:

- have a tree board or department;
- implement a tree care ordinance;
- support a forestry program with an annual budget of \$2 or more per capita; and
- participate in an annual Arbor Day observance and proclamation.

Details about the Tree City USA program qualification standards and certification are on the National Arbor Day Foundation website:

<http://www.arborday.org/programs/treecityusa.html>.

The application for recertification by the Tree City USA program is available online at:

<http://www.arborday.org/programs/treeCityUSA/apply.cfm>

NASO DNA was first awarded certification in 1999. Receiving the Tree City USA award from the National Arbor Day Foundation is recognition that NASO DNA has a progressive urban forest management program that is striving to improve this resource. In order to be recertified each year, NASO DNA must continue to meet these criteria and submit a recertification package to VDOF. A recertification application and a proclamation (2012) are included in Appendix D.

In accordance with the draft Tree Preservation and Replacement Instruction (Appendix D), NR staff are required to review new grounds maintenance contracts prior to issuance and oversee tree pruning or removal orders. Proponents of all projects and activities that may affect existing trees are required to consult with NR staff to identify all trees in the affected area and to develop a project/activity-specific tree preservation plan in accordance with this policy.

3.8.1 Beneficial Landscaping

Direction for grounds maintenance and urban forestry at NASO DNA comes from several sources. Foremost is EO 13148, *Greening the Government Through Leadership in Environmental Management*. This EO requires federal agencies to incorporate the principles and practices of beneficial landscaping as specified in the Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds (60 FR 40837). Specifically, federal projects are required, to the extent practicable, to:

- use regionally native plant species,
- use construction practices that minimize adverse effects on the natural habitat,
- reduce fertilizer and pesticide use,
- use water-efficient practices, and
- create outdoor demonstrations to promote awareness of the environmental and economic benefits of beneficial landscaping.

The use of regionally native plant species, which are generally better suited for local site conditions than nonnative species, reduces the need for intensive maintenance and the use of fertilizers and pesticides. Native plant species also are less likely to become invasive pests than nonnative species and serve as better sources of food and cover for native wildlife.

Effective use of native trees and shrubs in landscaping also can provide economic and environmental benefits to NASO DNA. When properly placed around buildings, trees and shrubs reduce energy consumption by moderating the effects of the sun and wind. Planting deciduous trees on the east- and west-facing sides of buildings provides summer shade, and planting evergreens on the north-facing side blocks cold winter winds. Other benefits provided by landscape plants include water conservation and water quality improvement. Trees and shrubs in the landscape reduce the impact of precipitation, reduce flow velocities, and capture and store excess runoff. In addition, landscaping with a variety of trees and shrubs provides habitat that attracts wildlife to the urban environment, which benefits both the wildlife and their human observers.

Selecting species that are suitable for a site requires knowledge of plant characteristics such as the species mature size, longevity, tolerance to soil compaction and pollution, and susceptibility to disease and insect pests. A list of plant species native to the region and suitable for landscaping purposes is in Appendix D. Plant characteristics and site requirements for each species are included in the list. The plant species listed are common commercial plants that may be purchased from the VDOF tree nursery or local nurseries that specialize in native plants. Not all species offered by these nurseries are native, so care must be taken when placing orders.

Beneficial landscaping practices also are associated with LID practices and LEED program requirements, as discussed in Section 3.2.4.

3.8.2 Selection of Plant Materials for Landscaping

The size of plants to be used depends on budget, site conditions, planting season, available labor, and desired results; however, only plants that are native to the coastal plains physiographic province of Virginia should be utilized for vegetation and landscaping activities on the Installation. Final approval of species to be planted should be obtained from the NRM prior to planting.

A list of plants that are native to the coastal plains physiographic province of Virginia is available on the VDCR-DNH website:
http://www.dcr.virginia.gov/natural_heritage/nativeplants.shtml#buy.

Small bare-root seedlings (whips) or cuttings (live stakes) are available in bulk quantities from the VDOF tree nursery. These seedlings are suitable for large-scale reforestation projects. Because they have relatively undeveloped root systems, bare-root seedlings are likely to dry out on poor, compacted, urban soils and are better suited for less disturbed sites. Container-grown stock is more expensive, but is less susceptible to drying and is better able to compete with surrounding vegetation. Sizes of containers vary from 6-in (15-cm) tube-grown seedlings (tublings) to large pots or balled and burlapped saplings. Two- to three-gallon container-grown stock is widely available from private nurseries, survives transplanting better than bare-root, and is appropriate for use on a wide range of sites. Areas up to several acres in size can be planted economically with this size planting stock. Large balled and burlapped stock also has a good survival rate after transplanting in poor or compacted urban soils, but is more costly per plant and is more labor intensive to transport and install than smaller stock. Balled and burlapped stock is most suitable for planting around buildings, along streets, and in high-visibility areas that are required to look good quickly. Planting a mixture of sizes of woody plants is an option that creates more diversity and a more naturalistic appearance.

During vegetation removal and revegetation activities there is an increased risk of BASH incidents until vegetation establishes and matures. Coordination with the onsite USDA BASH biologist and the Installation NRM will minimize potential BASH risk associated with revegetation activities. Vegetation selection should be conducted in such a manner to minimize BASH occurrence. If utilizing seed, it is recommended that slit seeding be utilized to minimize BASH concerns in the vicinity of the helipad.

3.8.3 Planting

The planning process should allow for planting during a suitable season. The type of planting stock used, in part, determines the appropriate time for planting. Bare-root seedlings should be planted in the spring before the emergence of new leaves. Larger woody material is best planted in the late fall after leaves have dropped. At this time transpiration is minimal and root growth increases. Since roots are often damaged in the transplanting process, planting during the fall allows additional time for root development before the summer months when transpiration peaks. Ground cover can be planted at any time, as long as there is adequate rainfall or available supplemental watering.

Proper tree planting is another vital element of a healthy urban forest. Using correct planting methods can increase a tree's ability to become established quickly and improve its health and longevity. Planting techniques differ somewhat with the type of material being planted, although the goal of each is to provide an environment that encourages root growth. Guidelines that apply to most types of planting stock are that the planting hole should be three to five times greater in diameter than the root ball of the material to be planted and only as deep as the root ball. It is important not to bury the roots too deeply or they will not be able to get enough oxygen. Appropriate planting guidelines for various plant materials are presented in Appendix D. Soil amendments should not be added directly to the planting holes for trees and shrubs. These amendments cause problems with soil moisture and root growth. If fertilizers are applied, it is important to use a slow-release product with low solubility so nutrients are not easily leached away. To ensure the greatest chance of survival, urban tree and shrub planting should be performed by trained Installation personnel or qualified tree care professionals.

3.8.4 Tree and Shrub Care

The care that newly planted materials receive after planting is critical to their health and longevity. Ensuring adequate soil moisture immediately after planting and during the first two years of establishment is the key factor in planting success. Overwatering can deprive the tree of air and also should be avoided.

Preventing damage from mowers and string trimmers is a significant problem for landscape managers. Wounds in a tree's bark make the tree more susceptible to disease and pest infestations and reduce its chance of survival. Mulch can be an effective method of protecting trees from mower damage, when used properly. Mulch protects trees by reducing weed growth around the plant's base, which reduces the need to mow near the plant. Mulch should be applied to a weed-free area around the root mat in a layer about 3–4 in (8–10 cm) thick. Mulch should not be applied too close to the tree trunk or too deeply as this creates an environment that promotes fungal growth and decay.

Placing trunk guards around the base of trees is another method of protecting them from mower damage. However, trunk guards are only suitable for use on small diameter trees and must be removed to prevent tree damage once the tree outgrows the guard.

Annual or periodic maintenance is an important part of keeping the urban forest in good health. Of critical importance is the removal of hazardous trees or branches, which if left unattended

could cause damage to persons or property. Other high priority maintenance practices include the removal of large-diameter dead or damaged limbs or limbs infected with disease or pests. Routine maintenance should include removal of small-diameter dead or damaged materials and shaping to avoid future structural problems or conflicts with the surrounding environment. However, since each cut has the potential to cause damage to a tree, no branch should be removed without a reason. As with planting, pruning should only be performed by qualified tree care professionals or trained personnel.

Detailed tree care instructions and a list of certified arborists are available on the International Society of Arborists' website: <http://www.isa-arbor.com/>

Care and maintenance of the Installation's existing urban trees also is important, particularly for the safety of Installation personnel and their dependents and the protection of real estate. Proper training and supervision is necessary for all Installation personnel involved with tree care, pruning and hazardous tree removal. NR staff coordinate with the VDOF to provide such training for personnel from the Field Engineering and Architecture Department (FEAD) and the Disaster Preparation Team. Training sessions will continue to be conducted periodically on an as-needed basis for new Installation employees. Appropriate pruning guidelines are presented in Appendix D.

3.9 FOREST MANAGEMENT

NASO DNA has extensive forest resources. Approximately 838 ac (339 ha) (approximately 48%) of NASO DNA is forested. The forested areas, however, largely consist of forested wetlands, which are not managed for commercial timber production, but as functioning ecosystems that help improve water quality and reduce flooding by slowing stormwater runoff and trapping sediment, nutrients, and other pollutants. The forested areas also provide a noise, safety, and visual buffer between military training activities and the surrounding communities, wildlife habitat, and outdoor recreation opportunities.

NAS Oceana Instruction 5090.2E, *Procedures for Cutting Firewood and Use of Tree Products*, is applicable to NASO DNA (Appendix D). This instruction establishes procedures governing the cutting of trees for firewood and obtaining other forest products at NAS Oceana and NASO DNA.

Because of the extensive area of forested land on NASO DNA, land clearing for MILCON or other projects would likely require the cutting and removal of trees. In instances where proposed projects would affect forestlands, the NAVFAC Regional Forester must review project plans to assess impacts, assess the commercial value of trees to be removed, and, where practicable, arrange timber sales. To limit impacts to migratory birds protected by the MBTA, tree cutting should be conducted during the months of September through February.

In the 1970s, reforestation efforts included the planting of approximately 182 ac (78 ha) of loblolly pine at NASO DNA. Although these areas are not being considered for commercial harvest, they require more active management than the hardwood-dominated forests on the

Installation. Planted pine stands generally consist of dense monocultures of loblolly pine and are prone to insect infestation and wildfire.

In 2009 the maritime forest habitat was damaged due to high winds, salt spray, and heat and water stress associated with storm and weather patterns that occurred that year, resulting in needle and forest kill. No management actions were undertaken, and recovery of this habitat has been observed.

A project to develop a forest inventory, which will include Fire Loading information, will be conducted in 2013–2015 at NASO DNA. The results of this inventory will be included in future INRMP updates and provided in Appendix H once available.

3.9.1 Insect Management

Southern pine beetle (*Dendroctonus frontalis*) is the primary insect pest problem of loblolly pine in the region. Early symptoms of a southern pine beetle infestation are the appearance of multiple pitch tubes or masses of resin and reddish boring dust marking the beetles' entrance. Tree foliage changes from yellow to brown over the course of one or two months and eventually falls as the tree dies. The prompt salvage and utilization of infested trees, including a 40-ft (12-m) buffer strip of green trees in advance of the beetle spot, is considered the best method of preventing additional tree loss. If trees cannot be salvaged, piling and burning or cutting and leaving infested materials also will help stop the spread of the infestation. If trees are to be cut and left on site, infested trees and an additional buffer of uninfested (green) trees should be felled toward the center of the infestation. To quicken the drying process and help eliminate the beetle, felled trees should be cut into 4- to 5-ft (1.2- to 1.5-m) sections. Because the threat of southern pine beetle is high in dense monocultures of loblolly pine, these stands require regular monitoring for southern pine beetle infestations. If an outbreak is detected, salvage activities will be coordinated through the NAVFAC Regional Forester.

3.9.2 Wildland Fire and Controlled Burning

The potential for wildfire is high in pine stands because of pine's inherent flammability and the buildup of fuel loads that occurs. Conducting controlled burns is a cost-effective, practical method of reducing the potential for catastrophic wildfires in such stands. Controlled burns are conducted during the winter or early spring on a 3–5 year rotation or when fuel loads are determined to be excessive. Controlled burning also is used to control pine and other woody vegetation and improve habitat conditions in several stands at NASO DNA. Five burn units at NASO DNA (Figure 3-4) are included in the controlled burn plan for NAS Oceana, which also includes NALF Fentress. Based on the desired habitat structure and wildland fire controls that are assessed periodically, these burn units may be modified or relocated, based on the desired outcome. Controlled burning is conducted according to an approved burn plan, which includes smoke management guidelines and conforms to the NAVFAC Mid-Atlantic Regional Engineer Clean Air Act Compliance Guide (Navy 2002b). The controlled burn plan details the objectives of the burn and provides maps and information for each burn unit. Smoke management is included as part of the plan. The plan is updated annually to address accomplishments and set goals for each year. The 2010 NAS Oceana, NALF Fentress, and NASO DNA Prescribed Burn and Smoke Management Plan is provided in Appendix J. Maintenance of firebreaks around each



Figure 3-4. Prescribed Burn Units of NASO DNA.

burn unit to protect adjacent land and fire lines within each burn unit to facilitate access is an important part of controlled burning. Firebreak and fire line maintenance is conducted prior to ignition by NR personnel.

3.10 FISH AND WILDLIFE MANAGEMENT

The diverse ecological communities of NASO DNA support a variety of types of wildlife including mammals, fish, birds, herpetofauna, and invertebrates. An important function of the NRP is to maintain and enhance habitats that support a full spectrum of native wildlife species. Common wildlife management tools available to natural resources managers include population management and habitat manipulation.

3.10.1 Population Management

Wildlife population management generally entails the controlled harvest or stocking of select game species. Hunting, trapping, fishing, and stocking are the direct forms of population management that may be employed by wildlife managers. The controlled harvest of whitetail deer is the major wildlife population management issue at NASO DNA. Whitetail deer have few remaining natural predators, and their populations could easily surpass the biological and cultural carrying capacity of the Installation and the surrounding area if not managed. The northern portion of NASO DNA has not participated in a public deer harvest since 1998, and the deer population in this area is managed through regulated hunting by NR personnel. Deer management with remaining sections of NASO DNA are managed through a recreational hunting program (see Section 3.11.1).

3.10.1.1 *Whitetail Deer*

NASO DNA participates in the VDGIF Deer Management Assistance Program (DMAP). DMAP is a site-specific management program that allows a more liberal harvest of antlerless deer to more effectively control the deer population. DMAP tags may only be used to harvest antlerless deer. VDGIF deer management objectives are based on the cultural carrying capacity of the community, which is defined as the maximum number of deer that can coexist compatibly with humans (VDGIF 2007b). Prior to 2001 the management objective at NASO DNA was to decrease the deer population. The objective is currently to limit or stabilize the population. Annual hunting seasons and bag limits are set to help achieve management objectives. The NASO DNA hunting program is managed as a voluntary, quality deer management (QDM) program, which prohibits the take of males with small antler beam diameter. The goal of the QDM is to build an older age class of male deer and to improve overall herd quality through reduced populations.

Basic deer harvest data used to characterize deer population and condition include sex, age, weight, antler development, and lactation information. Other useful data include hunter density (hunter man-days), permit types, number of roadkill, season (fall bow, winter bow, muzzleloader), and hoof condition (used as an indicator of disease). Harvest data collected at NASO DNA are maintained by NR staff and submitted to the state annually. The state summarizes the data and provides an annual report to the Installation. A summary of the annual reports provides information on population trends and herd condition, and may be used to assess

success in meeting management objectives. Because deer harvests vary from year to year according to weather or mast crops, as well as the deer population, three to five years of harvest data are needed to discern a harvest trend. NASO DNA harvest data for 1992–2003 and 2007–2012 are summarized in Table 3-2 through Table 3-6. Data summaries included in this section do not include data from years 2004, 2005, or 2006, as these data were not available for inclusion in the analysis.

The total deer harvest at NASO DNA ranged from a maximum of 41 in 1999 and 2008 to a minimum of six in 2001 (Table 3-2). The 2001 hunting season was severely limited for security reasons following the 11 September 2001 attack on the World Trade Center. Over the 18 hunting seasons for which data are available, males accounted for approximately 41% (31% antlered males and 12% males fawns of total harvest), and females accounted for approximately 58% of the total harvest. The number of female deer harvested relative to the male harvest (harvest:sex ratio) is an important index for determining if management objectives are being achieved. To maintain a stable deer population, the female harvest should be 30–40% of the total harvest; however, if the management objective is to reduce deer density, female harvest should exceed male harvest (VDGIF 2007b), which it does for the 18 years of data used in the analysis. The average harvest: sex ratio for the years assessed was approximately 3:2 (i.e., 58% females to 41% males), which is consistent with the Installation's previous goal of reducing the deer herd. If management goals shift towards stabilization of the population, the percent of females in the harvest should be reduced to less than 50%.

The age distribution of harvested deer also gives an indication of herd condition. A young age distribution in the harvest data can mean there is high hunting pressure in older age groups. For the 1992 through 2001 and 2007 through 2012 hunting seasons, fawns and yearlings (1.5 years old) accounted for 58% of deer harvested (Table 3-3). A low percentage (18%) of harvested deer were 3.5 years and older.

The fawn per doe harvest ratio (FDR) is a relative index of the past year's recruitment or reproduction. The FDR is the number of fawns (male and female) divided by the number of yearling and adult (>1.5 years old) females harvested. Healthy, reproductive deer herds are expected to have an FDR that equals or exceeds 1.0. A similar index, the number of fawns per antlerless harvest (number of fawns divided by the total number of antlerless deer harvested), also provides a useful approximation of the past year's recruitment or reproduction. A fawn per antlerless harvest rate that equals or exceeds 50% indicates a good reproduction rate. The FDR (1.0) for the 18 years of harvest data available indicates a healthy reproductive herd is present at the Installation; however, the percent of fawns in the antlerless harvest is 39%, which suggests somewhat of low recruitment within the NASO DNA deer population (Table 3-4).

Table 3-2. Deer Harvest Summary for NASO DNA (1992–2003 and 2007–2012).

Year	Male Fawns	Antlered Males	Females	Total Harvest	Females in Harvest (%)
1992	0	9	16	25	64
1993	2	8	8	18	44
1994	4	4	14	22	64
1995	4	14	13	31	42
1996	3	9	13	24	54
1997	9	5	19	33	58
1998	3	8	27	38	71
1999	3	5	31	41	79
2000	5	5	10	20	50
2001	0	1	5	6	83
2002	2	7	14	24	58
2003	3	5	21	30	70
2004	N/A	N/A	N/A	N/A	N/A
2005	N/A	N/A	N/A	N/A	N/A
2006	N/A	N/A	N/A	N/A	N/A
2007*†	2	13	11	27	42*
2008	1	14	26	41	63
2009	2	8	11	21	52
2010†	4	17	16	37	43
2011	1	7	6	14	43
2012	1	5	8	14	57
Total	49	144	269	466	-
Annual Average (per year)	3	8	15	26	58
Percent of Total Harvest (%)	12	31	58	-	-

N/A – data not available

*- 2007 dataset included one unsexed deer, which is not included in the male or female totals

† - Data include one road kill

Sources: VDGIF 2003, Navy 2006b, and Wright 2013

Table 3-3. Deer Age Distribution for NASO DNA (1992–2001 and 2007–2012).

Sex	Age				Total
	Fawn	1.5	2.5 [†]	3.5+ [†]	
Female	74	73	63	58	268
Male	48	72	45	22	187
Total	119	145	108	80	455
Percent (%)	26	32	24	18	

[†]- Data are estimated

Sources: VDGIF 2003 and Navy 2006b

Table 3-4. Deer Population Indexes for NASO DNA (1992–2003 and 2007–2012).

Year	FDR	Fawns in Antlerless Harvest (%)	Average Annual Reduction Rate for Males (%)	Average Annual Reduction Rate for Females (%)
1992	1.0	50	78	13
1993	1.0	50	75	60
1994	0.7	41	50	60
1995	1.4	59	83	29
1996	0.7	40	56	56
1997	0.9	48	60	29
1998	0.4	30	38	57
1999	0.8	44	20	20
2000	0.9	47	80	50
2001	0.7	40	0	67
2002	0.4	27	57	42
2003	0.5	30	80	24
2007	0.1	7	46	36
2008	0.6	32	46	26
2009	0.2	8	50	55
2010	0.6	30	18	29
2011	5.0	71	43	50
2012	1.7	56	20	25
Average	1.0	39	50	40

Sources: VDGIF 2003 and Navy 2006b

The average annual reduction rate for males (AARR-M) is the percentage of yearling males in the antlered male harvest. High AARR-M rates (> 60–70%) are characteristic of a young antlered male age structure and high harvest pressure on the antlered segment of the population, with few males surviving to the older age classes (3.5 years old or older). Low rates (<30–40%)

are representative of an older antlered male age structure and low hunting pressure on the antlered segment of the population as more males have an opportunity to reach the older age classes and exhibit large body size and antler development. The AARR-M also can be used as an index of the antlered male harvest per mortality rate (i.e., 60% AARR-M indicates that hunting mortality for antlered males is 60%). The AARR-M for the 18 years of data that were analyzed is 50%, which indicates a moderate harvest pressure on the antlered segment of the population (see Table 3-4).

The average annual reduction rate for females (AARR-F) is the number of yearling females harvested divided by the total number of yearling and adult females harvested. Low hunting pressure on females is indicated by an AARR-F below 20%, moderate hunting pressure is indicated by an AARR-F of 20–30%, and high hunting pressure is indicated by an AARR-F of 35–40 %. The average AARR-F for the 18 years of deer data analyzed is 40%, which indicates there is high harvest pressure on the female segment of the deer population at NASO DNA (Table 3-4).

Records of average dressed weight and antler measurements provide useful indices of the deer herd condition and are useful for identifying changes in population size and habitat conditions. The average dressed weight and antler characteristics for the yearling male age class is important in interpreting the balance between deer population size and habitat conditions because this age class is most affected by changes in population size and carrying capacity. In healthy productive deer herds in the Tidewater region, yearling males have average dressed weights of 85–90 pounds (30–41 kilograms), 4–6 antler points, and an average beam diameter of approximately 18 millimeters (0.7 inches) (VDGIF 2007b). Based on the 18 years of deer data available, yearling males at NASO DNA, on average, were slightly smaller (82 pounds) (37 kilograms), had fewer antler points (2.3), and had smaller beam diameters (13.6 millimeters [0.5 inches]) (Table 3-5) in comparison to the Tidewater region average.

Table 3-5. Average Weight and Antler Development for Male Deer for NASO DNA (1992–2003 and 2007–2012).

	Age			
	Fawn	1.5	2.5	3.5 +
Dressed Weight (pounds)	40	72	87	112
Antler Points	N/A	2.3	4.5	6.4
Beam Diameter (millimeters)	N/A	13.6	19.5	29.3
Spikes in yearlings (%)	N/A	82.2	N/A	N/A

Source: Navy 2006b

The percent of yearling males that are spike-antlered is a good indicator of herd health. As a general rule, as deer density increases, deer condition declines and the percentage of yearling males with spike antlers increases. The percentage of spikes in the yearling male harvest ranges from less than 30% in the best herds to greater than 50% in the poorest herds. Based on the 18 years of deer data available, more than 82% of the yearling males were spike-antlered (see Table 3-5), which indicates a high deer density is present.

Average field dressed weights of females and lactation rates also provide useful indices of the deer herd conditions. In healthy deer herds, lactation rates in adult females (>1.5 years old) should be 60–70%. For the 18 years of deer data analyzed, the average lactation rate for adult females 2.5 years old was 31%, and the average lactation rate for adult females 3.5 years old and older was 33.0% (Table 3-6), which is not suggestive of a healthy adult female population at the Installation.

Table 3-6. Average Weight and Lactation Rates for Female Deer for NASO DNA (1992–2003 and 2007–2012).

	Age			
	Fawn	1.5	2.5	3.5 +
Dressed Weight (pounds)	39.5	54.8	62.4*	66.6*
Lactation Rate (%)	N/A	7.9	31.4	33.3

*averages based on 2007–2012 data only

Source: Navy 2006b

Analysis of the available hunting season harvest data suggests the deer herd at NASO DNA has a stable age structure indicative of moderate hunting pressure on each segment of the population. Data suggests a healthy reproductive herd is present at the Installation; however, a lower than ideal recruitment rate also may be affecting the reproductive rate of the NASO DNA deer population. The number of antler points and weight data indicate that harvested deer are in below average condition for the region and may indicate a stressed population. The AARR-M and AARR-F rates indicate a moderate harvest pressures on male deer, and a high harvest pressure on the female segment of the deer population exists at the Installation. Additionally, the low lactation percentage within the adult female population also is indicative of poor health in a deer herd.

A major health issue associated with a stressed herd is an increase in parasitism and incidence of disease in the deer herd. Of particular concern are two closely related viruses, the epizootic hemorrhagic disease (HD) virus and the bluetongue virus, which are collectively referred to as HD. HD is one of the most important infectious diseases of whitetail deer, and outbreaks are seen almost every year somewhere in the U.S. It is not transmissible to humans. Hoof sloughing and splitting are symptoms of HD and are recorded for each deer harvested. HD is uncommon in the Coastal Plain and only one deer (a female harvested in 2011) at NASO DNA over the 18 year period analyzed had symptoms of HD.

3.10.2 Habitat Management

Habitat management at NASO DNA focuses on ensuring a variety of habitat types are available year-round for native bird and wildlife populations. The diversity of forested and wetland habitats at the Installation fulfills the habitat requirements for many species. Additional habitat is provided by the maintenance of early successional communities. Mowing, prescribed fire, and disking are tools that may be used in the fallow agricultural fields in the southern portion of the Installation for maintaining a variety of old field and scrub-shrub habitat.

The use of prescribed fire is particularly beneficial as it promotes the establishment of native grass and forb species. Native grassland species consist of a number of warm season grasses including big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), eastern gamagrass (*Tripsacum dactyloides*), coastal panic grass, switchgrass (*Panicum virgatum*), and broomsedge (*Andropogon virginica*), along with numerous forbs. The grasses tend to be tall and form persistent clumps that provide year-round habitat for a variety of small mammals and ground-nesting birds. Many of these grass species also produce large seed heads that are eaten by a variety of birds and other wildlife. Besides providing better wildlife cover, native warm season grasses are better suited to the region than introduced cool season grasses because the warm season grasses perform well on the nutrient poor soils of the area, require less water, and can be maintained by infrequent prescribed burns rather than frequent mowing.

To maintain different stages of early successional habitat and ensure the continuous availability of escape and nesting cover, no more than two-thirds of the wildlife cover plot acreage are treated annually. Treatment times may be varied between late summer and winter to increase diversity. Avoiding mowing or otherwise disturbing nests during the breeding season, roughly March through August, is important for successful nesting of grassland bird species.

Although canebrake rattlesnake has not been identified at the Installation, this species is known to occur in the region and has the potential to occur. If this species is observed at the Installation, implementation of mowing restrictions along forest edge habitat for this species is recommended by VDGIF. VDGIF recommendations include restricting mowing of any areas adjacent to forested wetlands to winter months (hibernation periods for the species). Other areas should be mowed frequently enough (weekly) so that the grass does not obscure the location of canebrake rattlesnakes. All mowing contractors should be appropriately trained in the identification and status of this species via distribution of an information sheet.

VDGIF's 2011 Canebrake Rattlesnake Conservation Plan is available online:
<http://www.dgif.virginia.gov/wildlife/reptiles/snakes/canebrake-rattlesnake/conservation-plan/canebrake-rattlesnake-conservation-plan.pdf>

3.10.3 Fisheries Management

Redwing Lake and Sadler Pond have been managed as recreational fisheries to varying degrees at NASO DNA for many years, and support for fisheries management has been provided by the VDGIF and USFWS fisheries biologists since 1961 (Corning 1968). Fish and water quality surveys found that fisheries potential was marginal or worse at Redwing Lake because of extreme shallowness (less than 4.0 ft [1.2 m] maximum depth), water infertility, and high turbidity (Corning 1968, Galvez and Swihart 2000, and Swihart 1982). Turbidity is the most limiting factor because it interferes with successful reproduction in nest-building species and prevents the establishment of a self-sustaining sport fish population. The lakes' high turbidity is attributed to wave action and a high population of common carp, which churn bottom sediments when feeding. Because the sediments in the lake largely results from off-Installation activities, management actions taken at NASO DNA are not expected to be effective in correcting the

situation (Galvez and Swihart 2000). Although Redwing Lake has minimal potential for quality recreational fishing, it provides habitat for a variety of fishes, birds, and other wildlife and provide valuable habitat at NASO DNA and in the region.

Sadler Pond was excavated in 1969 as an alternative site for recreational fishing at NASO DNA. The pond, however, was constructed in a soil formation composed of colloidal clay material. Clay particles are negatively charged, which causes them to repel each other and remain suspended in the water column, creating a turbidity problem at this pond as well. The pond also is located in an open area where wind and wave action erode the shoreline and add to the turbidity problem. Cationic coagulants were applied in 1984 and 1987 (USFWS, Office of Fishery Assistance 1985 and 1988), but such treatments are only considered a temporary solution as runoff and erosion quickly reintroduce sediments into the water. More effective, permanent measures were taken in 1986 when the shoreline was regraded and covered with filter cloth. The filter cloth served to protect the shoreline from erosion and wave action, and by 1987, aquatic vegetation had become established around the pond perimeter and the turbidity had lessened somewhat. Additional recommendations made by the USFWS, Office of Fishery Assistance (1988) were to plant trees and shrubs around the pond to act as a windbreak and to control sedimentation and erosion in the upland areas surrounding the pond. A number of trees have been planted on the site to fulfill this recommendation. Maintaining a no mowing zone around the pond perimeter and planting additional trees and shrubs as a riparian buffer are ongoing management activities that improve water quality and fishery potential at Sadler Pond.

An inventory and assessment of recreational fisheries available at NASO DNA is planned for 2013–2015. A review of the survey results will be conducted, once available, to determine if a recreational fisheries management plan should be developed for the Installation.

3.10.4 Migratory Bird Management

Migratory birds are a large, diverse group of birds that utilize breeding grounds in the U.S. and Canada, and overwinter in southern North America, Central and South America, the West Indies, and the Caribbean. The MBTA (16 USC §703–711) is the primary legislation in the U.S. established to conserve migratory birds. The MBTA prohibits the taking, killing, or possessing of migratory birds, their eggs, parts, and nests unless permitted by regulation. Nonnative species such as house sparrow, European starling, rock pigeon, and mute swan (*Cygnus olor*) are not protected by the MBTA.

The Final Rule on Take of Migratory Birds by the Armed Forces (50 CFR Part 21) allows for the incidental take of migratory birds by DoD during military readiness activities, provided a permit authorizing such activities has been received. Military readiness activities include all training and operations of the Armed Forces that relate to combat, and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Military readiness does not include the routine operation of installation support functions, such as administrative offices, military exchanges, commissaries, water treatment facilities, storage facilities, schools, housing, motor pools, laundries, MWR activities, shops, or mess halls; the operation of industrial activities; or the construction or demolition of facilities listed above (72 FR 8931). To address the unintentional take of migratory birds as a result of activities necessary to support the military mission, a memorandum of understanding (MOU)

was adopted between the DoD and the USFWS, as required by EO 13186, *Migratory Birds*, on 31 July 2006 (Benton et al. 2008). This MOU allows the military to obtain permits for the “unintentional take” of a migratory bird if it is in support of a military readiness operation. The procedures contain significant safeguards to ensure that the taking of birds is minimized when the new rule is used and that conservation measures are employed to compensate for the losses that may occur. Migratory bird management at NASO DNA includes a Nest Box Program (see Section 3.10.5) and promotion and participation in programs including the North American Waterfowl Management Plan, Neotropical Migratory Bird Conservation Act Program, Wetlands Protection and Enhancement Programs, Department of Defense Partners in Flight Strategic Plan, Waterbird Conservation for the Americas, PIF North American Landbird Conservation Plan, United States Shorebird Conservation Plan, and Watchable Wildlife Programs . Per the MOU the Navy must evaluate and coordinate with the USFWS during the annual INRMP review process on any potential revisions to migratory bird conservation measures taken to avoid or minimize take of migratory birds (DoD and USFWS 2006).

The USFWS established National Bald Eagle Management Guidelines in 2007 that include protective measures outlined in the Bald and Golden Eagle Protection Act (BGEPA) (16 USC §668–668c) and the MBTA (16 USC §703–712). Both the BGEPA and MBTA protect bald eagles by prohibiting killing, selling or otherwise harming eagles, their nests or eggs. The BGEPA also protects eagles from disturbance. The National Bald Eagle Management Guidelines provide guidance on restricting aircraft operation in proximity to known bald eagle nesting locations and establish a 1,000-ft (305-m) avoidance zone around bald eagle nests and roost sites. It should be noted that the tolerance level of bald eagles to noise continues to be an ongoing question that lacks sufficient research. Tolerance to noise is subject to spatial and temporal variations in the landscape and the source of the noise.

No bald eagle nests are known to occur at NASO DNA; however, if a bald eagle nest is identified at the Installation in the future, a 500-ft buffer around the nest should be established as recommended by VDGIF. Any project or activity requests within the VDGIF established 500-ft (152-m) buffer around bald eagle nests will require consultation with USFWS and VDGIF.

The Neotropical Migratory Bird Conservation Act (Public Law 106-247), enacted in 2000, provides grants to countries in Latin America and the Caribbean, and the U.S. for the conservation of neotropical migratory birds that winter south of the border and summer in North America. The Act encourages habitat protection, education, research, monitoring, and capacity building to provide for the long-term protection of neotropical migratory birds. Through the Act, a competitive grant program is administered by the Secretary of the Interior to provide financial resources and to foster international cooperation for conservation initiatives.

In 2008, the DoD approved the Coordinated Bird Monitoring Plan. The objective of the plan, jointly designed by the DoD and USGS biologists and managers, is to provide a comprehensive approach for helping the DoD fulfill its responsibilities under regulations that pertain to migratory birds. The plan outlines procedures for insuring that bird monitoring and assessments address important issues for the DoD; follow accepted procedures for design, data collection, and analysis; and preservation of data in long-term archives. A Coordinated Bird Monitoring Database has been established by the USGS, which DoD installations may use for long-term storage of their bird monitoring data. This will assist in the identification of species of concern

on installations and the implementation of appropriate management strategies (DoD 2012b). A DoD Coordinated Bird Monitoring Study is currently being conducted at NASO DNA to update the bird inventory, assist in management of migratory birds, and reduce the number of BASH incidents. Survey reports will be included in Appendix H once available.

BASH concerns associated with migratory bird populations at NASO DNA do exist in regards to aircraft operations as drones and helicopters are utilized at the Installation.

Installation projects and activities should include precautions to avoid negative impacts to migratory birds that have the potential to occur during implementation of the project/activity. Landscape alterations (i.e., tree removal, mowing, land clearing) should occur during the months of November through February, as recommended by USFWS to minimize impacts to migrating and nesting birds. If this cannot be accomplished, additional coordination with Installation NRS or NRM staff is required. As such, if birds of conservation concern are identified as utilizing the affected project/activity area, additional consultation USFWS and compliance with any USFWS-issued permits may be required.

NAVFAC Mid-Atlantic guidance for conducting habitat-disturbing activities (i.e. mowing, herbicide applications, noxious weed control, brush clearing, tree trimming and thinning) requires that these activities be conducted during the non-breeding season (15 August through 28 February) to the extent practicable. For tree trimming and thinning, or brush removal activities that must be conducted during the active breeding season, a pre-project clearance survey must be conducted by a qualified biologist to identify any active nests, and identification of avoidance measures for particular nests identified during the survey. If any nests are found during these surveys, these nests cannot be removed and the NRM must be notified of the nest locations. If significant impacts to nesting birds are anticipated from a project/activity, the project may be delayed until such impacts can be minimized, or other approved mitigation is identified by the Navy or through the agency consultation process.

3.10.5 Nest Box/Platform Program

The Installation NRP installed and maintains a number of bat boxes, osprey platforms, and bluebird and wood duck boxes to enhance nesting capability at NASO DNA (Figure 3-5). Artificial nest boxes and nesting platforms are useful for enhancing habitat conditions for a number of bird and bat species in areas where there are few natural nesting sites or where competition from aggressive nonnative species such as house sparrows and European starlings is high. Placement of structures that benefit insectivorous birds in urban areas also benefit Installation personnel, as these birds consume thousands of insects daily and provide entertainment for human observers. Eastern bluebirds (*Sialia sialis*), tree swallows (*Tachycineta bicolor*), purple martins, owls (Order Strigiformes), wood ducks, and bats are species that commonly utilize artificial structures; however, the Nest Box Program could potentially be expanded to benefit other species. Locations of existing and planned next box locations should be reviewed to ensure these do not increase the BASH risk at the Installation. Any existing boxes or platforms that are identified as potentially increasing the BASH risk should be removed.



Figure 3-5. Nest Boxes and Nesting Platforms of NASO DNA.

3.10.5.1 Osprey

Prior to the ban of dichlorodiphenyltrichloroethane (DDT) in the 1970s, osprey populations declined severely throughout the U.S. In recent years, however, osprey populations have rebounded and ospreys are now common in the Tidewater region. Within the southern portion of NASO DNA, ospreys nest on a variety of structures including constructed nesting platforms and light poles. Because of potential fire and electrocution, nesting platforms or light poles retrofitted with a raised platform are preferable to ospreys nesting on unmodified light poles or utility poles.

The first osprey nest platform at NASO DNA was installed in 1988 in the southern portion of the Installation. In 1996, a new nest platform was installed at the end of Bullpup Street. In addition, several utility poles, which supported active nests, were permanently disconnected from the utility grid to protect nesting birds. Two additional platforms were constructed in 2003. There are currently three known active osprey nests located on platforms or light poles at NASO DNA (Figure 3-5).

As with all migratory birds, ospreys are protected by the MBTA. No operations or maintenance may be performed on a structure if a nest is occupied and no nest may be removed or damaged without a permit from VDGIF. Osprey nesting season begins in April and continues until nestlings are fledged in July or August. NR staff monitor nest activity and can inform PWD personnel of nesting status if maintenance is required on any of the light poles or platforms that are occupied.

Osprey Nest Relocation or Removal

Inactive Nests: An inactive nest is defined as a nest without any eggs or dependent (flightless) young and includes nests under construction. Inactive nests should only be removed if the nest or placement of the nest poses a threat to property integrity, human health, or safety. No authorization or consultation is required for removal of inactive nests from 16 September through 15 April, although affected landowners may call VDGIF or USDA Wildlife Services to informally consult on pending removals or relocations if they so desire. It can be very difficult to discern the status of a nest from below; thus, from 16 April through September 15, inactive nests should only be removed if approved through consultation with USFWS, VDGIF or USDA Wildlife Services.

Active Nests: An active nest is defined as a nest containing eggs or occupied by dependent (flightless) young. All reasonable measures to protect an active nest until the young fledge must be considered before authorization to relocate or remove the nest is sought. Removal of active nests is generally not permitted, but a nest may be relocated or removed if it poses a direct threat to human health or safety or when the birds, nest, or eggs themselves are threatened unless they are moved. In rare situations, relocation or removal of a nest that merely constitutes a nuisance may be authorized if it interferes with the intended use of the structure.

Individuals interested in applying for a USFWS permit to remove or relocate an active nest may do so at: <http://www.fws.gov/migratorybirds/mbpermits/ApplicationForms.html>

VDGIF's "Removal or Relocation of Osprey Nests in Virginia: A Guideline for Landowners" (June 2010) is available online at: <http://www.dgif.virginia.gov/wildlife/birds/osprey/virginia-osprey-nest-guidelines.pdf>

Anyone seeking to have an active osprey nest relocated or removed must contact the NRM, who will coordinate with VDGIF, USFWS, and/or USDA Wildlife Services as appropriate, and obtain any required permits. To comply with Virginia law and VDGIF regulations, active nest relocation or removal may only be undertaken by an authorized federal, state, or local employee in the performance of their official duties as provided in 4 VAC 15-30-50, or by an individual authorized by USFWS for the nest removal. To comply with federal law, active nest relocation or removal may only be undertaken by an individual authorized by USFWS.

For removal of nests that require a permit, the Navy must be able to justify nest removal during the permit application process. For example removal of an active nest may be required if the birds and or nest are negatively impacting the military mission, or if implementation of the military mission would result in negative impacts to osprey or their nests. Once a nest is removed, the nest site should be modified to make it unattractive as a nesting site, such as through construction of a structure over the nest area to make it inaccessible to osprey in the future. Otherwise the site should be monitored every 2–3 days during nesting season (typically March–May, but could extend later if typically spring weather conditions are delayed) to prevent subsequent nest establishment. Other recommendations include coordinating with the NRM to construct a suitable nest platform (e.g., tower, electrical transformer, light poles) in the vicinity of the nest that will be removed that will be attractive to the nesting osprey. Creating a more desirable nesting location could potentially prevent nesting attempts in areas that interfere with the military mission and Installation infrastructure.

3.10.5.2 Eastern Bluebirds

The eastern bluebird has suffered population declines throughout its range because of pesticide use. Other threats to bluebird populations include habitat loss and the introduction of two invasive, nonnative species: the house sparrow and European starling. However, in areas with suitable habitat where nesting boxes have been put up, bluebird populations are increasing (North American Bluebird Society 2003). Ideal habitat consists of an open area for foraging, such as mowed lawn that is fringed by shrubs and hardwood trees. Erecting nest boxes in such areas reduces competition from house sparrows, tree swallows, and other small cavity nesters that also utilize this habitat type. An important consideration in nest box construction is preventing predation by raccoons and cats. Pole guards or entrance hole guards should be used. Mounting bluebird boxes on smooth round pipes also greatly reduces the chance of a loss to a predator. NASO DNA currently has nine bluebird boxes located along the row of longleaf pines (Pine Tree Road) in the southern section of the Installation. NR staff check the nest boxes annually for utilization and condition. If other species such as Carolina wrens (*Thryothorus ludovicianus*), Carolina chickadees (*Poecile carolinensis*), or tree swallows are observed using

the nest boxes, a second box should be placed approximately 25 ft (8 m) from the first. This will reduce competition for the nest box.

3.10.5.3 Wood Ducks

Wood ducks primarily nest in tree cavities in wooded swamps and marshes at the edges of ponds. Appropriate nesting habitat is often limited by the lack of cavity trees; therefore, supplemental wood duck boxes can benefit recruitment of nesting pairs and nesting success. However, nest boxes placed in close proximity to each other can encourage brood parasitism among wood ducks and result in nest abandonment. In order to maximize nest box use and minimizing nest abandonment, nest boxes should be placed several hundred feet apart and should not be visible to one another. Nest boxes can be placed either over the water or on land within 30–100 ft (9–30 m) of suitable brood habitat. Brood habitat includes forested, scrub-shrub, and emergent wetlands that are greater than 10 ac (4 ha). Abundant shrubby or downed woody material also should be available for cover. If located over the water, nest boxes should be placed at least 4 ft (1 m) above the high water level and the entrance hole should face the open water rather than the shoreline. The use of predator guards is another important factor for fledgling success.

The Installation currently has 30 wood duck boxes, five of which are plastic and 25 of which are wood. The plastic boxes are generally in poor condition and will be replaced with wood boxes. Duck box maintenance includes removing old nest material and adding fresh sawdust or wood shavings by 01 February of each year. Occupancy, box condition, and maintenance needs are recorded in a spreadsheet for each wood duck box (see Appendix H).

3.10.5.4 Bats

The bat species that is most likely to use bat houses at NASO DNA is the big brown bat (*Eptesicus fuscus*), which is a common bat in Virginia that utilizes a variety of habitats including urban, agricultural, and wooded areas (Navy 2006b). Bats can be particularly important in controlling nuisance insects as they are reported to eat up to 7,000 insects per night (Minnesota Department of Natural Resources 1992). Five bat houses have been installed in the southern section of the Installation, including two at the campground. Bats are known to use at least two of the bat houses (see Appendix H).

Habitat requirements, natural history, and nest box specifications for these and other species are on the Cornell Lab of Ornithology website: <http://nestwatch.org/>

3.10.6 BASH

NASO DNA contains a helicopter pad and is located within 5 mi (8 km) of the NAS Oceana airfield, which requires that land and wildlife management activities be conducted in a manner that minimizes the BASH risk. Each year military aircraft experience hundreds of collisions with birds and animals, causing millions of dollars in damages, injuries, and hundreds of aborted or delayed missions. The objective of the Navy BASH Program is to decrease animal populations

and attractants in the vicinity of the airfields in an effort to reduce the potential for collisions. The conditions that attract birds and other wildlife, and the potential for bird/wildlife strikes vary at each installation. Birds may flock to airfields or cause hazards en route; hazards may be seasonal or year round; bird/wildlife activity may change as area crop production changes, as sanitary landfills are opened or expanded, or as wildlife refuges are established or expanded.

The primary BASH issue at NASO DNA is associated with bird and wildlife conflicts associated with the use of drones and the active helicopter pad. The Installation has not developed a BASH Plan; however, if needed, the Installation may apply for wildlife depredation and/or migratory bird take permits from USFWS should control of wildlife and birds be necessary to meet the military mission and ensure the safety of military personnel and helicopter pilots. If depredation or take permits are obtained, these will need to be renewed annually by USFWS. Some control of larger game, such as deer, is provided by the Installation hunting program. Wetland and grassland habitats may pose as attractants to birds and wildlife, and improvements to these habitats in and around helipads or active flight areas should be avoided.

The primary management recommendation for addressing potential BASH issues at the Installation is to maintain vegetation to reduce BASH potential. The goal of vegetation management in BASH areas is to protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with Navy BASH Program requirements.

Some focused management strategies related to BASH reduction at the Installation include the following.

1. Discourage ponding of water within areas in proximity to helipad and flight zones to minimize attracting migratory birds and other wildlife, and to minimize the BASH potential.
2. Implement habitat enhancement and maintain habitat diversity for migratory bird species, consistent with BASH Program requirements. Recommendations for habitat enhancement should be made to attract birds and other wildlife away from the flight operations areas.
3. Maintain Migratory Bird Depredation Permits (if applicable) from the USFWS and VDGIF Kill Permits to allow harassment or harm to migratory birds and other species as part of Navy BASH Program requirements, and to maintain helipad and flight zone safety.
4. Procure and maintain BASH response equipment (i.e., propane cans, electronic scare devices, calls).
5. Conduct initial BASH training workshop for staff members with refresher training as needed.
6. Review locations of bird and bat boxes/platforms to determine if any of these should be removed to reduce BASH risks.
7. Review each project proposed on the Installation for BASH concerns and provide guidance for reducing or avoiding BASH concerns.

The BASH potential will be reduced by managing wildlife on undeveloped, semi-developed, and developed areas around helipads and flight zones. By tracking BASH-related incidents using a georeferenced data set, including information on habitat types at and near each incident's location, a more complete understanding of risks and potential causes of strikes can be developed, leading to more effective management actions.

The following references should be used to determine the appropriate management actions that should be implemented in consideration of reducing the BASH risk at the Installation:

- CNIC Instruction 3700, Navy BASH Program Implementing Guidance, establishes policy and procedures for implementing the CNIC BASH Program, establishes mandatory BASH event reporting and remains collection procedures, and establishes BASH program procedures.
- CNIC, BASH Manual, presents additional recommended policies, procedures, and instructional material to serve as an aid to CNIC shore aviation commands in developing local BASH policies and related personnel training programs; and identifies key BASH statutory and regulatory requirements, and provides advisory information for management of Navy airfields.
- OPNAVINST 3750.6R Ch. 4, Naval Aviation Safety Program, issues policies and provisions of the Naval Aviation Safety Program.
- Federal Aviation Administration (FAA), Advisory Circular 150/5200-32A, Reporting Aircraft Wildlife Strikes, explains the importance of reporting collisions between aircraft and wildlife (i.e., wildlife strikes), and examines recent improvements in the FAA's BASH Reporting system; how to report a wildlife strike; what happens to the wildlife strike report data; how to access the FAA National Wildlife Aircraft Strike Database; and the FAA's Feather Identification program.
- FAA, Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near airports as well as airport development projects that affect aircraft movement near hazardous wildlife attractants.

3.10.7 General Fish and Wildlife Management

In 2000 Congress began to provide annual funding to supplement existing state fish and wildlife conservation programs. Along with this funding came the responsibility of each state and territory to develop a Comprehensive Wildlife Conservation Strategy—an Action Plan for wildlife—by 01 October 2005.

The Virginia SWAP was adopted in 2005. This SWAP includes an evaluation of the location and relative abundance of wildlife and the habitat required to support these species, an assessment of problems facing Virginia species and habitats, recommended conservation actions to address these problems, and research, monitoring, and survey needs. The SWAP also identified 925 species of greatest conservation need in Virginia, 60% of which are aquatic, and 70% of which are invertebrates. These species are further grouped into four tiers of relative conservation need: critical (I), very high (II), high (III), and moderate (IV) (VDGIF 2005).

The SWAP identifies the species of greatest conservation need for each of the six ecoregions of Virginia, and provides life history, location and relative condition of habitat, specific threats and trends, conservation actions and strategies, and research and monitoring needs for each species (VDGIF 2005). The Installation is located within the Mid-Atlantic Coastal Plain region and a list of fish and wildlife species identified as Species of Greatest Conservation Need for the Mid-Atlantic Coastal Plain in the Virginia SWAP is included in Appendix I.

Five (5) of the 37 Tier 1 (Critical) vertebrate species identified in the SWAP have been identified at NASO DNA. Nine (9) of the 52 Tier II (Very High) vertebrate species that were identified in the SWAP have been observed at NASO DNA. Eight (8) of the 46 Tier III (High) vertebrate species that were identified have been observed at NASO DNA. Thirty-seven (37) of the 142 Tier IV (Moderate) vertebrate species that were identified in the SWAP have been observed at NASO DNA (VDGIF 2005). Species of conservation concern identified in the SWAP that have been observed at NASO DNA are identified in Appendix I.

Natural resources management strategies and recommendations included in this INRMP also satisfy the goals and objectives of the Virginia SWAP in conserving the state's natural resources for future generations.

The Virginia State Wildlife Action Plan contains a list of Species of Greatest Conservation Need for the Mid-Atlantic Coastal Plain region of Virginia, and is available for viewing and downloading at: <http://bewildvirginia.org/wildlifeplan/>

3.11 OUTDOOR RECREATION AND ENVIRONMENTAL AWARENESS

The Sikes Act requires that military installations provide public access for use of natural resources to the extent it is appropriate and consistent with the military mission. A number of outdoor recreation opportunities are available at NASO DNA to active and retired military personnel, Installation civilian employees, and their dependents. Members of the general public also may participate in recreational activities on the Installation, provided that they are sponsored by one or more of the above mentioned list of authorized individuals and they meet Installation access requirements.

Recreational opportunities at the Installation include beach going, picnicking, camping, wildlife watching, boating, hunting, and fishing. The MWR Department administers picnicking, camping, beach going, and boating activities. The NRP manages the hunting and fishing programs. Both MWR and the NRP provide management oversight of facilities/programs that provide wildlife viewing/watching opportunities. The NRP also provides regulatory oversight to ensure all individuals recreating are complying with natural, cultural, and other environmental resources laws and regulations via their CLE program. Coordination and cooperation between the MWR and NR staff is necessary for the protection and management of natural resources on MWR-administered facilities. NR personnel cooperate on issues such as the prevention of nonpoint source pollution, nuisance wildlife control, tree care, and other aspects of natural resources management.

Information, including geographic distribution, plant characteristics, and treatment for the most common poisonous plants in the U.S. is available at:

<http://www.cdc.gov/niosh/topics/plants/>

3.11.1 Hunting

Hunting opportunities at NASO DNA include hunting for deer and waterfowl, and are available to active duty and retired military personnel and their dependents, civilian employees of the Navy and their dependents, reservists, and retired employees of DoD. The above-mentioned persons also may sponsor one guest from the general public, as long as these guests meet access requirements. Hunting within the Naval Special Warfare Development Group compound hunting area is only open to those recreational hunters that can obtain appropriate access approvals into this compound. Hunting at NASO DNA is regulated by state law, the regional hunting and trapping instruction, CNRMA Instruction 11015.2B, and Installation instructions and/or rules and regulations guidance documents (see Appendix J). In accordance with the Sikes Act, user fees are set aside for the protection, conservation, and management of fish and wildlife such as implementation of habitat improvement and related activities.

Safety is a primary management issue in the hunting program. All firearm users must participate in a hunter gun safety course, and all bow hunters must demonstrate competence through a qualification test. Hunters also must obtain appropriate state licenses and regional permits in order to hunt on NASO DNA. Archery qualifications are held at NAS Oceana and shotgun qualifications are held at NASO DNA. Archery, shotgun, and black powder seasons correspond to state hunting seasons.

At NASO DNA, hunting is permitted in three separate areas of the Installation; the north end, which includes the wooded area north of the firing ranges; the central area of the Installation, which includes South Marsh and the adjacent forested areas; and within the southern-most portion of the Installation. Approximately 535 ac (217 ha) are included in the hunting areas. The hunting areas are divided into 44 compartments (Figure 3-6) that can accommodate one to two hunters each depending on the type of hunting and size of the compartment. Nineteen (19) of the compartments are designated as archery only, 13 are designated as shotgun or archery, and 12 are designated as black powder, archery, or shotgun.

Waterfowl hunting at Redwing Lake was formerly authorized; however, this lake has since been closed to hunting due to military mission safety/security requirements. The NRP also formerly managed waterfowl blinds on Lake Tecumseh; however, the Navy no longer manages the recreational resources of Lake Tecumseh as it has been determined to not be Navy property. Hunting at Lake Tecumseh should be coordinated with VDGIF, and the Hampton Roads Sanitation District, who owns the lake.

The NASO DNA hunting program is a dynamic program, and hunting areas can be closed or opened as dictated by military mission and wildlife population management requirements. The

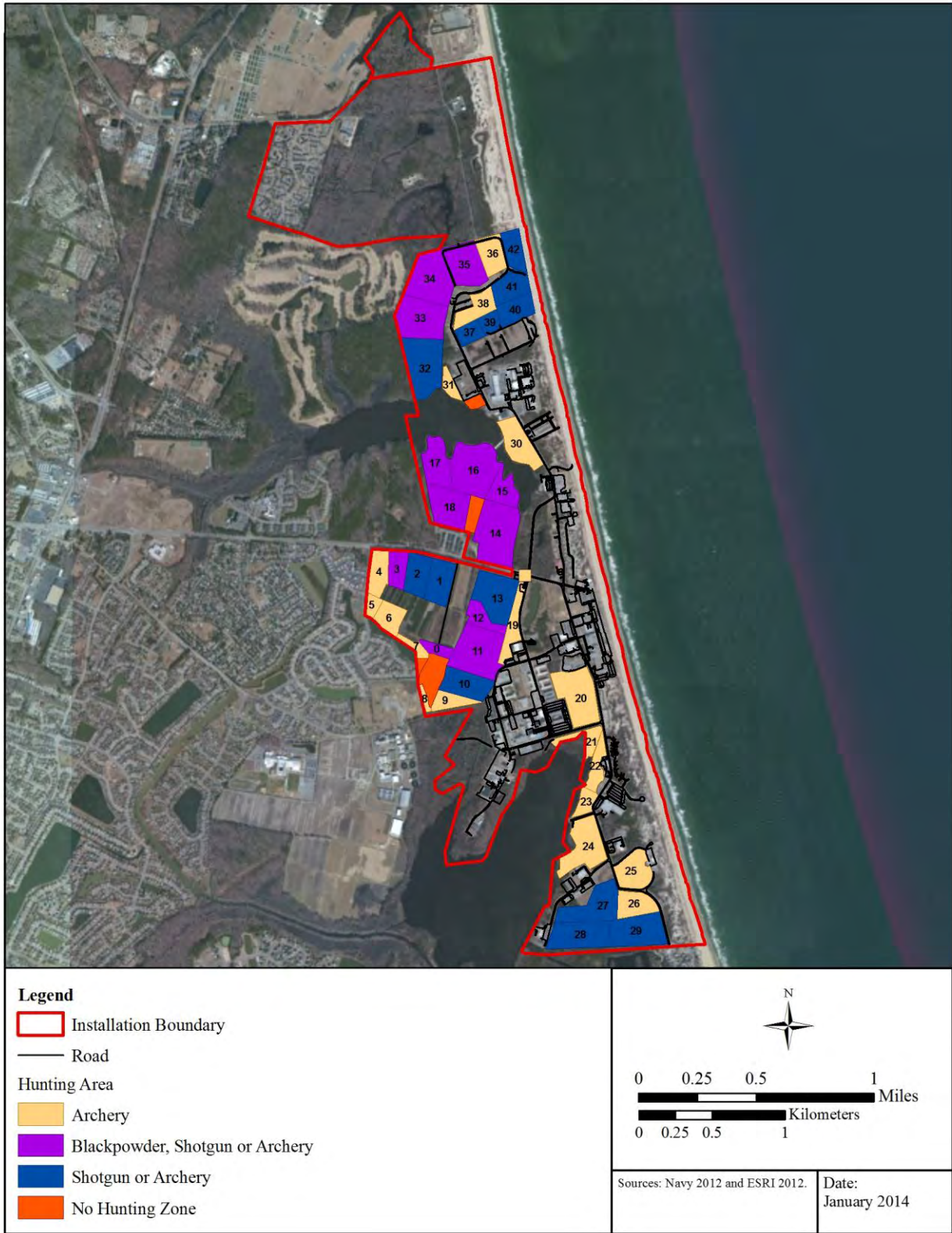


Figure 3-6. Hunting Areas of NASO DNA.

type of hunting allowed in a hunting area also may be changed for safety reasons, or to enhance wildlife population control. Changes that are made prior to the hunting season are reflected in the annual hunting program rules and regulations document, map updates, hunter indoctrination training classes, and NAVFAC Mid-Atlantic environmental and CNIC NAS Oceana NR websites. Changes made during the hunting season are posted at the hunter check in/out location. Currently the northern area of the Installation that constitutes the former Camp Pendleton parcel is not be open to general recreational hunting participants; however, environmental staff still conduct controlled hunts in this area for wildlife population control. This area may be opened to recreational hunting program participants at a later date.

The recent reauthorization of appropriations for implementation of the Sikes Act completed in June 2013 as part of the House of Representatives Bill H.R. 910 identified the need for DoD installations to improve their commitment to implementation of the Disabled Sportsmen's Access Act of 1998. This Act strives to improve access and provide adaptive equipment for disabled active and former military personnel for hunting, fishing, and/or other outdoor recreational activities on military installations. The Installation should assess their ability to provide adaptive equipment for disabled military personnel authorized to participate in hunting and fishing activities at the Installation, as part of implementation of this INRMP and in support of Sikes Act requirements.

3.11.2 Fishing

Popular recreational activities include saltwater fishing along the shoreline and freshwater fishing at the freshwater lakes of NASO DNA. Saltwater shore fishing is allowed between Labor Day weekend and Memorial Day weekend at designated locations, and a beach utilization map is provided by MWR that identifies areas approved for these activities. Freshwater fishing is permitted at Sadler Pond, and fishing also is allowed in the ditches that drain the Installation. Fishing along the shores of Lake Tecumseh also is authorized; however, the Navy NRP does not manage the Lake Tecumseh fisheries, as it has been determined that the lake is owned by the Hampton Roads Sanitation District. Fishing at Lake Tecumseh should be coordinated with VDGIF, and the Hampton Roads Sanitation District. Fishing at Redwing Lake was formerly authorized; however, this lake has been closed to fishing due to military mission/security reasons. The Southeast Redwing Lake Wetlands SIA ponds are currently not authorized for inclusion in the recreational fishing program as this area is being managed as a conservation site. Opening this area to recreational fishing increases the risk of inadvertent introduction of non-native and invasive species.

Appropriate state licenses and an Installation permit for freshwater fishing are required for fishing at NASO DNA. Installation permits can be purchased at the NASO MWR ticket office. Individuals desiring to fish on the Installation must complete an application at Building 78 at NAS Oceana. Updates to fishing areas and requirements are discussed and parking permits are issued during the application process. The regional freshwater fishing instruction is included in Appendix J (Enclosure 1). Similar to policies for the hunting program, areas listed in the instruction can be closed at any time. Coordination with the Installation NRP is required prior to fishing on the Installation to obtain a current listing of approved fishing areas during a given season.

3.11.3 Conservation Law Enforcement

The Sikes Act requires that CLE be provided on military lands (Benton et al. 2008), and that each military department will ensure that professionally trained NR and CLE personnel are assigned responsibility to protect and manage natural resources found on DoD installations, including implementation of INRMPs (DoD Legacy Program 2009). DoD installations must coordinate with the appropriate agencies to support CLE and enforce federal and applicable state laws and regulations that pertain to the management and use of the natural resources under their jurisdiction. This has included a variety of law enforcement options including employment of civilian CLEOs/game wardens, military police, or combinations of civilian CLEOs and military police. According to DoD Instruction 5525.17 (Conservation Law Enforcement Program), it is DoD policy that CLEOs assigned to DoD law enforcement elements may be co-located with the conservation program manager at the installation. In addition, CLE rules and responsibilities must be integrated into an installation's INRMP and Integrated Cultural Resources Management Plan (ICRMP), where CLE is required.

Regional Conservation Officers **serve as game wardens and** have the authority to apprehend and arrest all violators of federal, state, or Installation game laws and regulations on NASO DNA. CLE at NASO DNA is solely the responsibility of the Navy; however, Navy enforcement personnel cooperate with state and federal CLEOs, as needed, to enforce state and federal wildlife laws. Regional Conservation Officers are required to be trained in CLE and state and federal wildlife regulations. It is required that the Conservation Officers attend annual CLE refresher training to remain current on changes in regulations and enforcement policies.

3.11.4 Environmental Awareness

NAVFAC Mid-Atlantic environmental staff or other personnel as appropriate are responsible for coordinating environmental education and outreach efforts at NASO DNA. Environmental staff and other personnel coordinate annual events such as Arbor Day, Earth Day, National Public Lands Day, and Clean the Bay Day celebrations and activities, which are important for promoting environmental awareness at NASO DNA. Through such activities, Installation residents and volunteers have the opportunity to learn about environmental stewardship as well as contribute to protection and enhancement of local ecosystems. NASO DNA residents and volunteers also are encouraged to participate in habitat conservation efforts in the beach and dune areas. Dune stabilization efforts that rely on the participation of volunteers include collecting recycled Christmas trees and planting beach grasses on sections of the training beaches for dune stabilization.

Appendix K contains materials that can be used for educational outreach to the public with regards to natural resources management at NASO DNA, including pamphlets and brochures about safety hazards, wildlife compliance, and hunting, fishing, and archery opportunities at Navy installations in Hampton Roads. In addition to these brochures, natural resources information also is disseminated via the NAS Oceana website and Navy Installation Twitter accounts.

The NRP also accepts requests to conduct NR safety awareness and wildlife training classes/talks at the Installation. Availability of Navy staff to conduct these outreach events is

limited, and staff may not be available during the desired training request time frame; however, staff will attempt to make arrangements for another date or will recommend other sources from which to obtain similar information.

3.11.5 Wildlife Diseases

Individuals who recreate at NASO DNA and other personnel that live or work on the Installation also are at risk for zoonosis, diseases that are communicable from animals to humans under natural conditions. Zoonotic diseases of concern at NASO DNA include Lyme disease, West Nile virus, equine encephalitis, rabies, and distemper. To help prevent the spread of these diseases the NRM should post notices of disease outbreaks that may affect NASO DNA personnel and guests, and promote preventative measures to limit their spread and transmission. Fact sheets on zoonotic diseases of concern at NASO DNA are included in Appendix K.

Information on zoonotic diseases, including how to prevent the spread of the diseases, is provided by the Centers for Disease Control and Prevention and is available at:
<http://www.cdc.gov/ncezid/>

3.11.6 Human and Wildlife Conflicts/Safety Concerns

Individuals who recreate at NASO DNA and other personnel that live or work on the Installation should be aware that there is the potential for venomous snakes and poisonous plants to be present. Wearing protective clothing and hiking boots can reduce the risk of contact with poisonous plants and poisonous snakes. Individuals should remain on designated trails and avoid walking through dense piles of brush. If snakes are observed, individuals should avoid disturbing them, as they are not likely to strike unless provoked. If an individual is bitten by a snake, he or she should seek immediate medical attention. All wildlife incidences should be reported to the local Environmental Office, Safety Office, or Security Office. Fact sheets on poisonous plants and venomous snakes are included in Appendix K.

3.11.7 Wildlife Observation

Providing appropriate facilities for the enjoyment of nature and wildlife can create additional opportunities for outdoor recreation for Navy personnel and their dependents. A wildlife observation deck, constructed as a National Public Lands Day project, overlooks Lotus Pond and provides wildlife watching opportunities at NASO DNA. An associated interpretive trail adds to the educational value of the area. In addition to this site, wildlife observation can be conducted at Sadler Pond and along the recreational beaches of NASO DNA.

3.12 INTEGRATED PEST MANAGEMENT

An IPM Plan has been prepared for NAS Oceana, NALF Fentress, and NASO DNA (Appendix H). The focus of pest management at NASO DNA is to prevent interference with military operations and preparedness by protecting infrastructure, real property, and human health and

safety. NAVFAC Mid-Atlantic environmental staff provides pest management services through the Environmental Services Department. In addition, the Environmental Services Department responds to service calls for removal of nonmigratory birds and control of feral animals. Forest and landscape pests and invasive species are pest management issues that also are of concern to NR staff.

In accordance with OPNAVINST 6250.4C, Pest Management Programs, it is Navy policy to use an integrated pest management (IPM) approach to pest control. IPM uses ecologically, economically, and socially sound strategies to keep pests at tolerable levels. In IPM, the full range of pest control options (cultural, mechanical, biological, and chemical) may be employed after careful consideration of the pest's biology, the damage or infestation thresholds that require action, and the impacts each control alternative will have on the environment. A variety of biological, cultural, and mechanical pest management strategies used in IPM are included in the following discussions of the major types of pest issues that are relevant to the NRP at NASO DNA. Maintaining appropriate pesticide certification and invasive species control training is important for implementation of the IPM program at NASO DNA. Invasive species includes both animal and plants species.

3.12.1 Nuisance and Invasive Wildlife, and Invasive Plants and Noxious Weeds

3.12.1.1 Nuisance and Invasive Wildlife

DoD's Armed Forces Pest Management Board defines nuisance wildlife as wildlife that, because of their feeding or nesting habits, interferes with the military mission or well-being of domestic animals, other wildlife, or humans (Armed Forces Pest Management Board 2012). CNRMA Instruction 11015.3, *Natural Resources Management for Fish and Wildlife, Feral Animals, Invasive Species, and Certain Pests*, assigns responsibilities and provides points of contact for nuisance wildlife issues at NASO DNA. Authority and responsibility for nuisance wildlife ultimately resides with the NAVFAC Mid-Atlantic Core Environmental (EV) director. The NAVFAC Mid-Atlantic Core EV director may delegate this authority to the NAVFAC Mid-Atlantic Core and/or the NAVFAC Mid-Atlantic Installation NRM. The NAVFAC Mid-Atlantic Core EV director or an appointed delegate maintains the permits necessary for controlling species protected by federal or state law. At the Installation, the NRM is responsible for promptly responding to emergency wildlife calls as needed, to ensure the safety of NR personnel, military, civilians, and wildlife.

NR personnel involved in lethal control activities must be properly trained and duly certified for all weapons employed in accordance with applicable regulations. Appropriate equipment such as various sized cages must be maintained by natural resources and environmental services staff to assist in the humane capture and transport of nuisance wildlife. Potential nuisance wildlife problems at NASO DNA include various species of native and non-native animals.

Pursuant to 4 VAC 15-20-160 the following mammal and bird species are designated as nuisance species: house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), black rat (*Rattus rattus*), coyote (*Canis latrans*), feral hog (*Sus scrofa*), nutria (*Myocastor coypus*), woodchuck (*Marmota monax*), European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), and rock pigeon (*Columba livia*). Other nonnative species as defined in the Migratory Bird Treaty Reform Act of 2004 and regulated under 50 CFR 10.13 also are included as nuisance species.

Part B of the code states “*It shall be unlawful to take, possess, transport, or sell all other wildlife species not classified as game, furbearer or nuisance, or otherwise specifically permitted by law or regulation.*”

VDGIF defines nuisance wildlife in 4 VAC 15-20-160, and lists those species that are considered by Virginia as nuisance species; however feral pets, Canada goose and other waterfowl are not considered nuisance wildlife by this code. The code further states that “*It shall be unlawful to take, possess, transport, or sell all other wildlife species not classified as game, furbearer or nuisance, or otherwise specifically permitted by law or regulation.*” To ensure compliance with this law, any nuisance wildlife removal or control activities performed by the environmental staff at NASO DNA will be coordinated with VDGIF as necessary, to make certain that methods employed do not violate Virginia law.

Two nuisance wildlife surveys are currently being conducted at NASO DNA to identify nutria and coyote populations at the Installation. Nutria survey methods have been approved by the Chesapeake Bay Nutria Eradication Program and passive herbivory surveys will be used to ascertain the presence or absence of nutria at the Installation. An estimation of the current level of infestation will be made as well as an estimation of the impact potential of nutria within the Installation boundaries based on area of potential habitat and current estimated level of infestation. Artificial scent stations will be used to index coyote abundance at the Installation. Upon completion of the surveys, a nuisance wildlife assessment and management plan will be developed which will identify nuisance wildlife habitat and locations and include suggested removal methods. A copy of this plan will be included in Appendix H once available.

In addition to the nuisance and invasive wildlife species identified in this section, other species that pose a human health and safety concern, or that conflict with the military mission or military operations, may be designated as nuisance and/or invasive wildlife. Control of non-traditional nuisance/invasive species, or of species not listed under state regulation as a nuisance/invasive species may be conducted by NR staff once appropriate permits have been obtained from VDGIF and/or USFWS.

3.12.1.1.1 Red-Eared Slider

Although native to the Mississippi Valley area of the U.S., the red-ear slider is considered invasive along the coastal states of the U.S., Hawaii, and in parts of the Caribbean, Canada, and Mexico. Many of the thriving invasive non-indigenous populations of red-eared sliders are established through the illegal release of pets. Red-eared sliders threaten native species by competing for habitat, food, and nesting sites. Native turtle populations also can be harmed by

parasites and diseases that are transferred from red-eared sliders (USFWS 2011c). Proven effective control methods for removing red-eared sliders include hunting, trapping, and collecting eggs and hatchlings. Education of the public and prevention of the illegal release of red-eared sliders also is important (Columbia University 2002). Red-eared slider has not been observed at the Installation; however, a survey for this species should be conducted. If observed, a removal plan should be developed in cooperation with VDGIF for this nuisance species.

3.12.1.1.2 Birds

When birds nest or roost in objectionable locations, their feces are often unsightly, destructive, and hazardous to human health. Birds that frequently become problem species include house sparrows, European starlings, and pigeons, which are species that have adapted to take advantage of urban environments. NASO DNA discourages roosting in inappropriate places by adding exclusion devices, repellants, and other deterrents to existing structures. Trapping, shooting, and nest removal also are used for pigeon, starling, and house sparrow control. It is important to remember, however, that pigeons and nearly all bird species other than European starlings, house sparrows, and mute swans are protected by the MBTA and cannot be harmed without a permit issued by the USFWS through the USDA, Animal Plant Health Inspection Service's Wildlife Services program.

3.12.1.1.3 Nutria

Nutria are semiaquatic members of the rodent family, and were intentionally or accidentally introduced to the southeastern U.S. in the late 1930s for the fur industry (USGS 2004). Within 20 years of their introduction, nutria became a problem to farmers and native wildlife populations. Because of dense populations, nutria over-harvest preferred food species within their range resulting in the killing of native wetland plants and agricultural fields. This over-harvesting destroys productivity as less desirable species invade the impacted sites and increase erosion potential. Nutria also are known to feed on tree and shrub seedlings and can severely impact regeneration of some species. Burrowing in dams and levees is another type of damage caused by nutria. As their range and population have increased, the environmental and economic problems they cause also have increased. Using hardware cloth tubes or wire mesh plant guards may be necessary to protect bald cypress seedlings in planted wetlands and mitigation sites. Plastic seedling protectors may not deter nutria (USGS 2007).

Shooting can be used as the primary method of nutria control in areas with dense populations. Shooting is most effective when conducted at night with a spotlight at an established bait station. Bait stations can be established on floating rafts or boards that are continuously lit by a spotlight and in view of the shooter. Alternately, increasing the hunting and trapping efforts at the station may help control the population. Controlling nutria populations, however, will mostly be implemented by NRMs as there will not likely be much interest in this species by hunters or commercial trappers. Nutria are designated as nuisance species and may be taken at any time (except on Sunday) by use of a firearm or other weapon (VDGIF 2008).

3.12.1.1.4 Coyote

Coyotes resemble small collie dogs, with pointed ears, a slender muzzle, and a bushy tail. Coyotes are a top predator and can be useful in control of deer, Canada goose (by eating eggs), and

rodents. They are most active at night and early morning, especially in areas where human activity occurs, and during the hot summer months. Coyotes can become a nuisance in urban areas by preying on pets and damaging livestock and crops. Coyotes can constitute a threat to public health and safety when they frequent airport runways and residential areas, and act as carriers for rabies (Internet Center for Wildlife Damage Management 2005). Prohibiting wildlife feeding and making sure pet food and garbage cans are secure are some steps residents can take to deter coyotes from frequenting urban areas. Since rodents can be attracted to fallen bird seed, seeds accumulating underneath bird feeders should also be routinely cleaned up.

3.12.1.1.5 Feral Cats and Dogs

Pets that have been abandoned or left behind by owners often become serious pests on military installations. Feral animals are a health and safety risk for Installation personnel and threaten wildlife populations, especially migratory birds. Removal of feral pets from the environment is a natural resources management goal. Feral animal control is jointly conducted by NR staff and other environmental staff. The CNO Policy Letter of January 2002 on Preventing Feral Cat and Dog Populations on Navy Property outlines the Navy's policy on feral pets (Appendix J). In accordance with Navy policy, the Installation must adopt proactive pet management procedures that prevent the establishment of free-roaming cat and dog populations. Additionally, the Installation must ensure the humane capture and removal of feral cats and dogs, and every effort should be made to find homes for adoptable animals. At NASO DNA, captured feral pets are taken to the local animal control facility.

Feral cat populations are a particular concern because of the threat they pose to native birds and small mammal species. Feral cat populations are controlled at NASO DNA by encouraging responsible pet ownership and limiting access to food and shelter. Vaccination, registration, and tags are required for every pet on the Installation. Spay and neuter programs are promoted and all pets must be kept under strict supervision. Prohibiting the feeding of strays and ensuring all dumpsters are tightly secured are additional steps that control feral cat populations.

3.12.1.1.6 Pigs

Feral pigs (*Sus scrofa*) that have existed in the region since early European settlement are another problem species for native habitats and wildlife. Feral pigs have not been identified on the Installation in recent years. The removal of these animals from the Installation was due to the combination of proactive partnerships with BBNWR, lethal removal efforts, the repair of fences along the Back Bay watershed, and the repair and installation of the Installation's southern boundary security fence. There is still a population of feral pigs within the Back Bay watershed. More information on this population may be obtained from Back Bay NWR and False Cape State Park.

3.12.1.1.7 Miscellaneous Vertebrates

A number of vertebrate species such as groundhogs (*Marmota monax*), squirrels (Family Sciruidae), mice (*Mus* sp.), rats (*Rattus* sp.), skunks (Family Mephitidae), opossums, and nutria can be considered nuisance pests in urban environments. State wildlife regulations prohibit capture and relocation of wildlife to other locations, as this could contribute to the spread of wildlife diseases. As such, wildlife captured at the Installation must be released within another

area of the Installation, preferably within natural areas adjacent to the location of capture. Lethal methods of wildlife will not be used unless imminent danger to NASO DNA personnel exists, or if the species presence is damaging structures, disrupting the mission, causing a severe nuisance, or is otherwise intolerable.

3.12.1.1.8 Invertebrates

Ants, termites, bees, wasps, forest pests, and other invertebrates can cause destruction by invading and damaging structures. Ants are one of the most common household pests. Bees, wasps, and other social insect groups may establish nests in buildings and other Installation structures, causing health and safety hazards. Regular inspections and maintaining good sanitation (properly storing food, cleaning up grease and spills, etc.) can prevent infestations.

Termites can damage structural lumber, utility poles, and other wooden structures, as well as stored foods, books, and household furniture. Signs of termite infestation include swarming of winged forms in fall and spring, and evidence of tunneling in wood. Wood in damaged areas is typically thin and easily punctured with a knife or screwdriver (University of California Integrated Pest Management Online 2001).

Forests pests result when non-native insects and diseases are introduced into an ecosystem and cause environmental or economic damage. Although damage is inflicted on the host species, the impact of infestation can extend to associated plants and animals that depend on forested habitats. Forests pests can threaten forestry resources at NASO DNA, potentially contributing to an increased fire risk if the infestation is severe enough to cause large die offs (National Park Service n.d.). Section 3.12.2 provides additional information on forest and landscape pests.

3.12.1.2 Invasive Plants and Noxious Weeds

Many aggressive, nonnative plant species that have been used in agriculture, erosion control, and as ornamentals have become problematic weed species that are now considered a leading threat to native habitats. EO 11987, *Exotic Organisms*, and EO 13112, *Invasive Species*, address the control of invasive, nonnative species on federal facilities. EO 11987 specifically restricts the introduction of harmful exotic species into native ecosystems, and EO 13112 requires federal facilities, to the extent practicable and permitted by law, to:

- prevent the introduction of invasive species;
- detect and control such species;
- accurately monitor invasive species populations;
- provide for restoration of native species and habitats that have been invaded;
- conduct research on invasive species to prevent their introduction and provide for environmentally sound control; and
- promote public education on invasive species.

Management of invasive plant species at NASO DNA is focused on the species and communities desired rather than on simply eliminating the invasive species. Priorities are set based on

ecological significance, the severity of infestation, and the likelihood of successful control with available resources. Preventive measures keep invasive species from becoming established.

General control methods that are used to combat invasive species infestations include mechanical methods such as cutting, mowing, handpulling, burning, and chemical applications of herbicides. Herbicide applications are most effective with species that have a large percentage of foliage to stems and roots such as grasses and nonwoody vines. For woody species, a combination of practices that includes cutting the larger woody materials and treating resprouting vegetation with a foliar application of herbicides is frequently recommended.

Herbicides may only be applied by licensed DoD employees or contractors in a manner consistent with all label instructions. All herbicides used must be approved by regional entomologists and must be on the authorized user list. In addition, all outdoor pesticide use that is conducted in remote areas must be coordinated with NR personnel to ensure wildlife, plants, or their habitats are not affected. The Invasive Species Inventory Survey report is included in Appendix H.

A list of Virginia's invasive species, methods of control, and fact sheets are available on the VDCR-DNH website: <http://www.dcr.state.va.us/dnh/invinfo.htm>

A noxious weed is a plant that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, natural resources of the U.S., the public health, or the environment. Currently, no noxious weeds have been identified at the Installation; however, surveys for the presence of noxious weeds are conducted periodically, and the Installation takes precautions to avoid introduction of noxious weeds.

An invasive plant species inventory survey was conducted in 2012–2013 using an adaptive survey methodology with on-the-ground surveys and GPS data recording the location and presence/absence of invasive plant species. The surveys targeted high-risk areas and pathways which have been disturbed, such as roads, trails, and edge habitat, as invasive plant distribution is closely associated with these disturbances. Sixteen (16) invasive plant species were identified at NASO DNA during these surveys, which are typical of the Coastal Plain in Virginia (VDCR-DNH 2009). Invasive species observed include Japanese honeysuckle, Japanese stilt grass (*Microstegium vimineum*), Chinese privet (*Ligustrum sinense*), alligator weed (*Alternanthera philoxeroides*), Johnson-grass (*Sorghum halepense*), common reed, autumn olive (*Elaeagnus umbellata*), border privet (*Ligustrum obtusifolium*), Chinese lespedeza (*Lespedeza cuneata*), common dayflower (*Commelina communis*), English ivy (*Hedera helix*), gill-over-the-ground (*Glechoma hederacea*), multiflora rose (*Rosa multiflora*), pampas grass (*Cortaderia selloana*), Parrot feather milfoil (*Myriophyllum aquaticum*), and thorny Elaeagnus (*Elaeagnus pungens*). Mimosa (*Albizia julibrissin*) was not identified during the survey, but is known to occur on the Installation (M. Wright, personal communication, 18 February 2014). The following sections provide additional details on common reed and alligator weed. Detailed invasive species maps and results of the invasive species survey for all of the invasive species observed at NASO DNA is provided in Appendix H.

3.12.1.2.1 Common Reed

One of the primary invasive plant species of concern at NASO DNA is common reed. This large, invasive perennial grass that can be found throughout the United States. It is an aggressive grass species associated with salt and freshwater marsh habitats where land and hydrological regimes have been disturbed. It grows quickly and forms extensive, and often monotypic, stands that can overwhelm other wetland species. Common spreading mechanisms or vectors have been attributed to nutrient enrichment and an increase in soil disturbance associated with coastal development. It is also a significant problem in freshwater systems, and is difficult to eradicate once it becomes established (Invasive Plant Atlas of the United States 2013).

Aerial spraying of common reed populations at the Installation with Rodeo herbicide was initiated in 2006, and Installation populations were mapped at NASO DNA in 2008. In October 2011 an estimated 8 ac (3 ha) were sprayed with Rodeo Herbicide (Figure 3-7), with spraying conducted along the northern and eastern shoreline of Lake Tecumseh near the southern end of the Installation, as well as two patches east of Lake Tecumseh between Regulus Avenue and the lake. Backpack spraying was also conducted in 2011; however these areas are not depicted in Figure 3-7. Aerial spraying of populations along Redwing Lake also were sprayed prior to 2011; however, since this event sprayed mostly dead or dormant stands, this treatment did not result in preferred results. Aerial spraying of common reed conducted at the Installation between 2006 and 2011 was covered by an EA prepared for invasive species spraying events conducted at Navy installations located within the Hampton Roads region, which targeted common reed and kudzu (Appendix A).

During the 2012-2013 invasive species survey conducted at NASO DNA approximately 160 populations, or stands, of common reed were documented (see Figure 10 in Appendix H, Enclosure 5). The total area occupied by common reed was estimated to be 17.9 ac (7.2 ha). Common reed dominates many of the wet areas and inland shorelines of the Installation, with the largest population observed adjacent to Redwing Lake, which is approximately 2 ac (0.8 ha) in size.

3.12.1.2.2 Alligator Weed

Based on past invasive plant species surveys, one of the primary invasive plant species of concern on the northern portion of NASO DNA was alligator weed. This herbaceous perennial roots on shore or shallow water and also can be partially or wholly terrestrial. Alligator weed is native to South America but was first documented in the U.S. in 1897 in Mobile, Alabama. It is now found in coastal states from Virginia to Texas, the Tennessee Valley, and Puerto Rico as well as in California. Alligator weed is an aquatic plant that invades shallow open water habitats, wetlands, streams, ponds, and shorelines. It is often found in lakes, ponds, estuaries, and irrigation canals; but can also be found growing on dry land. Alligator weed can form thick mats that displace native vegetation, clog waterways, and interfere with agriculture, drainage, and irrigation. Dense mats can also lead to flooding and limit access to waterbodies. It spreads by animals or water, and can reproduce vegetatively from plant fragments that develop into entirely new plants, making it difficult to effectively eradicate. The terrestrial form can develop a massive rhizomatous root system (Invasive Plant Atlas of the Mid-South n.d.).



Figure 3-7. Invasive Species Management at NASO DNA.

The use of mechanical methods of control are expensive and ineffective against alligator weed and may actually hasten the spread of the invasive plant because stem fragments propagate the plant. The optimal control mechanism in Virginia is the use of glyphosate and other herbicides. The use of glyphosate and other nonselective herbicides requires careful knowledge of the chemicals and the use of appropriate application methods to ensure that other green vegetation is not adversely affected (VDCR-DNH 1997).

Invasive species surveys conducted in 2012 and 213 identified alligator weed in eight plot locations, which were distributed in isolated plots (see Figure 5 in Appendix H, Enclosure 5). These sites were located along the perimeter of ponds, canals and drainage ditches.

3.12.2 Forest and Landscape Pests

Proper plant selection and plant health management in landscaped and ornamental areas can reduce the level of effort required with regards to weed and pest management, both in urban and natural environments. Selecting the right plant for the space, limiting abuse (including soil compaction from vehicular and pedestrian traffic and damage from lawnmower and string trimmers), and maintaining or increasing species diversity are methods of promoting plant health. Monocultures of trees or shrubs create an opportunity for devastating pest or disease outbreaks. Stress induced by poor plant selection, insufficient water, wounding, or soil compaction creates avenues of infection or infestation and reduces a plant's ability to defend itself. Poor maintenance practices such as improper pruning also lead to wounding and points of entry for pathogens. The draft Regional Tree Preservation Instruction (Appendix D) addresses many of these issues and NASO DNA makes every effort to enforce this instruction. Although this regional instruction is still a draft instruction, it is included as part of this INRMP as it is an enforceable management requirement for the Installation. This draft regional instruction is largely based on the original instruction prepared for NAS Oceana (NAS Oceana Instruction 4100.2). NR staff are involved in all military construction projects and promote practices that preserve the integrity of the urban forest as well as individual trees.

3.13 CULTURAL RESOURCES MANAGEMENT

Cultural resources, including archaeological sites, historic structures, buildings, landscapes, objects, and districts are nonrenewable resources that illustrate the historical development of the U.S. federal facilities. As stewards of cultural resources; this responsibility is recognized in the National Historic Preservation Act (NHPA) of 1966 as amended; EO 11593, *Protection and Enhancement of the Cultural Environment* and EO 13287, *Preserve America*; and in numerous other federal laws and regulations, and DoD and Navy policies. Under the NHPA each federal agency is tasked with the responsibility of establishing a preservation program to identify and evaluate cultural resources that may be eligible for listing on the National Register of Historic Places. Properties under a federal agency's jurisdiction that are listed or eligible for listing on the National Register of Historic Places shall be managed and maintained in a way that considers the preservation of their historic, archaeological, architectural, and cultural values. The cultural resources program at NASO DNA is the responsibility NAVFAC Mid-Atlantic (Code EV2) under the Regional Historic Preservation Officer..

Several cultural resources surveys were conducted at NASO DNA during the 1980s (Navy 1983a, 1983b, 1983c, 1987a, 1987b, and 1987c). These surveys were conducted in the southern portion of NASO DNA and did not include the northern portion of the Installation. In October 2008, the Navy performed an additional archaeological survey, prepared by the Southeastern Archaeological Research Inc. (*Archaeological Characterization Study of Fleet Training Center Dam Neck, Virginia Beach, Virginia*). The Virginia Department of Historic Resources, also known as the State Historic Preservation Office, concurred with the findings of the report in a letter dated 11 December 2007. Additionally in January 2010, the southern area of the Installation was surveyed and two archaeological sites were evaluated.

To date, 14 archaeological sites have been identified at NASO DNA (figure not included to protect integrity of archaeological sites per the Regional Historic Preservation Officer), and five sites have been determined to be potentially eligible (requiring Phase II testing) or eligible for listing on the National Register of Historic Places. Further archaeological investigations are required for the area formerly known as Camp Pendleton in the northern area of the Installation, areas within the boundaries of the identified eligible or potentially eligible archaeological sites.

An archaeological survey of the northern portion of NASO DNA (Navy 1987d) found no archaeological sites and recommended no further investigation. However, formal concurrence on this finding has not been obtained from the Virginia State Historic Preservation Officer (SHPO).

The most recent architectural survey, Phase I Architectural Survey of Potentially Significant Cold War Era Resources (1948–1962) at Navy Hampton Roads Bases, identified a potential historic district associated with the Surface Launched Guided Missile School. The potential historic district consists of three buildings: Buildings 586, 543 and 572. The findings of the Phase 1 Architectural Survey are currently under review by Virginia Department of Historic Resources (Sadler & Whitehead Architects, PLC 2012).

NASO DNA is not included in the 1999 Programmatic Agreement (PA) for Historic Buildings in Hampton Roads between the Navy, the Virginia SHPO, and the National ACHP as it had not been surveyed prior to execution of the Regional PA. Therefore, in accordance with Section 106 of the NHPA, every action that has the potential to affect resources (e.g., ground-disturbing activities, renovation of buildings, and demolition of buildings) must be coordinated with the Virginia SHPO and other consulting parties as appropriate, prior to implementation.

An Integrated Cultural Resources Management Plan (ICRMP) is required for all DoD facilities per federal and DoD regulations. An ICRMP is a five-year planning document which serves to manage and protect cultural resources under the control of a military installation so that such resources are properly considered and integrated into the facilities decision-making process. The purpose of an ICRMP is to integrate the entirety of the installations' cultural resources program with the ongoing military mission. As such, an ICRMP allows for identification of potential conflicts between the installation's mission and cultural resources, and identifies actions necessary to meet statutory and regulatory requirements. NASO DNA was included in the 2012 regional ICRMP prepared for Naval Installations in Hampton Roads (Sadler & Whitehead Architects, PLC 2012). This document provides additional information and guidance on cultural resources management. Figure 3-8 will be updated if this site is formally designated. The cultural resources information identified in Figure 3-8 is not reflective of all known cultural resources at



Figure 3-8. Cultural Resources Management of NASO DNA.

NASO DNA. To protect the integrity of archaeological sites in accordance with the guidance provided by the Regional Historic Preservation Officer some cultural resources information is not shown. Cemeteries are located at NASO DNA, and any proposed action located within or adjacent to the boundaries of a cemetery shall be coordinated with the Installation facilities management division and the NAVFAC Mid-Atlantic Regional Historic Preservation Officer.

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4.0 NASO DNA NATURAL RESOURCES MANAGEMENT UNITS

For the purposes of natural resources management on NASO DNA, the Installation has been divided into three management units. The management units are based on general land use types and address specific management issues associated with the primary land use. Included are the Urban Management Unit, the Natural Areas Management Unit, and the Beaches and Dunes Management Unit (Table 4-1 and Figure 4-1). Although the Beaches and Dunes Management Unit includes natural ecosystems, it has specific management needs that distinguish it from management of the Natural Areas Management Unit. The natural resources management units described in this INRMP differ from the zoning classifications delineated in the Regional Shore Infrastructure Plan (Navy 2002a), which are based on the services that an area provides rather than the ecological considerations and natural resources management requirements of an area. Management issues are identified for each land unit, and recommendations for addressing the issues are provided.

Table 4-1. Natural Resources Management Units of NASO DNA.

Natural Resources Management Unit	Acres
Natural Areas	1,115
Urban	444
Beaches and Dunes	271
Total	1,830

4.1 URBAN MANAGEMENT UNIT

The Urban Management Unit is located primarily between the Natural Areas and Beach and Dunes Management Units (Figure 4-1). It encompasses approximately 444 ac (180 ha) and includes the Installation’s central support area, training facilities, and housing and personnel support activities on the Installation. The landscape in this unit is largely developed, but contains mowed lawns and fields, landscaped trees and shrubs, and small patches of forests within the developed areas. Sadler Pond and the surrounding picnic area and recreational trail is the largest undeveloped tract in this unit. This area has more intensive grounds maintenance requirements than other portions of the Installation, as well as other natural resources issues generally associated with urban environments. The primary natural resources management issues are:

- Coastal Zone Protection,
- Wetlands and Water Quality Protection,
- Shade Tree and Urban Forest Management,
- Fish and Wildlife Management,
- Outdoor Recreation and Environmental Awareness, and
- IPM.



Figure 4-1. Natural Resources Management Units of NASO DNA.

4.1.1 Coastal Zone Protection

All development or other activities that are likely to impact land or water use or natural resources within Virginia's coastal management area (coastal zone) will be reviewed to determine if coastal consistency determination is required. Federal lands, the use of which is by law subject solely to the discretion of, or which is held in trust by the federal government, its officers or agents, are excluded from Virginia's coastal zone. However, activities on federal lands with any reasonably foreseeable effects to Virginia's coastal zone must be consistent to the maximum extent practicable with Virginia's Coastal Zone Management Program. NR staff must review plans and proposed actions at NASO DNA to ensure consistency with the Virginia Coastal Zone Management Program and help obtain a consistency determination when required.

4.1.2 Wetlands and Water Quality Protection

Wetlands and water quality protection are important issues in the Urban Management Unit because of the high concentration of roads, parking lots, and other impervious surfaces that contribute oil, petroleum, and other hazardous materials to stormwater runoff. Establishing or enhancing vegetated riparian buffers along all waterways, retaining vegetative cover in drainage ditches, and establishing vegetative buffers around as much impervious surface area as practicable would help to substantially reduce nonpoint source pollution runoff. Past efforts to reduce runoff include the establishment of a vegetative filter strip and planting trees around Sadler Pond. During the performance period of this INRMP, NR staff will continue to work with the FEAD and other appropriate Installation and NAVFAC departments to identify additional areas to enhance or establish riparian buffers. Specific actions will include establishing zones where mowing is reduced to once or twice per year, creating no mowing zones where practicable, and planting appropriate native trees and shrubs where practicable.

Other impacts to wetlands and water quality could result from new construction in this management unit. Wetland delineations were completed pursuant to methods outlines in the 1987 Corps of Engineers Wetland Delineation Manual (1987 Manual) and *The Regional Supplement to the Wetland Delineation Manual: Atlantic and Gulf Coastal Plan Region*. The delineations provide the locations of aquatic resources under the potential jurisdiction of the USACE. After field and desktop review of the jurisdictional determination request package, the USACE has issued a preliminary jurisdictional determination in regards to these delineations in a letter dated 30 January 2012. Under the preliminary jurisdictional terms all waters identified on Figure 2-3 are assumed jurisdictional and regulated by the CWA. Activities involving the discharge of dredged or fill material, including those associated with mechanized land clearing, into these areas would require an USACE permit, Virginia Water Protection Permit from the VDEQ, and/or a permit from the VMRC. A City of Virginia Beach local wetlands board permit also may be required for activities that have the potential to impact tidal wetlands. The preliminary jurisdictional determination may be used with USACE permit applications if impacts to these aquatic resources cannot be avoided. NR staff will assist project proponents of an action in obtaining required local, state, and federal wetlands protection permits. Natural resources and environmental compliance (water program media managers, etc.) staff also will review erosion and sediment control plans for construction projects and actions that are 10,000 ft² (929 m²) or greater in size, and/or review the project SWP3 that would be required for construction projects that disturb one or more ac (0.4 or more ha). Frequent site visits will be conducted during

construction of such projects to help ensure compliance with erosion and sediment control plans and that BMPs are being implemented. The protection of watersheds and wetlands through initiatives such as establishing or enhancing buffer zones and implementing mowing restrictions is discussed in Section 3.2.3. Efforts to protect wetlands and water quality through the establishment and maintenance of buffer zones will continue as practical without detriment to the military mission at NASO DNA. In particular, the NRM will continue to monitor and minimize development/impacts within a 50-ft (15-m) buffer of wetlands and other waterbodies to the maximum extent practicable. The management of buffers on these resources is a conservation management initiative of this INRMP. There is no other regulatory requirement to maintain this buffer. NASO DNA is a narrow installation and upland area suitable for military mission required construction is minimal and further restricted by designating 50-ft (15-m) buffer zones. Construction that is directly linked to military readiness activities may occur within the 50-ft (15-m) buffer zone; however, like with working in wetland areas the project must be designed to avoid and minimize impacts to the buffer zone. The NRM and other NR and EV staff will work with project planners, designers, engineers, etc. to ensure that buffer impacts are avoided and/or minimized to the greatest extent practical.

4.1.3 Shade Tree and Urban Forest Management

Currently, NASO DNA has a small population of shade and ornamental trees and would benefit from an increase in the number and variety of trees and shrubs planted around the Installation. Specific sites or the types of sites that will be targeted for additional plantings include the picnic area and ball fields at Sadler Pond, roadside plantings along Regulus Avenue, and perimeter plantings around several Installation parking lots (i.e., the lot on Regulus Avenue across from Building 127 and the Shifting Sands Club parking lot). Arbor Day and Earth Day will continue to be observed by planting new trees at these and other appropriate sites identified by the NR personnel. Considerations such as species mature size, longevity, tolerance to soil compaction and pollution, and susceptibility to disease and insect pests will be taken into account when selecting appropriate native species for planting. NR personnel will coordinate with the FEAD on any contract that includes tree planting to ensure the contracts include watering of planted areas for one to two years after plantings to ensure survival.

NR personnel also will participate in the National Arbor Day Foundation's Tree City USA program. A recertification application, forest work plan, and proclamation in support of Arbor Day will be submitted to VDOF by 31 December each year, and annual Arbor Day celebrations will be held at NASO DNA. An example of this application packaged is included in Appendix D.

NR staff will review all plans where tree removal is proposed to ensure compliance with this INRMP and associated instructions (Appendix D). NR personnel will recommend tree protection measures, mitigation for lost trees, or selection of alternate sites. Proponents of projects or activities that may affect existing trees must consult with NR personnel to identify all trees in the affected area and to develop a site-specific tree preservation plan for the project in accordance with the this INRMP and associated instructions (Appendix D). All trees designated in the plan to be preserved will be identified on applicable project drawings and marked in the field. Additionally, NR will continue to promote the use of beneficial landscaping practices and the importance of using native species.

In an effort to improve urban tree health at NASO DNA, NR personnel will continue to coordinate with VDOF to provide pruning and tree care instruction for the FEAD, the Disaster Preparation Team, and others concerned with tree care and hazardous tree removal. Training sessions will be offered on an as needed-basis.

In order for future tree plantings to be most effective, an inventory of existing trees should be completed, and an urban forest management plan developed. The urban forest plan should assess tree health, including disease and pest problems and mower damage, and utility/tree conflicts. An urban forest management plan that assesses tree condition and provides guidance for care and maintenance would assist land managers in prioritizing and budgeting tree care work efforts required now and in the future.

4.1.4 Fish and Wildlife Management

Improving fisheries management at Sadler Pond and continuing to provide supplemental nesting habitat by maintaining nesting structures for birds and bats are the primary objectives of fish and wildlife management in the Urban Management Unit.

Ongoing efforts to improve water quality at Sadler Pond will continue. Specific management actions include continuing to maintain a no mowing zone around the pond's perimeter, and planting additional trees and shrubs around the pond. Evergreen species including loblolly pine and eastern red cedar will be planted on the northeast and southwest faces of the pond to form windbreaks to reduce bank erosion. In addition, the drainage ditches that drain into Sadler Pond from the ball fields and other portions of the developed area will be inspected to ensure ditches are well vegetated to help slow runoff and filter stormwater before entering the pond. NR personnel will coordinate with Installation and NAVFAC departments to establish improved vegetative or structural BMPs where required. Periodic water quality surveys will be conducted to assess the success of these management efforts.

There are at least two wooden structures and two concrete columns located within the Urban Management Unit that are designated nesting platforms, and which are used by osprey and other bird species. The wooden platforms were created to keep birds from nesting directly on utility transformers. The concrete columns installed as part of a former aboveground steam line that has since been demolished. NR staff maintain the stand-alone wooden nesting structures. The utilities department and other tenants that construct nesting platforms over utility lines or equipment maintain the concrete column platforms. NR personnel conduct annual inspections of these structures during the fall, and monitor nesting activity throughout the nesting season. Figure 3-5 depicts the most recent data for active nests. Not all nesting locations shown on Figure 3-5 are associated with man-made nesting platforms/structures. Any additional platforms that are installed will be GPS-located, entered into the Installation GIS database, and the data sheet will be revised to include the new platforms. The Navy tracks and monitors all nest locations. Man-made osprey specific nesting platforms are maintained; however, not all of these platforms are maintained by NR staff.

Nuisance and invasive wildlife can interfere with the military mission or well-being of domestic animals, other wildlife, or humans because of their feeding or nesting habits. An example of nuisance wildlife activity that may occur in the Urban Management Unit is osprey nesting on

communication towers and electrical transformers, which can potentially cause damage to these structures and harm the nesting osprey. Other potential nuisance wildlife problems at NASO DNA are associated with various species of native and non-native plants and animals as described in Section 3.12. Control of non-traditional nuisance/invasive species, or of species not listed under state regulation as a nuisance/invasive species may be conducted by NR staff once appropriate permits have been obtained from VDGIF and/or USFWS. Management of pets, especially those that have been abandoned or left behind by owners, is a key component of fish and wildlife management in the Urban Management Unit.

4.1.5 Outdoor Recreation and Environmental Awareness

Most outdoor recreation facilities (ball fields, picnic area, tennis courts, basketball courts, and recreational trail) in the Urban Management Unit support concentrated forms of recreation and are maintained by MWR. NR staff will continue to coordinate with MWR personnel on natural resources issues such as tree care and reducing nonpoint pollution at these recreational facilities on an as needed-basis.

Freshwater fishing is the primary form of outdoor recreation that occurs in the unit. Fishing conditions at designated fishing locations at the Installation are not optimal because of poor water quality. Efforts to improve water quality and recreational fishing at Sadler Pond and ditches will be conducted as described in Section 4.1.4 and Section 4.1.5 of this INRMP. Additional improvements to water quality will be implemented as erosion and sediment repairs are made as recommended in erosion control plan that is currently being prepared. A copy of this document will be included in Appendix H once available.

Most Earth Day and Arbor Day celebrations take place in the picnic areas in this natural resources management unit, which offers significant opportunities for increasing environmental awareness among Installation personnel and their dependents. NR staff will continue to conduct annual Arbor Day and Earth Day celebrations. Tree planting in the picnic area, around the ball fields, and around the perimeter of Sadler Pond will continue to be the focus of these celebrations. NR staff will suggest appropriate species for planting and assist with the planting. Post-planting care must be coordinated with the FEAD for two years to ensure survival.

4.1.6 Integrated Pest Management

Mosquitoes and other insect pests, rodents, and feral cats are the primary pest problems in this management unit, whereas landscape weeds are a minor issue. The NAVFAC Mid-Atlantic Environmental Services staff is responsible for pest management at NASO DNA and, along with independent contractors, performs most pest control activities on the Installation. Qualified NR staff are responsible for controlling nuisance wildlife situations that may involve game animals, migratory birds, or other protected wildlife species.

Control of feral animals is largely an issue of educating NASO DNA personnel and residents on the importance of neutering, keeping pets indoors, and not feeding feral animals. The Installation website and newspaper are venues that will be used for informing Installation personnel and residents about pet and wildlife issues.

4.1.7 Summary of the Urban Management Unit Actions

- Review plans and proposed actions to ensure consistency with the Virginia Coastal Zone Management Program and help obtain a federal coastal consistency determination as required by the CZMA.
- Coordinate with appropriate Installation and NAVFAC departments to identify additional areas to enhance or establish riparian buffers. Establish reduced mowing and no mowing zones along selected ditches and wetlands, and plant appropriate native trees and shrubs where practicable.
- Review plans for projects that have the potential to impact wetlands against NASO DNA wetland delineation maps, and assist the proponent of an action in applying for, reviewing, and obtaining all required state and federal wetlands protection permits.
- Review sediment control plans and SWP3 for construction projects and actions that disturb 10,000 ft² (929 m²) or one or more ac (0.4 or more ha), respectively.
- Update the NASO DNA wetland delineations every five years.
- Promote the use of beneficial landscaping practices and the importance of using native species.
- Focus new urban tree planting efforts in the picnic area and ball fields at Sadler Pond, the roadside along Regulus Avenue, and the perimeter of parking lots such as those on Regulus Avenue across from Building 127 and the Shifting Sands Club.
- Assist with hazardous tree recognition and removal.
- Participate in National Arbor Day Foundation's Tree City USA program. Submit a recertification application, forest work plan, and proclamation in support of Arbor Day to the VDOF by 31 December each year.
- Coordinate an annual, joint Arbor Day–Earth Day celebration event.
- Review all development plans and actions where tree removal and pruning is proposed and provide recommendations for tree protection, mitigation for lost trees, or selection of alternate sites.
- Continue to coordinate with VDOF to provide pruning and tree care instruction for the FEAD, Disaster Preparation Team, and others concerned with tree care. Offer training sessions on an as-needed basis.
- Continue to maintain a no mowing zone around the perimeter of Sadler Pond to reduce bank erosion and improve fish habitat.
- Utilize opportunities such as Earth Day and Arbor Day to plant evergreen species including loblolly pine and eastern red cedar on the northeast and southwest faces of Sadler Pond to form windbreaks to reduce bank erosion.
- Coordinate with appropriate Installation and NAVFAC departments to establish improved vegetative and structural BMPs in and around the drainage ditches that

drain into Sadler Pond from the ball fields and other portions of the developed area.

- Conduct water quality surveys to assess the effectiveness of management activities at Sadler Pond.
- Conduct annual inspections and maintenance of osprey nesting platforms, bat boxes, and bluebird nest boxes during the fall.
- Monitor nesting activity at osprey nesting platforms, and bat and bluebird nest boxes throughout the nesting season.
- Continue to coordinate with MWR personnel on natural resources issues such as tree care and reducing nonpoint pollution at recreational facilities on an as needed-basis.
- Assist with the removal of miscellaneous nuisance and invasive wildlife, and invasive plants and/or noxious weeds in the administrative and housing areas.
- Have appropriate NR staff attend annual CLE refresher courses.
- Complete the Environmental Checklist (see Appendix A), as needed, for those natural resources management actions that may affect a regulated resource, or other Navy managed environmental resource. Conduct associated consultations and required mitigations, and acquire associated permits in coordination with the appropriate Navy environmental media manager.

4.2 NATURAL AREAS MANAGEMENT UNIT

The Natural Areas Management Unit includes areas throughout the Installation that are relatively undeveloped, including forested areas, and the Navy-owned portion of Redwing Lake. The 13-ac (5.3-ha) mitigation wetland site for military construction and the 9-ac (3.6 ha) closed landfill on Regulus Avenue (ERP Site 1) also are included in this unit. This management unit encompasses approximately 1,115 ac (451 ha). The extensive area of undeveloped land in this unit primarily serves as a noise and safety buffer for military training activities at NASO DNA, but also supports a diversity of wildlife species, and offers opportunities for outdoor recreation. As the NASO DNA mission expands, expansion of development into currently undeveloped lands of the Installation also may be needed to accommodate future growth. Important natural resources management issues include:

- Coastal Zone Protection;
- Wetlands and Water Quality Protection;
- Habitat Conservation and Restoration;
- Forest Management;
- Fish and Wildlife Management;
- Outdoor Recreation and Environmental Awareness;
- IPM; and

- Cultural Resources Management.

4.2.1 Coastal Zone Protection

As with the Urban Management Unit, any proposed project that is likely to impact land or water use or natural resources may require a coastal consistency determination. In accordance with the CZMA, NR staff will review plans and proposed actions in this unit to ensure consistency with the Virginia Coastal Zone Management Program and help to obtain a consistency determination when required.

4.2.2 Wetlands and Water Quality Protection

The largest percent of the Installation's wetlands occurs in the Natural Areas Management Unit. Preventing the loss and degradation of wetlands from development is the primary focus of wetlands protection in this area. Wetland delineation field studies have been performed at NASO DNA. Wetland delineations were completed pursuant to methods outlines in the 1987 Corps of Engineers Wetland Delineation Manual (1987 Manual) and *The Regional Supplement to the Wetland Delineation Manual: Atlantic and Gulf Coastal Plan Region*. The delineations provide the locations of aquatic resources under the potential jurisdiction of the USACE. After field and desktop review of the jurisdictional determination request package, the USACE has issued a preliminary jurisdictional determination in regards to these delineations in a letter dated 30 January 2012. Under the preliminary jurisdictional terms all waters identified on Figure 2-3 are assumed jurisdictional and regulated by the CWA. Activities involving the discharge of dredged or fill material, including those associated with mechanized land clearing, into these areas would require an USACE permit, Virginia Water Protection Permit from the VDEQ, and/or a permit from the VMRC. A City of Virginia Beach local wetlands board permit also may be required for tidal wetlands. The preliminary jurisdictional determination may be used with USACE permit applications if impacts to these aquatic resources cannot be avoided. NR staff will review plans for projects that have the potential to impact wetlands, and assist the action proponent in applying for and obtaining required state and federal wetlands protection permits.

Most of the Natural Areas Management Unit located in the northern end of NASO DNA is comprised of forested or emergent wetlands. As surrounding landscapes become more densely developed, the importance of these wetlands for protection of regional water quality and flood protection increases.

A portion of the southern out-parcel area of the Installation located in this management unit has the potential to serve as a wetland mitigation site to compensate for the loss of wetlands elsewhere on the Installation, if needed. Wetland restoration or creation could be accomplished either by plugging several of the main ditches that were formerly used to drain agricultural fields, or by excavating upland areas to create additional wetlands. NR staff will conduct further analysis and produce site-specific plans on an as-needed basis. Other wetland areas that were previously used for agricultural production are no longer mowed, and are being allowed to revert back to natural wetland habitat.

As discussed in 4.1.2, efforts to protect wetlands and water quality through the establishment and maintenance of buffer zones will continue.

4.2.3 Habitat Conservation and Restoration

The Lovett's Marsh SIA, a portion of Dune and Swales SIA, Southeast Redwing Lake Wetlands SIA, Helicopter Pad Wetlands SIA, and a portion of Interdunal Swale, Dune, and Freshwater Marsh SIA are areas with high conservation priority in this management unit. These areas provide habitat for rare species (the state rare early white-top fleabane and fasciculate beaksedge) and a significant interdunal swale community.

Water quality in the Southeast Redwing Lake Wetlands SIA is thought to be impacted by sewage and runoff from the adjacent housing area. The current conditions on this site will be reassessed to determine if corrective action is warranted.

Loblolly pines planted during the 1970s in a portion of the Interdunal Swale, Dune, and Freshwater Marsh SIA are considered a threat to this significant natural area. Storm damage from Hurricane Isabel however, caused significant damage to the trees, which will be assessed and tree removal planned accordingly. Removal of planted pines from the swale wetlands would be consistent with the Navy's policy on ecosystem management and the SAIA, and might qualify for wetland restoration credit.

Four wetland mitigation sites involving restoration of existing wetlands are in this management unit: Redwing Lake, Lovetts Marsh, MACS 24, and southern out-parcel mitigation sites. The Redwing Lake mitigation wetland represents past restoration efforts undertaken in this management unit. The site has a well-developed emergent and open water marsh system and the forested wetland portion is developing. The bald cypress planted on the site is well established and has grown. NR staff will continue to monitor the site for potential problems such as common reed.

At Lovetts Marsh efforts are ongoing to reduce the maple canopy that dominates an area that was historically thought to be an extensive emergent marsh that was part of the Back Bay watershed. A weir, initially installed in 1996, was modified in 2001 to increase the water level to about 3.5 ft (1.1 m) to kill the existing hardwoods. The increased water level is proving successful and additional hardwood treatment such as girdling or herbicide injection will not likely be necessary to reduce the established trees. NR staff will continue to monitor the site to determine when hardwood control is achieved and how to manipulate future water levels. As discussed in Section 3.7.2, USFWS installed a weir on the south end of Lake Tecumseh, and the resulting habitat modification are assisting the Navy in meeting their management goals associated with the Lovetts Marsh mitigation site.

The MACS 24 mitigation site was monitored for three years to comply with permit requirements and to ensure that mitigation goals were achieved. Future monitoring would only be required to document the continued success of the site and identify invasions of common reed. Monitoring currently consists of periodic visual inspections of site conditions.

The southern out-parcel mitigation site was established as part of the mitigation requirements associated with the NAS Oceana Aeropines Golf Course Notice of Violation mitigation requirements.

4.2.4 Forest Management

There is no active management program for timber harvesting at NASO DNA. The forest management strategy is therefore primarily custodial to ensure maintenance of biodiversity and to provide a noise and safety buffer for the Installation's military training activities. Specific management requirements in the planted pine stands include enhancing wildlife habitat, reducing the risk of catastrophic fire, and controlling insect and disease outbreaks. Timber removal is warranted only to prevent the decline of a healthy forest ecosystem from insects and disease, hurricanes, and other such potentially catastrophic events. If timber harvesting or salvage operations are required, NR personnel will coordinate with the NAVFAC Regional Forester. In addition, in instances where proposed MILCON projects would affect forest resources at NASO DNA, NR staff will coordinate with the NACFAC Regional Forester to assess impacts and, where practicable, arrange timber sales.

NAS Oceana Instruction 5090.2E, *Procedures for Cutting Firewood and Use of Tree Products* (Appendix D) provides governing the cutting of trees for firewood and obtaining other forest products at NASO DNA.

NR staff also will continue implementing controlled burning to reduce fuel loads and enhance wildlife habitat. Burning will be conducted on a three- to five-year rotation as weather conditions permit, and as funding is available. NR staff will follow guidelines presented in the NAS Oceana, NALF Fentress, and NASO DNA Prescribed Burn and Smoke Management Plan (2010), and will update the plan annually to reflect accomplishments and to set new goals. Adequate firebreaks around each burn unit and internal fire lines also will be maintained as needed.

Additionally, NR staff will monitor forest stands to control insect and disease outbreaks. Southern pine beetle is the major forest pest in the area and is most likely to be a problem in stressed, overstocked pine stands. If a beetle infestation is detected, NR staff will coordinate with the NAVFAC Regional Forester to implement salvage or control operations.

A Forest Inventory project was awarded in FY13 that will establish forest management stands, provide associated metrics (e.g., moisture, fuel loads), and determine the need, safety, and methodology requirements associated with conducting prescribed burning activities. This inventory is schedule to be completed in 2015. The results of this inventory will be included in future INRMP updates and provided in Appendix H once available.

4.2.5 Fish and Wildlife Management

The combination of forests, wetlands, abandoned agricultural fields, and hedgerows in this management unit creates a mosaic of habitats suitable for a variety of the region's native wildlife. Reductions in agricultural land in the Virginia Beach area have resulted in the loss of early successional habitat, which has become increasingly rare. This habitat type is important for a number of grassland birds and other wildlife species that depend on open fields for foraging or hunting. Early successional habitat is maintained through a combination of treatments. Areas within the fallowed agricultural fields are managed as wildlife food and cover plots and will continue to be disked or bush-hogged periodically to prevent the invasion of woody species.

Treatments throughout the Installation will be limited to one-half to two-thirds of the total area annually so that escape cover is always available. Treatments will not be conducted during the breeding season to avoid disturbing ground nesting species. Prescribed burning will continue to be conducted on three- to five-year intervals to control woody species and promote the establishment of native warm season grasses.

If the canebrake rattlesnake is observed at the Installation, implementation of mowing restrictions along forest edge habitat for this species is recommended by VDGIF, as described in Section 3.10.2. If a canebrake rattlesnake is observed, it should be reported to the NRM and individuals should avoid harming the animal which may strike if provoked.

The forested areas in the northern portion of this management unit provide important habitat for resident and neotropical migrant songbirds and other wildlife species that occur at NASO DNA. Maintaining a variety of habitat types including large contiguous areas of forest and emergent and scrub-shrub wetlands will provide for most of the resident wildlife. Implementation of the Installation's Nest Box Program is another wildlife management priority in this management unit. All of the Installation's bat, bluebird, and wood duck boxes are located in this unit. Annual monitoring and maintenance will continue to be conducted by NR staff prior to 01 February each year. Wood shavings or other suitable nesting material will be replaced in wood duck boxes and repairs made as needed. Additional habitat will be provided by the installation of wood duck boxes in appropriate locations in this unit. Lovetts Marsh and the MACS 24 wetlands mitigation site offer ideal habitat and could support approximately 8–10 wood duck boxes. In addition, a portion of the existing boxes will be removed from their present locations and redistributed to other sites with suitable wood duck habitat. The new sites will be GPS-located, entered into the Installation GIS database, and nest box log sheet revised to document new locations (see Appendix H). The nest box location map (Figure 3-5) also will be updated to reflect the changes.

The Natural Areas Management Unit provides the greatest opportunity for deer population management at NASO DNA. NR staff will continue to administer the NASO DNA hunting program in cooperation with the VDGIF DMAP regulations for QDM. NR staff will continue to cooperate with VDGIF to set annual hunting seasons and bag limits at the Installation. Annual harvest data will continue to be collected, summarized, and reported to VDGIF to help assess deer population levels and herd condition.

4.2.6 Outdoor Recreation and Environmental Awareness

Hunting is a popular form of outdoor recreation in this management unit. Deer hunting is at a maximum level that can be supported given the Installation mission and available area. NR personnel will continue to administer the NASO DNA hunting program with the support of the Sportsman's Quality Management Board.

The presence of trained game wardens is an important component of the hunting and fishing programs as it greatly reduces the potential for fish and game violations on the Installation. NR staff are required to participate in DoD Fish and Wildlife Law Enforcement training and Federal Phase I Law Enforcement training, and should attend annual CLE refresher courses.

A small nature trail/floating boardwalk and wildlife viewing platform located on the west side of the Southeast Redwing Lake Wetlands SIA (Figure 3-3) is maintained by the NRP. This trail is located directly off of a main road on the Installation and there is no parking or defined walkways leading up to this floating boardwalk. Additional maintenance, promotion of, and the establishment of safe access to the site should be conducted for this nature and wildlife viewing area.

4.2.7 Integrated Pest Management

Common reed and alligator weed are the primary invasive plant species that affects this management unit (see Section 3.12.1). Infestations of common reed along the northern and eastern shoreline of Lake Tecumseh were treated under a region-wide eradication program. An estimated 8 ac (3 ha) were aerially sprayed from 13–24 October 2011 around the southeastern edge of NASO DNA, adjacent to Lake Tecumseh, as well as in several locations in the southern portion of the Installation (Figure 3-7). Smaller infestations that need treatment and inaccessible areas that will not be able to be treated under the regional aerial spraying program have been and will be considered for hand-spraying by NR personnel.

Treatment of alligator weed populations is being conducted in the northern section of the Installation by the Virginia Air National Guard–Camp Pendleton NRP.

4.2.8 Summary of the Natural Areas Management Unit Actions

- Review Installation plans and proposed actions in the Natural Areas Management Unit to ensure consistency with the Virginia Coastal Zone Management Program and help to obtain a consistency determination when required.
- Review plans for projects that have the potential to impact wetlands against NASO DNA wetland delineation maps, and assist the proponent of an action in applying for and obtaining all required state and federal wetlands permits.
- Develop site-specific plans on an as-needed basis for wetland mitigation sites within fallow agricultural fields located in the southern portion of the Installation.
- Continue to monitor all mitigation sites for potential problems and infestations of common reed.
- Coordinate common reed control treatments and monitor in identified infestation areas.
- Reassess conditions in the Southeast Redwing Lake Wetlands SIA to determine if sewage and runoff are impacting wetlands. Work with NAVFAC Mid-Atlantic personnel to correct the issue, if necessary.
- Continue to monitor the Lovetts Marsh wetland mitigation site, and implement additional hardwood control and water level manipulations as required to achieve goals.
- Contact the USACE Norfolk District Office, to pursue obtaining mitigation credit for removal of pine in the Interdunal Swale, Dune, and Freshwater Marsh SIA.

- Coordinate timber harvesting or salvage operations with the NAVFAC Regional Forester as required.
- Coordinate with the NAVFAC Regional Forester to assess impacts of any proposed MILCON projects on forest and, where practicable, arrange timber sales.
- Continue implementing controlled burning to reduce fuel loads and enhance wildlife habitat in accordance with the Installation's most current Prescribed Burn and Smoke Management Plan.
- Update the ~~NALF Fentress, and~~ NASO DNA Prescribed Burn and Smoke Management Plan (2010) annually to reflect accomplishments and set new goals.
- Maintain firebreaks and fire lines for each burn unit as needed.
- Monitor forest stands to control southern pine beetle and other insect and disease outbreaks.
- Continue to maintain vegetation within portions of the northern and southern areas of the Installation through a combination of mowing and controlled burning to provide a variety of grassland and scrub-shrub habitats.
- Implement mowing restrictions as recommended by VDGIF if a canebrake rattlesnake is observed on the Installation.
- Continue to use prescribed fire to manage portions of the fallow agricultural fields in the southern portion of the Installation to control woody vegetation and promote a mix of native warm season grasses and forbs.
- Continue to cooperate with VDGIF to set annual hunting seasons and bag limits at the Installation, and continue to collect, summarize, and report deer harvest data annually to VDGIF to help assess deer population levels and herd condition.
- Conduct annual inspections and maintenance of bat, bluebird, and wood duck boxes prior to 01 February each year, and monitor nesting activity throughout the nesting season.
- Develop a plan to install up to 10 wood duck boxes at Lovetts Marsh and the MACS 24 wetland mitigation site. GPS locate the new nest boxes, and update the nest box location on Figure 3-5 and on the monitoring sheet in Appendix H.
- Develop and implement a redistribution plan for wood duck boxes. GPS new locations, correct the GIS data layer for nest box locations, and update the nest box data log (Figure 3-5 and Appendix H).
- Conduct periodic inspections of the nature trail/floating boardwalk and wildlife viewing platforms to ensure appropriate utilization.
- Continue to monitor and treat common reed, alligator weed, and other invasive plants as needed.
- Have appropriate NR staff attend annual CLE refresher courses.

- Complete the Environmental Checklist (see Appendix A), as needed, for those natural resources management actions that may affect a regulated or other Navy managed environmental resource. Conduct associated consultations and required mitigations, and acquire associated permits in coordination with the appropriate Navy environmental media manager.

4.3 BEACHES AND DUNES MANAGEMENT UNIT

The Beaches and Dunes Management Unit encompasses approximately 271 ac (110 ha) along the NASO DNA shoreline. Small arms firing range fans, recreational beaches, and training areas are located in this management unit. The training areas in this unit provide critical areas for amphibious and land-based military exercises. The coastal setting, general topography, and vegetative cover are important components of the training environment. The physical and biological character of the beaches and dunes also is an important component of regional biodiversity. Several uncommon to rare natural communities are represented, and several state rare species are present in the area. A vegetated, intact dune system also is important for protection of facilities located inland from the shore from storm surges and hurricanes. The Regional Shore Infrastructure Plan (Navy 2002a) classifies most of this unit as mission support; however, environmental consideration must be made when planning training activities in the Beaches and Dunes Management Unit. Soil disturbances and root damage to vegetation pose serious threats to this sensitive environment. This management unit includes the Middle Beach Dunes SIA, a portion of the Interdunal Swale, Dune, and Freshwater Marsh SIA, and a majority of the Dune and Swale SIA (see Section 3.7.1 and Figure 3-3). Important natural resources management issues include:

- Coastal Zone Protection,
- Wetlands and Water Quality Protection,
- Fish and Wildlife Management,
- Threatened and Endangered Species Protection,
- Marine Resources Protection,
- Habitat Conservation and Restoration,
- Forest Management,
- Outdoor Recreation and Environmental Awareness, and
- Integrated Pest Management.

A primary and secondary dune delineation was completed at NASO DNA in 2013, and will be used to further refine management of resources within this management unit after the survey report is finalized. The final report and maps will be included in Appendix H when available.

4.3.1 Coastal Zone Protection

The primary dunes located in the Beaches and Dunes Management Unit are an important protected natural resource. Dune utilization activities within this unit should be consistent with

the state's Coastal Zone Management Program. NR staff will review proposed projects for coastal consistency.

4.3.2 Wetlands and Water Quality Protection

Wetland communities in this management unit include the shoreline and a number of small interdunal wetlands, several large interdunal swale wetlands, and extensive palustrine forested wetlands located in the northern portion of NASO DNA. Protection of this habitat type is important to the area's biodiversity, several state-rare plant and animal species, and other local fauna. The wetlands serve as the only freshwater sources in the area and are particularly important for amphibians. Protection from the major threats to these wetlands, including encroachment and vehicular traffic, will be provided through continued enforcement of state and federal wetlands protection laws. Vehicle exclusion fencing and signage also may be used in select areas to prevent trespassing.

Mapping of wetlands in this unit and associated management of these areas are consistent with methodologies and requirements identified in Section 4.1.2 and Section 4.2.2.

4.3.3 Fish and Wildlife Management

Fish and wildlife in the Beaches and Dunes Management Unit are managed similarly to how the resources are managed in the Natural Areas Management Unit (Section 4.2.5).

4.3.4 Threatened and Endangered Species Protection

Rare, threatened, and endangered species surveys conducted at NASO DNA in 1992 (Buhlmann et al. 1992) identified several state rare species and habitats within the Beaches and Dunes Management Unit. Additional rare, threatened, and endangered species inventories also have been conducted on the formerly named Camp Pendleton portion of the Installation, the last of which completed in 2010 (Evans and Belden 2010). Since these past surveys did not cover all Installation areas and did not sufficiently cover all potential species of concern, it is recommended that a comprehensive rare, threatened, and endangered species survey data be completed for NASO DNA in coordination with VDCR-DNH biologists to assess current conditions and occurrence of protected species and significant ecological communities of interest. An update to the rare, threatened, and endangered species inventory of NASO DNA is scheduled for 2014. Section 2.6.2 provides additional information for the federally listed wildlife species, as well as wildlife species proposed for federal listing known to occur at NASO DNA.

The federally endangered Kemp's ridley sea turtle and the federally threatened loggerhead sea turtle have been documented successfully nesting on the beaches of NASO DNA. Beach monitoring will continue to be conducted daily from 15 May through 31 August following the turtle monitoring protocol included in the 13 July 2011 BO issued to BBNWR, and updated to include NASO DNA in 2012 (Appendix F). NR staff also will conduct or coordinate annual sea turtle track and nest identification training for beach patrol personnel. If a loggerhead or other sea turtle nest is observed at the Installation, it will be left in situ, except in the case where operational uses of the beach would result in the take of a nest. In these cases, the Navy will coordinate with the USFWS BBNWR in accordance with the 13 July 2011 BO and 2012 update.

NR staff will coordinate and consult with relevant state and federal regulatory agencies to obtain permits and mitigation requirements for all Installation actions that may impact rare, threatened, and endangered species.

4.3.5 Marine Resources Protection

It is not uncommon to observe marine mammals, reptiles, fishes, and birds along NASO DNA beaches and within the Navy's defined nearshore environment. A habitat assessment and species inventory of the nearshore environment has been identified as a requirement for this INRMP that will be used to guide management practices related to marine resources at the Installation. Any marine animal (e.g., mammal, bird, fish, herpetofauna) sighted on NASO DNA beaches will be reported to NR staff, who will respond, as appropriate, to the site and report the sighting to the Virginia Aquarium and Marine Science Center and additional points of contact consistent with the protocols referenced in Appendix F.

As discussed in Section 2.5.4, several fish species with designated EFH in the nearshore waters adjacent to NASO DNA have the potential to occur in the vicinity of the NASO DNA nearshore/offshore environment. The Navy manages and protects species with designated EFH and other fish species of concern managed under NOAA NMFS.

NR staff will coordinate with and obtain required permits from the appropriate state and federal agencies for any Installation activities that have the potential to impact marine resources. NR personnel also will continue to maintain a database of all sightings and strandings that occur on NASO DNA.

4.3.6 Habitat Conservation and Restoration

4.3.6.1 Beaches and Dunes Protection

This unit includes the Middle Beach Dunes SIA, the majority of the Dune and Swale SIA, and a portion of the Interdunal Swale, Dune, and Freshwater Marsh SIA (see Section 3.7, Figure 3-3, and Figure 4-1). These areas are priority locations for conducting habitat conservation and restoration within this management unit.

A site specific example of restoration within this unit includes the dunes in the northern portion of the Dune and Swale SIA. A restoration project was undertaken in the mid-1990s to repair a section of the dunes. Military training activities caused a blow-out of the dune and resulted in a saltwater intrusion situation. The site has improved; however, recent storm damage and unauthorized dune access issues continue to negatively impact this site. To prevent saltwater intrusion and a full blow-out of the dune, the NRP continues to enter into Cooperative Ecosystems Studies Unit partnerships, to recycle Christmas trees, and enlist the support of Installation and local community supporters to conduct restoration activities (dune grass plantings, sand fencing installation, etc.) to repair this section of dune. In addition, access to the dunes continues to be restricted to minimize dune degradation. Education and outreach regarding the importance of dunes and what is or is not authorized in dune areas, coupled with increased security and CLE patrols of this area are needed to stop/minimize the unauthorized dune access contributing to the degradation and destabilization of the dunes.

The efforts discussed in the above example to continue dune restoration are conducted across the entire Beaches and Dunes Management Unit. These efforts are conducted specifically to reduce erosion, stabilize the dunes, and to increase suitable habitat for native species. Restricting vehicular access to protected areas, the planning of native dune vegetation, and the placement of sand fencing and recycled Christmas trees around the bases of eroding primary dunes helps prevent further soil loss and helps the process of accretion. Clean Christmas trees (no tinsel or ornaments) are obtained from local citizen drop-offs, local vendor drop-offs, and pickup and transfer from the City landfill. NR staff will coordinate with the Disaster Preparation Team and Cooperative Ecosystems Studies Unit partners to install sand fencing and Christmas trees. Additional fencing and signs also will be posted in select areas to block unauthorized vehicle access roads that dissect the dune system and cause additional degradation. NR staff will continue to support a volunteer-based dune vegetation planting program. Annual maintenance and monitoring of these efforts are important to the success of establishing vegetation, stabilizing the dunes, and reducing sand migration in the dunes. Amphibious training and other vehicular access is and should be limited to designated training areas and authorized access roads for which appropriate NEPA analysis has been conducted. If changes in land use or management practices for these sites are contemplated, NR personnel will consult with VDCR-DNH to obtain recommendations for minimizing impacts to these resources.

Mapping changes in dune vegetation over time using a combination of field verification and aerial imagery would help with monitoring and assessing the success of restoration and dune stabilization activities and projects. Assessment of the effectiveness of the dune protection program can be accomplished partly through photo-interpretation. Historic, current, and future imagery can be used to map and assess changes in vegetative cover and other natural features that correlate to dune stabilization efforts. NR staff can update dune protection plans by reviewing maps and documenting any ongoing and future stabilization activities. This monitoring will help with plan development for designated fence and/or vegetation placement locations, and promote restoration of the dunes in this management unit.

4.3.6.2 *Shoreline Erosion Control*

In order to ensure shoreline stability, maintenance and monitoring of the restored shoreline near the BOQ and Shifting Sands Club area and the amphibious training maneuver area (LCAC training beach) should be completed as a facility infrastructure needs requirement. Future beach nourishment should be implemented contingent on the results of beach monitoring, and should only proceed after appropriate state and federal permits are obtained. NR staff will assist in obtaining permits, mitigation requirements, and conducting consultations with all appropriate NRP affiliated regulatory agencies. NR staff will review and provide feedback, and technical advice on all supporting NEPA, Permit Applications, CZMA coastal consistency determinations (CCDs), project design, contract, etc. documentation.

4.3.7 Forest Management

Forest resources located in the Beaches and Dunes Management Unit are managed similarly to forest management described for the Natural Areas Management Unit (Section 4.2.4).

4.3.8 Outdoor Recreation and Environmental Awareness

The beaches and dunes offer recreational opportunities, including sunbathing, fishing, volleyball, picnicking, camping, swimming, surfing, hunting and wildlife viewing. The fishing beach and campgrounds are located at the south end of the Installation. The MWR oversees and administers the sunbathing, volleyball, picnicking, camping, swimming, and surfing activities; however, NR personnel are consulted on issues pertaining to natural resources management and environmental regulation. MWR provides instructions and maps for users of recreational facilities of the Installation that describe accepted and prohibited uses, and identifies approved recreational areas.

Recreational beach users are limited to use of pedestrian walkways, which were constructed to minimize unauthorized access and erosion of the dunes. NR staff will periodically inspect the walkways to ensure safety and appropriate utilization.

Installation residents and volunteers also are encouraged to participate in habitat conservation efforts in the beaches and dunes area. Such activities are generally enjoyed by participants as well as help to increase environmental awareness and understanding. Dune stabilization efforts including collecting recycled Christmas trees and planting beach grasses on sections of the training beaches for dune stabilization will continue to be organized by NR staff.

The NRP manages the hunting and fishing programs as described in Section 4.1.5, Section 4.2.6, and Appendix J. Routinely the CELO patrols the beaches to ensure people recreating are complying with natural resources regulations and policies.

4.3.9 Integrated Pest Management

Integrated pest management in the Beaches and Dunes Management Unit is conducted similarly as in the Natural Areas Management Unit (Section 4.2.7).

4.3.10 Summary of the Beaches and Dunes Management Unit Actions

- Review proposed projects that affect natural resources in the Beaches and Dunes Management Unit for consistency with the Virginia Coastal Zone Management Program, and help to obtain a federal coastal consistency determination when required.
- Review plans for projects that have the potential to impact wetlands against NASO DNA wetland delineation maps, and assist the proponent of an action in applying for and obtaining all required state and federal wetlands protection permits.
- Coordinate with and obtain the required permits from the appropriate state and federal agencies for any Installation activities with the potential to impact marine resources.
- Monitor interdunal swale wetlands for impacts. Install vehicle exclusion fencing and use signage in select areas to prevent trespassing.

- Conduct a habitat assessment and species inventory of the nearshore environment.
- Continue to conduct daily sea turtle surveys from 15 May through 31 August following the sea turtle monitoring protocol in Appendix F.
- Continue to maintain a database of all marine animal strandings that occur at NASO DNA, and report these to the Virginia Aquarium and Marine Science Center
- Continue to coordinate annual sea turtle track and nest identification training for beach patrol personnel.
- Schedule updated rare, threatened, and endangered species surveys with concurrence from VDCR-DNH, continue to routinely monitor state rare species and significant natural ecosystems, and assist in the identification of marine resources as needed.
- Continue to protect the Dune and Swale SIA by restricting training vehicle access across the dunes to the designated training route.
- Provide all beach patrol vehicles with updated copies of the 13 July 2011 BO on the BBNWR Sea Turtle Management Program and 2012 BO update, which identifies proper monitoring and management protocol for sea turtles observed at the Installation.
- Document and map annual dune restoration efforts and designate additional areas that require protection.
- Arrange a consultation with the VDCR-DNH if changes in land use or management practices for the SIAs located within this management unit are contemplated to obtain recommendations for minimizing impacts to these resources.
- Initiate a long-term monitoring plan to assess the effectiveness of the dune protection program.
- Coordinate with the Disaster Preparation Team to install sand fencing and Christmas trees to stabilize and restore dunes.
- Install signs and fencing to restrict unauthorized access to the dunes and identify additional areas where fencing and signs are needed to block vehicle access roads that dissect the dune system and cause degradation, and coordinate installation with the Disaster Preparation Team.
- Coordinate timber harvesting or salvage operations with the NAVFAC Regional Forester as required.
- Coordinate with the NAVFAC Regional Forester to assess impacts of any proposed MILCON projects on forest and, where practicable, arrange timber sales.

- Continue implementing controlled burning to reduce fuel loads and enhance wildlife habitat in accordance with the Installation's most current Prescribed Burn and Smoke Management Plan.
- Update the ~~NALF Fentress, and~~ NASO DNA Prescribed Burn and Smoke Management Plan (2010) annually to reflect accomplishments and set new goals.
- Maintain firebreaks and fire lines for each burn unit as needed.
- Monitor forest stands to control southern pine beetle and other insect and disease outbreaks.
- Continue to maintain vegetation within portions of the northern and southern areas of the Installation through a combination of mowing and controlled burning to provide a variety of grassland and scrub-shrub habitats.
- Conduct periodic inspections of the beach access walkways to ensure appropriate utilization.
- Continue to cooperate with VDGIF to set annual hunting seasons and bag limits at the Installation, and continue to collect, summarize, and report deer harvest data annually to VDGIF to help assess deer population levels and herd condition.
- Continue to monitor and treat common reed, alligator weed, and other invasive plants as needed.
- Have appropriate NR staff attend annual CLE refresher courses.
- Complete the Environmental Checklist (see Appendix A), as needed, for those natural resources management actions that may affect a regulated or other Navy managed environmental resource. Conduct associated consultations and required mitigations, and acquire associated permits in coordination with the appropriate Navy environmental media manager.

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5.0 INRMP IMPLEMENTATION

Implementation of this INRMP will follow an annual strategy that addresses legal requirements, DoD and Navy directive or policy requirements, funding, implementation responsibilities, technical assistance, labor resources, and technological enhancements. In order for this INRMP to be considered implemented, the following actions will need to be completed.

- Funding is secured for completion of all Environmental Readiness Level (ERL) 4 projects, as described in Section 5.4.
- Installation is staffed with a sufficient number of professionally trained natural resources management staff needed to perform the tasks required by the INRMP.
- Annual coordination with all cooperating offices is performed.
- Specific INRMP accomplishments that are undertaken are documented each year as part of the annual review.

The following sections provide an overview of natural resources consultation requirements, achieving no net loss, NEPA compliance, project development and classification, funding sources, commitment, and use of cooperative agreements. Appendix M provides information on the environmental program requirements (EPR) number, status, prime legal driver and initiative, cost estimate, and funding source for each of the projects proposed in this INRMP.

5.1 NATURAL RESOURCES CONSULTATION REQUIREMENTS

Section 7 of the ESA requires federal agencies to consult (formally or informally, depending on the level of affects to species from the proposed action) with USFWS (inland fish, plants, and wildlife) or NOAA NMFS (marine mammals, fish, or fisheries) when any proposed activity authorized, carried out, or conducted by that agency may affect a federally listed species or designated critical habitat. If adverse effects to listed species are anticipated as the result of proposed actions, formal consultation would be required. As a result of formal consultation, USFWS or NOAA NMFS would issue a BO, which would include actions that the federal agency must complete in order to conduct the proposed activity. If proposed actions may affect, but are not likely to adversely affect listed species, Section 7 consultation can be done informally and without the need to conduct a comprehensive biological assessment. In this case a letter of concurrence would be provided by the interested agency.

If critical habitat is located on federal property and adequate protection and management of the critical habitat has been included in the Installation INRMP, the ESA allows USFWS and or NOAA NMFS to preclude this habitat from the BO. However, in order for the critical habitat to be excluded, the qualifying INRMP must address the maintenance and improvement of the primary constituent elements important to the species, and must manage for the long-term conservation of the species. The USFWS or NOAA NMFS may decline to designate critical habitat where there exists a plan that provides for the adequate management or protection for listed species. The USFWS uses the following three-point criteria to determine if an INRMP provides adequate management or benefit to species. For each criterion, an explanation of how the INRMP addresses the requirement is provided.

1. The plan provides a conservation benefit to the species. The cumulative benefits of management activities identified in a management plan, for the length of the plan, must maintain or provide for an increase in a species' population or the enhancement or restoration of its habitat within the area covered by the plan (i.e., those areas deemed essential for conservation of the species). A conservation benefit may result from reducing fragmentation of habitat, maintaining or increasing populations, insuring against catastrophic events, enhancing and restoring habitats, buffering protected areas, or testing and implementing new conservation strategies.

2. The plan provides certainty that the management plan will be implemented. Persons charged with plan implementation are capable of accomplishing the objectives of the management plan and have adequate funding for implementing the management plan. They have the authority to implement the plan and have obtained all the necessary authorizations or approvals. An implementation schedule (including completion dates) for conservation effort is provided in the plan.

3. The plan provides certainty that the conservation effort will be effective. The following criteria are considered when determining the effectiveness of the conservation effort. The plan includes: (1) biological goals (broad guiding principles for the program) and objectives (measurable targets for achieving the goals); (2) quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, and standards for these parameters by which progress will be measured; (3) provisions for monitoring and, where appropriate, adaptive management; (4) provisions for reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort; and (5) a duration sufficient to implement the plan and achieve the benefits of its goals and objectives.

In addition to USFWS consultation requirements for potential impacts to federally listed species, all project and plans, including INRMPs, must be submitted to USFWS via their online project review system to determine if there are federally listed species, critical habitat, or special status species concerns for the Installation. Submission of the INRMP for USFWS review using this process will ensure all species identified by USFWS as a concern for the Installation have been addressed.

The USFWS online project review process is available at:
http://www.fws.gov/northeast/virginiafield/endspecies/Project_Reviews_Introduction.html

Once finalized, the Navy will provide this INRMP to USFWS for review and comment through the online project review process described above. Once comments from USFWS have been received, and the INRMP updated as necessary, a copy of their concurrence with implementation of this INRMP will be included in Appendix B.

5.2 ACHIEVING NO NET LOSS

Section 101(b)(1)(I) of the Sikes Act states that each INRMP shall, to the extent appropriate and applicable, and consistent with the use of the Installation to ensure the preparedness of the Armed Forces, provide for “no net loss in the capability of military installation lands to support the military mission of the installation.” It is DoD policy that appropriate management objectives to protect mission capabilities of installation lands (from which annual projects are developed) be clearly articulated, and receive high priority in the INRMP planning process (Navy 2006a).

The effectiveness of this INRMP in preventing “net loss” will be evaluated annually. Mission requirements and priorities identified in this INRMP will, where applicable, be integrated into other environmental programs and policies. It is not the intent that natural resources are to be consumed by mission requirements, but rather are sustained for the use of mission requirements. To achieve this, the goal of this INRMP is to conserve the environment for the purpose of the military mission. There may be instances where a “net loss” of mission capability may be unavoidable to fulfill regulatory requirements other than the Sikes Act, such as complying with a BO under the provisions of the ESA, or from the protection of wetlands under the provisions of the CWA. However, both the USFWS and USACE are required to adhere to the Sikes Act provision of no net loss. Loss of mission capability in these instances will be identified in the annual update of the INRMP and will include a discussion of measures being undertaken to recapture any net loss in mission capability.

5.3 NEPA COMPLIANCE

Prior to passage of Sikes Act legislation the extent of natural resources management on military lands was largely discretionary. Although installations with applicable natural resources were required to prepare natural resources plans, it was not a legal requirement. The only legal natural resources requirements for installations were related to compliance with ESA, CWA, and other statutory requirements or DoD directives. Passage of the SAIA brought into effect the requirement for “the Secretary of each military department to prepare and implement an INRMP for each military installation in the U.S. under the jurisdiction of the Secretary” (Navy 2006a). The Council on Environmental Quality (CEQ) defines an INRMP as a major federal action requiring NEPA analysis, and as a result the Navy Office of the Assistant General Counsel (Energy, Installations, and Environment) has established that implementation of an INRMP per SAIA requirements, necessitates the preparation of NEPA documentation prior to approval of the INRMP. The preparation of an EA is usually sufficient to satisfy the NEPA review requirement for most installation INRMPs; however, in cases where implementation of the INRMP will have significant impact on the environment, the preparation of an Environmental Impact Statement (EIS) is required. Annual updates and revisions are covered by the original NEPA documentation unless a major change in installation mission or program scope occurs.

Decisions that affect future land or resource use that are associated with an INRMP require NEPA analysis. The NRM should refer to Secretary of the Navy Instruction 5090.6A and Chapter 5 of OPNAVINST 5090.1C Ch-1 for basic guidance on the preparation of NEPA documents.

CEQ’s “Regulations for Implementing NEPA” (available at: http://ceq.hss.doe.gov/nepa/regs/ceq/toc_ceq.htm) and “NEPA’s 40 Most Asked Questions” (available at: <http://ceq.hss.doe.gov/nepa/regs/40/40p3.htm>) provide further information.

The INRMP and associated NEPA documentation should be prepared as individual documents to ensure that the viability, integrity, and intent of each are maintained. The intent of the INRMP is to outline projects that would fulfill Navy compliance and stewardship obligations, whereas the intent of the NEPA documentation is to analyze the impacts of the various program management options outlined within the INRMP. Although each of these documents are prepared as separate documents, they should be prepared simultaneously, as it is important for installation NRMs to coordinate the two documents at the earliest possible stage to ensure that decisions reflect current environmental values, and avoid potential conflicts.

Preparation of the NEPA documentation should be completed early in the planning process to involve Navy decision-makers in preparation of the document. If a comment period or public notice is required under NEPA, public notice and comment periods should be coordinated and integrated with development and review of the INRMP. A finding of no significant impact (FONSI) must be achieved before an INRMP may be approved. If a FONSI is not achievable, the NEPA process must proceed to development of an EIS. One of the first steps in the NEPA process is to define the proposed action and explain its purpose and need. The proposed action is to develop and implement an INRMP that integrates natural resources management with the installation’s military use in a manner that ensures military readiness and provides for sustainable multipurpose uses and conservation of natural resources (Navy 2006a). The purpose and need for the INRMP is to meet statutory requirements imposed by the SAIA as well as the requirements of various DoD and Navy instructions. The purpose and need section for the proposed action can be further clarified with a brief discussion of the required plan elements (as outlined in the SAIA) applicable to the installation.

The majority of the NEPA document should focus on the discussion of relevant environmental issues and reasonable alternatives. Alternatives that are not feasible because they are inconsistent with the installation mission, unreasonably expensive, or too technically or logistically complex should not be included in the analysis. Additionally, any alternative that is associated with significant environmental impacts cannot be analyzed in an EA (i.e. publication of a FONSI is not possible), and would require preparation of an EIS. The CEQ defines reasonable alternatives as those that are economically and technically feasible, and utilize common sense. Feasibility is a measure of whether the alternative makes sense and is achievable. The analysis should focus on the alternatives and methodologies proposed for accomplishing the management objectives for the program elements. Appendix E of the 2006 Navy INRMP Guidance document recommends that the NEPA analysis for INRMP documents adopt a “programmatic” approach that provides opportunities for the installation to accommodate unforeseen projects that meet pre-established criteria for significance evaluation, as well as changes to the projects, as long as impacts are covered within the overall scope and analysis for the selected alternative (Navy 2006a). Analysis in the NEPA document will focus on evaluation and comparison of alternative plans in association with four management objectives: land management, fish and wildlife management,

forestry management, and outdoor recreation management. Analysis should not focus on the individual projects or practices except in the cases of controversial projects, or projects considered outside the scope of, or a major deviation from a previously existing INRMP (Navy 2006a). The projects and recommendations outlined in an INRMP should provide a framework for reviewing on-going activities, and also will assist in reviewing changes for unforeseen projects or modifications in the future. It is important to distinguish that the NEPA analysis for evaluating plans/programs is different from the project level of analysis used for project specific actions.

The No Action alternative should always be included as an alternative to implementation of the INRMP. The No Action alternative describes impacts that would occur if the installation did not implement the INRMP, and the installation continued to operate without a plan or the existing plan if one is in place. The No Action alternative serves as a baseline to which all other alternatives are compared. Each alternative should describe the general geographical extent applicable to each of the management objectives and program elements. Each of the reasonable alternatives may only represent variable intensities of one or more of the management objectives and program elements; however, differences in funding levels for each alternative would not constitute a valid range of alternatives. For example, it is not acceptable for all required compliance projects to represent an alternative. A brief summary and comparison of all alternatives considered for the INRMP should be included in the NEPA document to provide the agency and public reviewers with the range of management scenarios that were analyzed.

Although specific projects are not required to be analyzed in the NEPA document, a complete list of projects, including description, cost estimate, funding priority designations, and implementation schedule must be included to provide the basis of the proposed action. If agency stakeholders and the Navy determine that potential projects are controversial, sufficient project details must be provided in the INRMP so that a decision can be made regarding significance as part of the NEPA analysis. Additionally, controversial projects, or projects outside the scope or intent of the INRMP, may require a tiered or amended NEPA document for that specific project. All projects must be consistent with the methodologies analyzed in the NEPA document, and the installation should ensure that the NEPA documentation for the INRMP is prepared such that it will accommodate for unforeseen projects, and changes to original projects. Reference Appendix E of the Navy INRMP Guidance document (Navy 2006a) for more information on NEPA requirements associated with evaluation of INRMP documents.

5.4 PROJECT DEVELOPMENT AND CLASSIFICATION

This INRMP is a public document that requires the mutual agreement of the Installation, USFWS, and state fish and wildlife agencies. It is crucial therefore, that these entities reach a common understanding as to which projects are most likely to be funded through the sources identified in Section 5.5. An annual strategy must be adopted for INRMP funding that addresses the Installation's legal requirements. The Navy programming hierarchy is described in Section 5.4.1 and Project Classification is described in Section 5.4.2.

5.4.1 Programming and Budgeting Classification

The Office of Management and Budget and the EPA require federal agencies to classify natural resources projects in order to assist with programming and budgeting priorities. The priority classifications (Class 0 through Class III) are summarized below.

- **Class 0: Recurring Natural Resources Conservation Management Requirements.** Includes activities needed to cover the recurring administrative, personnel, and other costs associated with managing DoD's conservation program. Recurring costs consist of manpower, training, supplies, hazardous waste disposal, recycling activities, permits, fees, testing and monitoring and/or sampling and analysis, reporting and record keeping, maintenance of environmental conservation equipment, and compliance self-assessments.
- **Class I: Current Compliance.** Includes projects and activities needed because an installation is currently out of compliance; has a signed compliance agreement; has received a consent order; has not met requirements based on applicable federal or state laws, regulations, standards, presidential EOs, or DoD policies; and/or are immediate and essential to maintain operational integrity or sustain readiness of the military mission.
- **Class II: Maintenance Requirements.** Includes projects and activities not currently out of compliance but which will be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year.
- **Class III: Enhancement Actions Beyond Compliance.** Includes those projects and activities that enhance conservation resources or the integrity of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or EO and are not of an immediate nature.

The Navy funding classification of recurring and non-recurring projects consists of the following four ERLs, in accordance with OPNAVINST 5090.1C Ch-1. The following descriptions of each ERL are presented in decreasing order of priority, with ERL 4 having the highest priority as must fund compliance projects, and ERL 1 representing environmental stewardship projects.

Environmental Readiness Level 4 (ERL 4) – Environmental Compliance:

- supports all actions specifically required by law, regulation or EO (DoD Class I and II requirements) just in time;
- supports all DoD Class 0 requirements as they relate to a specific statute such as hazardous waste disposal, permits, fees, monitoring, sampling and analysis, and reporting and record keeping;
- supports recurring administrative, personnel and other costs associated with managing environmental programs that are necessary to meet applicable compliance requirements (DoD Class 0);
- supports DoD policy requirement to comply with overseas Final Governing Standards and Overseas Environmental Baseline Guidance Document; and

- supports minimum feasible Navy executive agent responsibilities, participation in Office of the Secretary of Defense (OSD) sponsored inter-department and inter-agency efforts, and OSD mandated regional coordination efforts.

Environmental Readiness Level 3 (ERL 3) – Navy Proactive Involvement:

- supports all capabilities provided by ERL 4;
- supports existing level of Navy executive agent responsibilities, participation in OSD sponsored inter-department and inter-agency efforts, and OSD mandated regional coordination efforts;
- supports proactive involvement in the legislative and regulatory process to identify and mitigate requirements that will impose excessive costs or restrictions on operations and training; and
- supports proactive initiatives critical to the protection of Navy operational readiness.

Environmental Readiness Level 2 (ERL 2) – Navy or DoD Policy Requirement:

- supports all capabilities provided under ERL 3;
- supports enhanced proactive initiatives critical to protection of Navy operational readiness;
- supports all Navy and DoD policy requirements; and
- supports investments in pollution reduction, compliance enhancement, energy conservation and cost reduction.

Environmental Readiness Level 1 (ERL 1) – Navy Environmental Stewardship:

- supports all capabilities provided under ERL 2;
- supports proactive actions required to ensure compliance with pending/strongly anticipated laws and regulations in a timely manner and/or to prevent adverse impacts to the Navy mission; and
- supports investments that demonstrate Navy environmental leadership and proactive environmental stewardship.

5.4.2 Project Classification

The list of projects described in this INRMP consist of both “must fund,” compliance-type projects and stewardship-type projects. “Must fund” conservation requirements are those projects and activities that are required to meet recurring natural resources conservation management requirements or current legal compliance needs, including EOs. These projects are designated ERL 4 or 3 in the Navy funding classification system, described in Section 5.4.1.

“Must fund” or ERL 4 or 3 projects could include:

- developing, updating, and revising INRMPs;

- salaries and annual training of professional personnel involved in the development and implementation of INRMPs, in accordance with Individual Development Plans;
- terms and conditions of BOs issued by USFWS or NMFS;
- baseline surveys needed to keep INRMPs current;
- biological surveys to determine population status of rare, threatened, and endangered species;
- survey and monitoring programs to support MBTA and related permits;
- wetland surveys for planning, monitoring and/or permit applications;
- erosion control measures required to remain in compliance with natural resources protection regulations and to maintain land condition for realistic training operations;
- support of leadership roles or executive agent responsibilities such as for the Coastal America, and Chesapeake Bay agreements; or
- Memorandums of Agreement/Understanding commitments.

This list is not meant to be all-inclusive, but is meant to provide an overview of the types of projects that could be classified as compliance or must fund projects.

INRMP projects are developed based on the unique circumstances facing an installation. INRMPs should include only valid projects and programs that enhance an installation's natural resources, promote proactive conservation measures, and support investments that demonstrate Navy environmental leadership and proactive environmental stewardship. These projects are considered "stewardship" projects and fall under ERL 1 or 2 in the Navy classification system. Examples of stewardship projects include, but are not limited to:

- community outreach activities, such as Earth Day and Migratory Bird Day activities;
- education and public awareness projects such as interpretive displays, oral histories, watchable wildlife areas, nature trails, wildlife checklists, and conservation teaching materials;
- biological surveys or habitat protection for non-listed species;
- management and execution of volunteer and partnership programs;
- demonstration plantings of native plant materials;
- experimental conservation techniques;
- agriculture outlease improvements;
- forest stand improvements and other management efforts; and
- wildlife management efforts.

All INRMP Projects must be entered into the EPR network system and receive approval up the chain of command prior to soliciting any signatures on the INRMP. CNO N45 is the final authority for designating the appropriate ERL for a given INRMP Project.

5.5 FUNDING SOURCES

INRMP projects must be validated and entered into the EPR-web before ERL 3 and 4 projects can be programmed into the system for funding. ERL 1 and 2 projects are not usually funded through the EPR-web system, and alternate sources of funding should be sought for these projects. EPR-web project entries should include clear justification of funds being requested so that: (1) natural resources funds are distributed wisely, and (2) funding levels are not threatened by the use of funds in ways that are inconsistent with funding program rules (Navy 2006a). The primary sources for funding Navy NRP projects are: Operations and Maintenance, Navy (O&MN) Environmental Funds, Sikes Act Revenues, Legacy Resource Management Program (Legacy) Funds, Navy Forestry Revenues, Agricultural Outleases, Fish and Wildlife Fees, Recycling Funds, SERDP Funds, and other Non-DoD Funds.

5.5.1 O&MN Environmental Funds

A majority of natural resources projects are funded with O&MN environmental funds, and are primarily restricted to support “must-fund” environmental compliance projects (i.e., Navy ERL 4 projects). O&MN environmental funds are generally not allocated for ERL 1–3 projects. Other limitations for the use of O&MN environmental funds include the following.

- Only the initial procurement, construction, and modification of a facility or project are considered valid environmental funding requirements. The subsequent operation, modification due to mission requirements, maintenance, repair, and eventual replacement is considered a Real Property Maintenance funding requirement.
- When natural resources requirements are tied to a specific construction project or other action, funds for natural resources requirements should be included in project costs.

O&MN environmental funds are expected to be the primary source of funding for NASO DNA INRMP Environmental Compliance (ERL 4) Projects.

5.5.2 Sikes Act Revenues

Sikes Act Revenues include funds received for hunting and fishing permits and fees that are primarily collected as part of installation hunting, fishing or trapping programs. These fees are deposited and used in accordance with the Sikes Act and DoD financial management regulations. The Sikes Act specifies that user fees collected for hunting, fishing or trapping shall be used only on the installation where they are collected, and be used exclusively for fish and wildlife conservation and management at that installation. Permit fees that are collected as part of the NASO DNA hunting and fishing program are used to support natural resources management projects at the Installation.

5.5.3 The Legacy Resource Management (Legacy) Program

Legacy was part of a special Congressional mandated initiative for funding military conservation projects. Although Legacy was originally funded from 1991 to 1996 only, funds for new projects have continued to be available through this program (Navy 2006a). Legacy funds can be used for a variety of conservation projects, such as regional ecosystem management initiatives, habitat

preservation efforts, archaeological investigations, invasive species control, monitoring and predicting migratory patterns of birds and animals, and national partnerships and initiatives, such as National Public Lands Day. Requests for Legacy funds should consider the following:

- The availability of Legacy funds is generally uncertain early in the year.
- Pre-proposals for Legacy projects are due in March and submitted using the Legacy Tracker Website.
- Project proposals are reviewed by the Navy chain of command before being submitted to the DoD Legacy Resource Management Office for final project selection.
- The Legacy Website provides further guidance on the proposal process and types of projects requested.

Legacy funds should be considered as a potential funding source for NASO DNA INRMP Projects.

5.5.4 Navy Forestry Revenues

Forestry Revenues originate from the sale of forest products on Navy lands, and can be used to fund forestry and potentially other natural resources management programs. Forestry revenues are given preference for funding the Annual Navy Forestry Funds and the DoD Forestry Reserve Account. Annual Navy Forestry Funds are used to support commercial forestry operations at installations. Forestry revenues are first used to reimburse commercial forestry expenses, then, as directed by DoD Financial Management Regulation 7000.14-R Volume 11A, 40% of net proceeds for the FY for the installation are distributed to the state in which the installation resides. The state usually uses these funds to support road systems and schools. Once the commercial forestry expenses are reimbursed, and proceeds are distributed among the state counties, any remaining amount is transferred to a holding account known as the DoD Forestry Reserve Account.

Forestry Revenues also can be used to fund the improvement of forested lands; fund unanticipated contingencies associated with administration of forested lands and production of forest products, for which other sources of funds are not available; and natural resources management for implementation of approved plans and agreements. In order for a natural resources project to be eligible for funding from Forestry Revenues it must:

- Be specifically included in an approved management plan, such as an INRMP; and

Provide for:

- fish and wildlife habitat improvements or modifications;
- range rehabilitation where necessary for support of wildlife;
- control of off-road vehicle traffic;
- specific habitat improvement projects and related activities; and
- adequate protection for species of fish, wildlife, and plants considered threatened or endangered.

The amount of funds available through Forestry Revenues varies from year to year. It is important to note that the amount of funds remaining for natural resources management is relatively small, and although installations are not required to have a timber harvesting plan to be eligible for funds from the DoD Forestry Reserve Account, Reserve Account funds cannot be used for “must fund” environmental compliance projects. Due to the amount of forest resources available at NASO DNA, DoD Forestry Reserve Account funds are a potential source of funding for INRMP Projects that are not classified as Environmental Compliance (ERL 4) projects. Funds from any timber sales at NASO DNA will be deposited in the National Forestry Reserves Account.

5.5.5 Agricultural Outleases

Agricultural Outleasing funds are collected through the leasing of Navy-owned property for agricultural use. This money is directed back into the NRP and reallocated throughout the Navy by NAVFAC Headquarters. Agricultural Outleasing funds are primarily allocated for agricultural outlease improvements, but also may potentially be used for natural resources management and stewardship projects once the primary objective is met. In addition to projects related to agricultural outleasing, these funds can be used for implementation of INRMP Stewardship Projects. Although funds available through Agricultural Outleasing varies from year to year, this funding source is one of the more consistent sources for implementing INRMP projects that do not have Level 1 requirements. Agricultural Outleasing funds should be considered as a potential funding source for NASO DNA INRMP Projects that are not classified as Environmental Compliance (ERL 4) projects.

5.5.6 Recycling Funds

Installations that have a Qualified Recycling Program (QRP) may use their proceeds for some types of natural resources projects. Any proceeds collected as part of the installation QRP must first be used to cover QRP costs, and then up to 50% of the net proceeds can be for pollution abatement, pollution prevention, composting, alternative fueled vehicle infrastructure support, vehicle conversion, energy conversion, or occupational safety and health projects, with first consideration given to projects included in the installation’s pollution-prevention plans. Remaining funds may be transferred to the non-appropriated MWR account for approved programs, or retained to cover anticipated future program costs. NASO DNA does not currently include a QRP so Recycling Funds are not expected to be used to support any of the natural resources projects recommended in this INRMP.

5.5.7 Strategic Environmental Research and Development (SERDP) Funds

SERDP is DoD’s corporate environmental research and development program, planned and executing in full partnership with the Department of Energy and EPA, with participation by numerous other Federal and non-Federal organizations (Navy 2006a). SERDP funds are allocated for environmental and conservation project through a competitive process. The focus of SERDP is on Cleanup, Compliance, Conservation, and Pollution Preventions technologies. Due to the competitive process involved with allocation of SERDP Funds, NASO DNA is not expected to receive funds through this source.

5.5.8 Non-DoD Funds

Non-DoD Funds, such as those received from grant programs, are available to fund natural resources management projects, such as watershed management and restoration, habitat restoration, and wetland and riparian area restoration. Federally funded grant programs typically require non-Federal matching funds, however, installations can partner with other groups for preparing proposals for eligible projects. NASO DNA should consider grant funding and partnerships as a potential funding source for INRMP natural resources projects.

5.6 USE OF COOPERATIVE AGREEMENTS

A cooperative agreement is used to acquire goods or services, or stimulate an activity that will be implemented for the public good. Section 103a of the Sikes Act (16 USC 670c-1) provides the authority to enter into cooperative agreements with state and local governments, NGOs, and individuals to provide for the maintenance and improvement of natural resources on, or to benefit natural and historic research on DoD installations. In addition to a standard cooperative agreement, examples of other agreements include MOU, and Cooperative Assistance Agreement. Funds appropriated for multiyear agreements during a FY may be obligated to cover the cost of goods and services provided under a cooperative agreement entered into or through an agency agreement under Section 1535 of Title 31 during any 18-month period beginning in that FY, without regard to whether the agreement crosses FYs. Cooperative agreements entered into are subject to the availability of funds.

EO 13352, *Facilitation of Cooperative Conservation* (26 August 2004), directs that the Secretaries of the Interior, Agriculture, Commerce, and Defense, and the Administrator of the EPA shall, to the extent permitted by law and subject to the availability of appropriations and in coordination with each other as appropriate: carry out the programs, projects, and activities of the agency that they respectively head that implement laws relating to the environment and natural resources in a manner that facilitates cooperative conservation; take appropriate account of and respects the interests of persons with ownership or other legally recognized interests in land and other natural resources; properly accommodate local participation in federal decision making; and provides that the programs, projects, and activities are consistent with protecting public health and safety.

NASO DNA does not currently have any cooperative agreements in place.

5.7 PROJECT IMPLEMENTATION SCHEDULE

For prioritization and budgeting purposes, actions or projects recommended in this INRMP are provided in Appendix M. The prime legal drivers (as described previously in this section), programming and budgeting priority, cost estimate, potential funding source, and completion schedule are identified for each project. Cost estimates may represent annual expenditures for NR staff and other technical support for planning, coordinating, and implementing activities or the cost of materials, personnel, and/or contractors associated with a project. All projects submitted for O&MN funding must be included in this INRMP or a clear justification for their omission must be provided. An INRMP annual increment addendum must be prepared annually to facilitate

implementation of the INRMP. The annual increment addendum should provide concise detail and cost estimates of proposed work or projects planned for each FY.

Relevant legal drivers and initiatives that were identified for each management issue in this INRMP also are summarized in Appendix M. Primary statutes and regulations identified in the project table include the CWA, SAIA, ESA, NEPA, MBTA, MMPA, CZMA, NHPA, Soil and Water Conservation Act, BGEPA, Forest and Rangeland Renewable Resources Planning Act, National Invasive Species Act, and Magnuson-Steven Fishery Conservation and Management Act; state and local conservation laws and plans; Navy and DoD instructions and policies; and presidential EOs.

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Appendix A

National Environmental Policy Act and Coastal Consistency Documentation and Information

- Enclosure 1 Environmental Assessment on Implementation of the INRMP**
- Enclosure 2 Project Planning Environmental Checklist**
- Enclosure 3 Documentation of Public Review**
- Enclosure 4 Coastal Consistency Determination**
- Enclosure 5 Environmental Assessment for Treatment of Invasive Species at Hampton Roads Naval Installations**

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Enclosure 1. Environmental Assessment on Implementation of the INRMP

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DEPARTMENT OF DEFENSE
DEPARTMENT OF THE NAVY

FINDING OF NO SIGNIFICANT IMPACT FOR ENVIRONMENTAL
ASSESSMENT FOR THE IMPLEMENTATION OF AN INTEGRATED NATURAL
RESOURCES MANAGEMENT PLAN (INRMP) FOR NAVAL AIR STATION
OCEANA, DAM NECK ANNEX, AND NAVAL AIR STATION OCEANA, SOUTH
VIRGINIA BEACH ANNEX (CAMP PENDLETON)

Pursuant to the Council on Environmental Quality regulations (40 Code of Federal Regulations § 1500-1508) implementing procedural provisions of the National Environmental Policy Act (NEPA), the Department of the Navy, gives notice that an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) have been prepared for the development and implementation of an Integrated Natural Resources Management Plan (INRMP) for Naval Air Station (NAS) Oceana, Dam Neck Annex (DNA), and NAS Oceana South Virginia Beach Annex (commonly referred to as Camp Pendleton) and an Environmental Impact Statement (EIS) is not being prepared.

Proposed Action:

The proposed action (Alternative 2) is to develop and implement an INRMP consistent with the military use of the property and the goals and objectives established in the Sikes Act Improvement Act (SAIA). The goal of the INRMP is to implement an ecosystem based natural resources program that provides for conservation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations. The proposed INRMP would address and implement land management, forest management, fish and wildlife management, outdoor recreation, cultural resources protection, conservation education, and natural resources program administration. A total of 62 ongoing and new management actions and projects are proposed to meet compliance and stewardship objectives for natural resources management at the installations.

FINDING OF NO SIGNIFICANT IMPACT FOR ENVIRONMENTAL ASSESSMENT FOR THE IMPLEMENTATION OF AN INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN (INRMP) FOR NAVAL AIR STATION OCEANA, DAM NECK ANNEX, AND NAVAL AIR STATION OCEANA, SOUTH VIRGINIA BEACH ANNEX (CAMP PENDLETON)

Existing Conditions:

Dam Neck Annex and Camp Pendleton are located in the southeastern portion of Virginia Beach on the shore of the Atlantic Ocean in Virginia. Land uses surrounding the bases include industrial, commercial, residential, recreational, and agricultural though most of the agricultural lands are rapidly being converted to residential and recreational developments. Impacts to relevant resources that were evaluated for each alternative included land use, soil resources, wetlands and water quality, coastal zone resources, vegetation, wildlife, threatened and endangered species, cultural resources, air quality, environmental justice and socioeconomics.

Alternatives Analyzed:

The no action alternative (Alternative1) is the continued implementation of the management objectives and practices specified in the natural resources plans for Dam Neck Annex (U.S. Navy 1998) and Camp Pendleton (U.S. Navy 1997). The existing management plans provide valuable information on natural resources management; however, the plans do not set time frames for implementation of or provide cost estimates for natural resources projects. Also, many of the project management recommendations provided in the current natural resources plans have been completed, and new projects described in the proposed INRMP would not be implemented under this alternative. In addition, no EA was completed for development of the existing plans, nor were they provided for public review. Consequently, the existing plans do not meet the SAIA requirements for an INRMP. The no action alternative is carried forward as a baseline for comparison to the other alternatives as required by CEQ regulations.

Environmental Effects:

This EA demonstrated that implementation of the proposed action would result in no impact, positive impacts, or minimal negative impacts to environmental resources. The greatest potential negative impact would be from annual prescribed burning, which has the potential to increase air emissions. However, benefits from prescribed burning, including reducing the risk of catastrophic wildfire and managing early successional habitat, which is important to a number of wildlife species on the bases, would also be

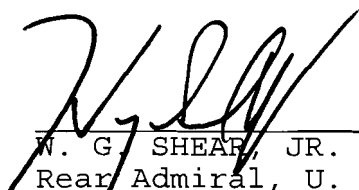
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provided. Additionally, impacts to air quality would be minimized through the use of proper smoke management procedures and optimizing the burning schedule. Because Dam Neck Annex and Camp Pendleton are in a marginal nonattainment area for ozone, an applicability analysis is required under the General Conformity Rule of the CAA. The applicability analysis provided in the EA demonstrates under both alternatives emissions from prescribed burning would be well below *de minimis* levels for annual criteria pollutant emissions.

Findings:

Based on information gathered during preparation of the EA, the Department of the Navy finds that implementing the proposed action will not significantly impact the quality of the environment. The EA and FONSI addressing this action may be obtained by interested parties by contacting Commander, Atlantic Division, Naval Facilities Engineering Command, 1510 Gilbert Street, Norfolk, Virginia 23511-2699 (Attn: Mr. Chris Petersen), telephone (757) 322-4560. A limited number of copies of the EA are available to fill single copy requests.

7 Sept 2006
Date



W. G. SHEAR, JR.
Rear Admiral, U. S. Navy
Deputy Commander, Navy
Installations Command

**ENVIRONMENTAL ASSESSMENT
ON THE
IMPLEMENTATION OF THE
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
FINAL**

**NAVAL AIR STATION OCEANA, DAM NECK ANNEX
and
NAVAL AIR STATION OCEANA, SOUTH VIRGINIA BEACH ANNEX
(CAMP PENDLETON)
VIRGINIA BEACH, VIRGINIA**



**Prepared for:
Atlantic Division
Naval Facilities Engineering Command**

May 2005

EXECUTIVE SUMMARY

This Environmental Assessment (EA) analyzes the potential environmental consequences resulting from implementation of the proposed Integrated Natural Resources Management Plan (INRMP) at Naval Air Station (NAS) Oceana, Dam Neck Annex (DNA), and NAS Oceana South Virginia Beach Annex, which is generally referred to as Camp Pendleton (CP) in Virginia Beach, Virginia. The two adjacent properties lie along the Atlantic coast, have an extensive beaches and dunes system, and share other similar natural resources and management issues. To ensure a holistic, ecosystem approach is taken; resource management was combined into a single INRMP for the two bases. The environmental analysis process is designed to ensure that the public is involved in the process and informed about the potential environmental effects of the proposed action and to help decision makers take environmental factors into consideration when making decisions related to the proposed action.

Purpose and Need for the Proposed Action

The purpose of this action is to implement a conservation program that integrates fish and wildlife management, land management, and management of outdoor recreational opportunities, as practicable and consistent with the military mission and planned mission activities. The need for this action is to meet statutory requirements under the Sikes Act Improvement Act (SAIA). In November 1997, the Sikes Act, 16 U.S. Code (USC) § 670a et seq., was amended to require the Secretary of Defense to prepare and implement INRMPs for each military installation in the United States, unless the absence of significant natural resources on a particular installation makes preparation of a plan for that installation inappropriate.

Preferred Action and Alternatives

The Navy proposes to develop and implement an INRMP consistent with the military use of the property and the goals and objectives established in the SAIA. The goal of the INRMP is to implement an ecosystem-based natural resources program that provides for conservation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations.

The potential impacts of three alternatives; (1) a no action alternative, (2) the proposed action, and (3) an enhanced alternative are analyzed in this EA. The no action alternative would continue to implement the goals and objectives stated in the existing natural resources management plans for the bases. Under the proposed action alternative, only Navy Assessment Level 1 projects as described by the Navy Environmental Requirements Guidebook would be implemented. Navy Level 1 projects are compliance driven and have high funding priority. Under the third alternative, all Navy Assessment Level 1 requirements and, based on the availability of funding, Navy Level 2, 3, 4, and 5 would be implemented. Level 2 requirements are derived from DoD or Navy policy; Level 3 requirements are for pending regulations; Level 4 must meet future needs; and Level 5 requirements are leadership initiatives.

Summary of Environmental Consequences

It is expected that there would be positive long and short term effects associated with implementation of the three alternatives analyzed in this EA. A summary of the potential impacts is contained in Table ES-1.

Table ES-1. Comparison of Alternatives.

Resource	Alternative 1 No Action Alternative	Alternative 2 Proposed action	Alternative 3 Enhanced Alternative
Land Use	No change	Positive effects on the bases' ability to sustain military land use through protecting soil and water resources and providing information for future land planning.	Same as Alternative 2 with enhancement of existing land use resulting from landscaping of select urban areas.
Soil Resources	No change	Positive effects from review of soil erosion and control plans, implementation of dune protection and monitoring, and installation of vehicle exclusion fencing.	Same as Alternative 2 with additional benefits to soil resources resulting from implementing BMPs around Sadler Pond drainage ditches to reduce soil erosion.
Water Resources	No change – Permits will continue to be sought when actions would effect water resources.	Positive effects from increased coordination and review of permitting requirements, compliance with wetlands regulations, and implementation of projects including basewide wetlands delineation and implementing BMPs to minimize impacts to water quality from sedimentation.	Same as Alternative 2 with additional benefits from use of BMPs and reduced mowing around Sadler Pond drainage ditches, conducting water quality monitoring at Sadler Pond, and increasing riparian buffers in other areas.
Marine Resources	No change	Positive impacts to marine resources could result from nightly surveys of beaches for sea turtle tracks and nests and providing sea turtle identification training.	Same as Alternative 2
Coastal Zone Resources	No change	Positive effects from implementing dune protection and monitoring, installation of vehicle exclusion fencing, and the review of projects to ensure consistency with the Virginia CZMP.	Same as Alternative 2
Vegetation	No change	Positive effects from invasive species control, monitoring tree disease and insect infestation, and conducting controlled burns.	Same as Alternative 2 with additional benefits from beneficial landscaping.

Table ES-1. Comparison of Alternatives (cont'd).

Resource	Alternative 1 No Action Alternative	Alternative 2 Proposed Action	Alternative 3 Enhanced Alternative
Fish and Wildlife	No change	Positive effects from game and nongame management and habitat management, the conservation and enhancement of the natural habitats, administering installation hunting and fishing programs, and maintenance of early successional habitat, improved base awareness of feral pet issues.	Same as Alternative 2 with additional benefits from the distribution, maintenance, and monitoring of osprey platforms, bat, bluebird and wood duck boxes,
Threatened and Endangered Species	No change	Positive effects from rare species surveys, tracking of species status, and compliance with regulations.	Same as Alternative 2 with additional benefits resulting from consultations with VDCR-DNH to ensure that future land use changes would not affect rare species habitat.
Cultural Resources	No change	Positive impacts to undiscovered cultural resources from consultation with SHPO during project planning.	Same as Alternative 2
Air Quality	No change	Minimal effect from prescribed fire; action is in conformity with State Implementation Plan.	Same as Alternative 2
Socioeconomics	No change	No change to population, income, or employment.	Same as Alternative 2
Environmental Justice	No change	No disproportionately high adverse impact on minority or low-income populations.	Same as Alternative 2

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ACRONYMS AND ABBREVIATIONS

BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BMP	best management practice
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH ₄	methane
CNO	Chief of Naval Operations
CO	carbon monoxide
CP	Camp Pendleton
CRMP	Coastal Resources Management Program
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
<i>de minimis</i> level	minimum threshold level
DNA	Naval Air Station Oceana, Dam Neck Annex
DoD	Department of Defense
DoDI	Department of Defense Instruction
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
EPA	Environmental Protection Agency
EPR	Environmental Program Requirements
ESA	Endangered Species Act
FCTCLANT	Fleet Combat Training Center Atlantic
FEMA	Federal Emergency Management Agency
FY	fiscal year
FONSI	finding of no significant impact
INRMP	Integrated Natural Resources Management Plan
LANTDIV	Atlantic Division, Naval Facilities Engineering Command
Legacy	Legacy Resources Management Program
MBTA	Migratory Bird Treaty Act
MILCON	military construction
MWR	Morale, Welfare, and Recreation Department
NAAQS	National Ambient Air Quality Standards
NAB	Naval Amphibious Base
NAS	Naval Air Station
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO ₂	nitrogen dioxide
NO _x	oxides of nitrogen
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places

ACRONYMS AND ABBREVIATIONS (cont'd)

NWI	National Wetlands Inventory
O&MN	Operations and Maintenance, Navy
O ₃	ozone
OMB	Office of Management and Budget
OPNAVINST	Chief of Naval Operations Operating Instruction
Pb	lead
PM ₁₀	particulate matter with a diameter less than or equal to a nominal 10 micrometers
ppm	parts per million
ROI	region of influence
ROICC	Resident Officer in Charge of Construction
RSIP	Regional Shore Infrastructure Plan
SAIA	Sikes Act Improvement Act
SCS	Soil Conservation Service
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO ₂	sulfur dioxide
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VDCR-DNH	Virginia Department of Conservation and Recreation-Division of Natural Heritage
VDGIF	Virginia Department of Game and Inland Fisheries
VDOF	Virginia Department of Forestry
VOCs	volatile organic compounds

1.0 PURPOSE AND NEED FOR ACTION

1.1 Introduction

Naval Air Station (NAS) Oceana, Dam Neck Annex (DNA) and NAS Oceana South Virginia Beach Annex, which is generally referred to as Camp Pendleton (CP), are two adjacent Navy installations located in the southeastern portion of the City of Virginia Beach, Virginia (Figure 1-1). DNA encompasses approximately 1,351 acres and is bounded by Virginia Beach to the west, the community of Sandbridge to the south, the Atlantic Ocean to the east, and CP to the north. CP encompasses 351 acres and is bounded to the north by the State Military Reservation Camp Pendleton, the Wadsworth Navy Family Housing complex to the west, and the Atlantic Ocean to the east. Several other military installations including Fort Story, and Naval Amphibious Base Little Creek, and NAS Oceana are also located in Virginia Beach. The Navy owns approximately 36,000 acres in the Hampton Roads area (U.S. Navy 2002).

Land uses surrounding the bases include industrial, commercial, residential, recreational, and agricultural though most of the agricultural lands are rapidly being converted to residential and recreational developments. Because of the intense level of development in the region, DNA, CP, and the other coastal military installations are extremely important to the region's ecology. These bases, along with First Landing State Park to the north and Back Bay National Wildlife Refuge to the south, support the few remaining undeveloped dune systems along the Virginia coast. Together, DNA and CP have nearly 4 miles of coastal primary and secondary sand dunes.

1.2 Proposed Action

DNA and CP propose to develop and implement an Integrated Natural Resources Management Plan (INRMP) consistent with the military use of the property and the goals and objectives established in the Sikes Act Improvement Act (SAIA). The goal of the INRMP is to implement an ecosystem-based natural resources program that provides for conservation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations. Because the two adjacent properties have similar ecosystems, natural resource attributes, and other natural resources management issues, a single comprehensive INRMP is proposed, which would help ensure a holistic, ecosystem approach to resource management is taken.

1.3 Purpose and Need

The purpose of this action is to implement a conservation program that integrates fish and wildlife management, land management, and management of outdoor recreational opportunities, as practicable and consistent with the military mission and planned mission activities.



Figure 1-1. Location and Regional Setting of DNA and CP.

The need for this action is to meet statutory requirements under the SAIA. In November 1997, the Sikes Act, 16 U.S. Code (USC) § 670a et seq., was amended to require the Secretary of Defense to prepare and implement INRMPs for each military installation in the U.S., unless the absence of significant natural resources on a particular installation makes preparation of a plan for that installation inappropriate.

The principal use of military installations is to ensure the preparedness of the armed forces. The SAIA requires each installation to prepare an INRMP that provides for the following program management activities, to the extent that such activities are consistent with use of the installation for military preparedness:

- The conservation and rehabilitation of natural resources on the installation;
- The sustainable multipurpose use of the resources, including hunting, fishing, trapping, and nonconsumptive uses; and
- Subject to safety requirements and military security, public access to the installation to facilitate such uses.

As required by the SAIA, the plan must, to the extent appropriate and applicable, provide for:

- Fish and wildlife management, land management, forest management, and fish- and wildlife-oriented recreation;
- Fish and wildlife habitat enhancement or modification;
- Wetland protection, enhancement, and restoration, where necessary for support of fish, wildlife, or plants;
- Integration of, and consistency among, the various activities conducted under the plan;
- Establishment of specific, natural resources management goals and objectives and time frames for proposed actions;
- Sustainable use by the public of natural resources, to the extent that the use is not inconsistent with the needs of fish and wildlife resources;
- Public access to the military installation that is necessary or appropriate for the sustainable use of natural resources, subject to requirements necessary to ensure safety and military security;
- Enforcement of applicable natural resource laws (including regulations);
- No net loss in the capability of the installation's lands to support the military mission of the installation; and
- Such other activities as the Navy has determined are appropriate.

In preparing this plan, as required by the SAIA, DNA and CP have worked in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the Virginia Department of Game and Inland Fisheries (VDGIF) so that the plan reflects the mutual agreement of these parties concerning conservation, protection, and management of fish and wildlife resources on the

bases. Also, as required by the SAIA, the INRMP has been provided for public comment, and all comments received were taken into account in finalizing the plan.

1.4 Regulatory Compliance

This environmental assessment (EA) has been prepared pursuant to Section 102 of the National Environmental Policy Act (NEPA) of 1969, 42 USC § 4231 et seq., and in accordance with the regulations of the Council on Environmental Quality (CEQ) that implement NEPA procedures (40 Code of Federal Regulations [CFR] § 1500-1508) and the Navy Environmental and Natural Resources Program Manual (Chief of Naval Operations Operating Instruction [OPNAVINST] 5090.1B). NEPA requires federal agencies to take into consideration the potential environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect the environment through providing an assessment of alternative actions and providing the opportunity for public comment on federal actions that have the potential to impact the environment. The information presented in this document will provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or if a finding of no significant impact (FONSI) would be appropriate.

Individual actions identified in the INRMP may require state and federal review to ensure compliance with major environmental legislation such as the Endangered Species Act (ESA), Clean Water Act (CWA), Clean Air Act (CAA), Coastal Zone Management Act (CZMA), and National Historic Preservation Act (NHPA). Potential permits, coordination, and environmental protection plans include, but are not limited to, the following:

- CZMA consistency determination;
- Virginia Erosion and Sediment Control Plan;
- Virginia Water Protection Permit Program;
- Virginia Storm Water Discharge Permit for Construction Activities;
- U.S. Army Corps of Engineers (USACE) applicable permits; and
- Appropriate Joint Permit Application with state and local agencies.

An abbreviated list of pertinent regulations and guidance is in Appendix A.

1.5 INRMP Implementation

1.5.1 Programming and Budgeting Priorities

The Office of Management and Budget (OMB) and the Environmental Protection Agency (EPA) require federal agencies to classify natural resources projects in order to assist with programming and budgeting priorities. Department of Defense Instruction (DoDI) 4715.3, Enclosure 4, provides detailed guidance on programming and budgeting natural resources projects. The priority classifications (Class 0 through Class III) are summarized below.

- **Class 0: Recurring Natural Resources Conservation Management Requirements.** Includes activities needed to cover the recurring administrative, personnel, and other

costs associated with managing the Department of Defense's (DoD's) conservation program. Recurring costs consist of manpower, training, supplies, hazardous waste disposal, recycling activities, permits, fees, testing and monitoring and/or sampling and analysis, reporting and record keeping, maintenance of environmental conservation equipment, and compliance self-assessments.

- **Class I: Current Compliance.** Includes projects and activities needed because an installation is currently out of compliance; has a signed compliance agreement; has received a consent order; has not met requirements based on applicable federal or state laws, regulations, standards, presidential Executive Orders (EOs), or DoD policies; and/or are immediate and essential to maintain operational integrity or sustain readiness of the military mission.
- **Class II: Maintenance Requirements.** Includes projects and activities not currently out of compliance but which will be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year.
- **Class III: Enhancement Actions Beyond Compliance.** Includes those projects and activities that enhance conservation resources or the integrity of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or EO and are not of an immediate nature.

An additional assessment level is assigned to projects to assist in recognizing appropriate funding sources in Environmental Program Requirements (EPR) exhibits. The following descriptions of Navy Assessment Levels are summarized from the Navy Environmental Requirements Guidebook (Chief of Naval Operations [CNO] 2003). Navy Level 1 requirements are those prescribed by state or federal laws, regulations, and EOs; Level 1 requirements include OMB/EPA Class 0, I, or II projects and ongoing efforts. Navy Level 2 requirements are derived from DoD or Navy policy; Level 3 requirements are for pending regulation; Level 4 requirements meet future requirements; and Level 5 requirements are leadership initiatives.

1.5.2 Funding Sources

The Navy Environmental Requirements Guidebook (CNO 2003) also describes various potential funding mechanisms for natural resources projects. Operations and Maintenance, Navy (O&MN) environmental funds are the primary source of resources to support Navy Level 1 (OMB/EPA Classes 0, I, and II) actions, though these funds are generally not available for Navy Level 2 through Level 5 actions. In addition, only the initial procurement, construction, or modification of a facility or project is a valid use of O&MN funds. The subsequent operation and maintenance is considered a Real Property Maintenance funding requirement. When natural resources actions are required as part of a military construction (MILCON) project, costs should be paid by MILCON funds as part of the overall construction project.

Forestry revenues from the sale of forest products on Navy lands are a source of funding for two programs: the Annual Navy Forest Funds and DoD Forestry Reserve Account. The DoD Forestry Reserve Account funds can be used for improvement of forestlands and for

implementation of projects described in an approved management plan that provides for habitat improvement and protection. These funds are suitable for many of the types of natural resources management projects identified in the proposed INRMP. User fees collected from the base fishing program may be used only for the protection, conservation, and management of fish and wildlife such as habitat improvement and related activities. National Public Lands Day funds are available for projects that showcase public lands and the importance of protecting natural resources through volunteerism. The National Environmental Education and Training Foundation manages and coordinates this fund. The Legacy Resources Management Program (Legacy) can provide funding for a variety of conservation projects such as habitat preservation efforts and ecosystem management efforts. A project proposal must be submitted in order to be eligible for Legacy, Annual Navy Forest, or DoD Forestry Reserve Account funds. Across the Navy, projects are prioritized and funded annually.

1.5.3 Project Implementation Schedule

For prioritization and budgeting purposes, actions or projects recommended in the INRMP that require a request for funds are listed in a project implementation table in Appendix B. The prime legal drivers, programming and budgeting priority, and potential NEPA and CZMA requirements are identified for each project. All projects submitted for O&MN funding must be included in the INRMP or a clear justification for their omission must be provided. An INRMP increment addendum must be prepared annually to facilitate implementation of the INRMP. The annual increment addendum should provide concise detail and cost estimates of proposed work or projects planned for each fiscal year.

Relevant legal drivers and initiatives that were identified for each management issue in the INRMP are also summarized in the project table. Primary statutes and regulations identified in the project table include the CWA, SAIA, ESA, NEPA, and Migratory Bird Treaty Act (MBTA); state conservation laws; Department of Navy and DoD instructions and policies; and presidential EOs.

All projects would undergo annual review and reprioritization, and would be subject to budget constraints due to the cost of war or other mission related funding cuts. Projects would be assessed on an individual basis for compliance with the NEPA and other compliance related environmental requirements.

1.6 Scope of the Environmental Assessment

This EA has been prepared to evaluate the potential environmental impacts of implementing the proposed INRMP for DNA and CP. The analysis compares and summarizes the environmental consequences of the proposed action and alternative management objectives rather than individual projects or practices and is therefore a programmatic EA. Site-specific environmental analyses that are required for future projects may be tiered to this EA provided the anticipated impacts of a specific project, project components, affected resources, or circumstances do not differ substantially from those evaluated in this EA.

Relevant resources evaluated in this EA include land use; soil resources; water resources; marine resources; coastal zone resources; vegetation; fish and wildlife; rare, threatened, and

endangered species; cultural resources; air quality; socioeconomics; and environmental justice. In compliance with NEPA and OPNAVINST 5090.1B guidelines, the scope of this EA focuses on those resources potentially subject to impact. Implementation of any of the alternatives would not be likely to affect noise. Noise generated from implementation of any of the alternatives would not be above background levels and was therefore not considered relevant to this assessment.

2.0 PROPOSED ACTION AND ALTERNATIVES

This section of the EA describes and compares the proposed action and alternatives, including the no action alternative, as well as alternatives considered but eliminated from further analysis.

- **Alternative 1, No Action Alternative.** Under this alternative, DNA and CP would continue implementation of the objectives and practices outlined in the previous natural resources management plans (U.S. Navy 1997 and 1998a). Ongoing natural resources practices would continue and there would be no change to the objectives outlined in the previous plan.
- **Alternative 2, Proposed Action.** The proposed action is to develop and implement an INRMP that emphasizes compliance with environmental statutes and regulations and is consistent with the military use of the property and the goals and objectives established in the SAIA. Under this alternative, compliance and maintenance projects classified as Navy Level 1 projects (OMB Classes 0 through II), would be implemented.
- **Alternative 3, Enhanced Alternative.** Like Alternative 2, the enhanced alternative would implement an INRMP consistent with the military use of the property and the goals and objectives established in the SAIA. In addition to the compliance and maintenance activities that would be implemented under the proposed action, projects and activities that enhance resources or those that address environmental stewardship goals would also be implemented. These projects are identified as Navy Level 2 through 5 projects (OMB Class III).

2.1 Selection Criteria for Alternatives

Each alternative presented for analysis must be a reasonable alternative that meets the needs and purpose of the proposed action. Each alternative must integrate natural resources management at DNA and CP with the installations' military mission in a manner that ensures military preparedness and meets the requirements of SAIA and other conservation laws that regulate natural resources on federal lands. In order for an alternative to be viable it must maintain compliance with and follow guidance set forth by 32 CFR Part 190, DoDI 4715.3, OPNAVINST 5090.1B, and the Sikes Act (16 USC §670a-f). Specifically, each alternative must:

1. Be based on the principles of ecosystem management;
2. Provide for sustainable multipurpose uses of natural resources;
3. Maintain compliance with relevant environmental regulations;
4. Provide for public access for use of natural resources subject to safety and military security considerations;
5. Establish specific natural resources management objectives and time frames for proposed actions; and

6. Prevent loss in the capability of military lands to support the military mission of the installation.

2.2 Alternatives Eliminated from Consideration

Alternatives to the proposed action that would disproportionately administer one portion of the natural resources program over others or not take multiple uses and ecosystem management into account were considered and eliminated from further discussion. Included was an alternative that proposed the implementation of a natural resources program that maximizes the sustained yield of timber products while minimizing wildlife management, outdoor recreation, and stewardship activities. While this alternative would meet criteria 3, 5, and 6, it would not meet criteria 1, 2, and 4 and therefore would not be compliant with the SAIA, DoDI 4715.3, or OPNAVINST 5090.1B. As such, this alternative is unreasonable and is excluded from further analysis (see 40 CFR § 1502.14(a)).

A second alternative, the implementation of a natural resources program for preservation of land resources that precludes multiple uses of forests, fish and wildlife, land resources, and outdoor recreation was also eliminated from further consideration. While this alternative would meet criteria 3 through 6, it would not meet criteria 1 and 2 and would therefore not be compliant with the SAIA, DoDI 4715.3, or OPNAVINST 5090.1B. As such, this alternative is unreasonable and is also excluded from further analysis (see 40 CFR § 1502.14(a)).

2.3 Mission Constraints on Natural Resources Management

Constraints from training or other mission-related activities at DNA and CP are minor, though access to portions of the beaches and dunes is restricted during live firing exercises at the rifle range. The small arms range firing fans are directed toward the Atlantic Ocean and have little effect on natural resources management.

2.4 Alternatives Considered

2.4.1 Alternative 1 – No Action

The no action alternative involves the continued implementation of the existing natural resources management plans for DNA and CP. The existing management plan for DNA was developed as a stand-alone document (U.S. Navy 1998b). CP was originally annexed as part of Naval Amphibious Base (NAB) Little Creek and was included as part of the NAB Little Creek INRMP (U.S. Navy 1997). However, since then, the CP site has been annexed under NAS Oceana. The existing management plans provide valuable information on natural resources management; however, they do not set time frames for implementation of or provide cost estimates for natural resources projects. Also, many of the program management recommendations provided in the current natural resources plans have been completed. New projects described in the proposed INRMP would not be implemented under the no action alternative. In addition, no EA was completed for development of the existing management plans, nor were the plans provided for public review. Consequently, the existing plans do not meet the SAIA requirements for an INRMP. The no action

alternative is carried forward as a baseline for comparison to the other alternatives as required by CEQ regulations.

Natural resources management issues are addressed under three general program areas (land management, fish and wildlife management, and forest management) in the existing INRMPs for DNA and CP. Program areas address management issues from a multipurpose use perspective, and emphasis is placed throughout on good stewardship of the natural resources entrusted to the Navy. Management actions that would provide for the maximum sustained multipurpose uses are prioritized for implementation. These plans address land management practices that reduce grounds maintenance costs, conserve soil and water, improve real estate value, protect and enhance wetlands and floodplains, protect and restore dunes, abate nonpoint sources of water pollution, control noxious weeds, and prevent erosion. Management practices that conserve and promote conservation of fish and wildlife and their habitats, particularly habitats of state or federally listed rare, threatened, or endangered species, and that manage game fish and wildlife species and their habitats for optimum sustained yield are identified and recommended. In addition, coastal zone management practices that protect wetlands and water quality and promote conservation and biodiversity are identified and recommended.

2.4.2 Alternative 2 – Proposed Action

The proposed action would implement those Navy Level 1 (OMB Classes 0 through II) activities described in the DNA and CP INRMP. The goal of the INRMP is to implement an ecosystem-based natural resources program that provides for the conservation of natural resources; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations. The plan discusses a number of management issues relevant to natural resources and describes specific management actions related to each issue. A summary of all projects described in the INRMP including implementation schedules, legal drivers, and source of funding is in Appendix B. Under Alternative 2, only those projects classified as Navy Level 1 (OMB Classes 0 through III) would be implemented. A summary of activities that would be implemented under Alternative 2 follows.

Coastal Zone Management. Under the proposed action, all proposed actions would be reviewed to ensure consistency with the Virginia Coastal Zone Management Plan (CZMP) and assistance with obtaining coastal zone consistency determinations would be provided.

Wetlands and Water Quality Protection. Under the proposed action, water resources would continue to be managed in accordance with relevant federal, state, and local water protection laws and EOs. DNA and CP would obtain all appropriate federal, state, interstate, and local certifications and permits required by point and nonpoint pollution control, groundwater protection, dredge and fill operations, and storm water management programs for any action that may impact water quality. Wetlands and water quality protection projects and activities under this alternative include: conducting basewide wetlands mapping and obtaining jurisdictional determinations on a project-by-project basis; reviewing and updating sedimentation and storm water pollution prevention plans; assisting action proponents in obtaining federal wetlands protection permits; developing site-specific plans for wetland

mitigation; determining whether sewage and runoff are impacting the Southeast Redwing Lakes Wetlands Special Interest Area and correcting any problems identified; and monitoring Lovetts Marsh wetland mitigation site and implementing additional hardwood control and water level manipulation as required to achieve restoration goals.

Rare, Threatened, and Endangered Species. Under the proposed action, all state and federally listed threatened and endangered species occurring at DNA and CP would continue to be protected by the ESA and state regulation. Because it is in the interest of the Navy to help protect and preserve unprotected, but rare species, under the proposed action, DNA and CP would also strive to protect the areas of significant habitat that support these species. Rare, threatened, and endangered species protection activities proposed under this alternative include: restricting use of areas to protect state and federal rare, threatened, and endangered species and their habitats; obtaining an updated rare, threatened, and endangered species survey; conducting nightly beach monitoring for nesting sea turtles; and providing training in identification of sea turtle tracks and nests as well as other marine resources.

Marine Resources Protection. Under the proposed action, the Navy would coordinate with the National Marine Fisheries Service (NMFS) and USFWS to obtain relevant permits prior to implementing any action with potential to impact marine resources. Sightings of stranded marine mammals or sea turtles on DNA and CP beaches would be reported to natural resources staff who would report the incident to the Virginia Marine Science Museum's Stranding Center. Natural resources staff would also maintain a database of all strandings that occur on DNA and CP.

Habitat Conservation and Restoration. Habitat conservation and restoration are important natural resources management issues in the proposed INRMP. Management efforts under Alternative 2 would focus on protection of the bases' special interest areas and restoration of significant natural habitats. The dune systems of DNA and CP comprise a particularly important habitat where restoration efforts would be concentrated. Projects that would be implemented under this alternative include: implementing dune protection and restoration measures; initiating long-term monitoring to assess the effectiveness of dune protection; installing signage and vehicle exclusion fencing to protect swale wetlands; monitoring interdunal swale wetlands for impacts from training; and inspecting and repairing beach access walkways to prevent foot-traffic damage to dune habitats.

Shade Tree and Urban Forest Management. Shade tree and urban forest management is an important issue at DNA because of the level of development at the base. Shade tree and urban forest resources, however, are very limited and the dominant urban landscape features are mowed lawn and open field. The primary goal of urban forest management under the proposed action would be to maintain the health and integrity of the urban forest, ensure the safety of personnel and their dependents, and protect Navy real estate. Under the proposed action, natural resources staff would: review development plans that propose tree removal and provide recommendations for protection, mitigation, or selection of alternative sites; promote the use of beneficial landscaping practices; coordinate with the Virginia Department of Forestry (VDOT) to provide training in tree care; and assist with identification and removal of hazard trees.

Forest Management. Both DNA and CP have extensive forest resources. Approximately 585 acres (43 percent) at DNA and 266 acres (75 percent) at CP are forested. The forested areas, however, largely consist of forested wetlands, which are not managed for commercial timber production, but as functioning ecosystems that help improve water quality and reduce flooding by slowing storm water runoff and trapping sediment, nutrients, and other pollutants. The forested areas also provide a noise, safety, and visual buffer between military training activities and the surrounding communities, wildlife habitat, and outdoor recreation opportunities. All timber harvesting and salvage operations, including clearing land on construction sites, would be coordinated with the regional Navy forester under this alternative. Additionally, forest stands will be monitored for outbreaks of southern pine beetle and other insect and diseases.

Prescribed Burning. Conducting controlled burns is a cost-effective, practical method of reducing the potential for catastrophic wildfires in forest stands with high fuel loads, areas adjacent to firing ranges, or other areas where vegetation manipulation is desired. Prescribed burning projects that would be implemented under Alternative 2 include: implementing controlled burning in accordance with the NAS Oceana controlled burn plan; updating the plan annually to reflect accomplishments and set new goals; and maintaining firebreaks and fire lines as needed.

Fish and Wildlife Management. Under the proposed action, white-tailed deer (*Odocoileus virginianus*) populations would continue to be managed through a quality deer management program that is aimed at building an older age class of male deer and improving overall herd quality through reduced populations. Projects proposed under this alternative include administration of the base hunting and fishing program and the collection and reporting of deer harvest information to the VDGIF.

Outdoor Recreation and Environmental Awareness. The primary objectives of outdoor recreation and environmental awareness initiatives under the proposed action would be to improve the quality of life for installation personnel, their dependents, and the military community by providing for outdoor recreation opportunities to the maximum extent possible within the constraints of the military mission and capability of the natural resources; and foster understanding and awareness of the environment through educational programs. Continued administration of the regional hunting and fishing programs is the primary outdoor recreation and environmental initiative under this alternative.

Pest and Invasive Species Management. The primary objective of pest management at DNA and CP under the proposed action would be to prevent interference with military operations and preparedness by protecting infrastructure, real property, and human health and safety. The Regional Pesticide Compliance and Pest Management Plan (draft), which describes requirements, resources, responsibilities, and procedures for pest management throughout the region, would be implemented when finalized. Integrated pest management efforts would be implemented to control feral pets, Canada geese, and invasive alien plants at DNA and CP. Specific projects would include: monitoring common reed; assisting with the removal of nuisance wildlife in administrative and housing areas; and the purchase of a large cage for animal transport.

Cultural Resources. To date, four archaeological sites have been identified at DNA that require additional evaluation to determine eligibility for the National Register of Historic Places (NRHP). An archaeological survey of CP found no archaeological sites and recommended no further investigation. However, formal concurrence on this finding has not been obtained from the State Historic Preservation Officer (SHPO). Under the proposed action, the SHPO would be consulted during the planning process for new construction or other activities with potential to impact cultural resources to avoid unauthorized or accidental disturbance.

Training and Professional Development. Personnel assigned natural and cultural resources management responsibilities are required to receive training as applicable to their specific job assignments. Under the proposed action, natural resources staff would attend annual law enforcement refresher courses; ArcView, wetlands delineation and regulation, and marine mammal stranding training; and invasive species control and coastal ecology and shoreline stabilization workshops, as appropriate.

2.4.3 Alternative 3 – Enhanced Alternative

The enhanced alternative would implement all projects described in the INRMP for DNA and CP, including those proposed for implementation by Alternative 2 as well as additional environmental stewardship projects not required for compliance or maintenance. A summary of all projects described in the INRMP including implementation schedules, legal drivers, and source of funding is in Appendix B. A summary of those additional activities that would be implemented under the enhanced alternative follows.

Coastal Zone Management. The coastal zone management activities proposed under this alternative are the same as those described above for the proposed action.

Wetlands and Water Quality Protection. In addition to those projects that would be implemented under Alternative 2, the enhanced alternative includes projects that would: establish reduced and no-mowing zones along ditches and wetlands; plant appropriate native trees and shrubs where practicable; maintain a no-mowing zone around Sadler Pond to reduce bank erosion and improve water quality; coordinate with the Resident Officer in Charge of Construction (ROICC) to identify areas to enhance or establish riparian buffers and to improve the vegetative and structural best management practices (BMPs) in and around Sadler Pond drainage ditches; and pursue obtaining mitigation credit for removal of pine in swale wetlands.

Rare, Threatened, and Endangered Species. In addition to those projects that would be implemented under Alternative 2, the enhanced alternative would include consultation with the Virginia Department of Conservation and Recreation-Division of Natural Heritage (VDCR-DNH) on changes in land use or management practices for special interest areas.

Marine Resources Protection. The marine resource protection activities proposed under this alternative are the same as those described above for the proposed action.

Habitat Conservation and Restoration. The habitat conservation and restoration activities proposed under this alternative are the same as those described above for the proposed action

with the addition of the maintenance of scrub shrub and early successional habitat in the north and south outparcels through mowing and controlled burning.

Shade Tree and Urban Forest Management. In addition to those projects that would be implemented under Alternative 2, the enhanced alternative would include the development and implementation of landscaping plans for the picnic area and ball fields at Sadler Pond, the parking lot at Shifting Sands Club, and the parking lot on Regulus Avenue across from building 127.

Forest Management. The forest management activities proposed under this alternative are the same as those described above for the proposed action.

Prescribed Fire. The prescribed fire activities proposed under this alternative are the same as those described above for the proposed action.

Fish and Wildlife Management. Under the enhanced alternative, the following activities are proposed in addition to those described above for the proposed action: develop and implement a plan for redistribution of wood duck boxes, GPS new box locations, update GIS data layer and nest box data log; conduct annual inspections and maintenance of bluebird, bat and wood duck boxes and osprey platforms; monitor nesting activity at osprey nesting platforms and bluebird nest boxes; and conduct water quality surveys at Sadler Pond to assess the effectiveness of management activities around the pond.

Outdoor Recreation and Environmental Awareness. In addition to the projects that would be implemented under Alternative 2, natural resources staff would assist the Regional Outreach Specialist with the environmental awareness programs such as the National Arbor Day Foundation's Tree City USA program. Specific projects proposed under the enhanced alternative include: assisting the regional outreach specialist with the National Arbor Day Foundation's Tree City USA Program and annual Arbor Day and Earth Day events; and submitting a recertification application, forest workplan, and proclamation of support of Arbor Day to VDOF annually.

Pest and Invasive Species Management. In addition to the pest and invasive species management activities proposed under the proposed action, natural resources staff would assist in educating base personnel about the impact and health risks of loose pets and feral animals.

Cultural Resources. The cultural resources activities proposed under this alternative are the same as those described above for the proposed action.

Training and Professional Development. The training and professional development activities proposed under this alternative are the same as those described above for the proposed action.

3.0 AFFECTED ENVIRONMENT

This section describes the relevant existing environmental conditions that would be impacted by implementation of the alternatives discussed in Section 2.0. In accordance with CEQ regulations (§ 1502.15), the descriptions presented below are no longer than necessary to understand the potential effects of implementation of the proposed action or no action alternative. More detailed information on the affected environment is presented in the INRMP for which this EA was developed.

3.1 Land Use

3.1.1 Regional Land Use

DNA and CP are located in the southeastern portion of Virginia Beach on the shore of the Atlantic Ocean in Virginia. Land uses surrounding the bases include industrial, commercial, residential, recreational, and agricultural though most of the agricultural lands are rapidly being converted to residential and recreational developments. Several other military installations including NAS Oceana, Naval Amphibious Base Little Creek, and Fort Story are also located in Virginia Beach.

3.1.2 Base Land Use

DNA and CP are outlying parcels under the command of NAS Oceana. DNA is home to the Fleet Combat Training Center Atlantic (FCTCLANT) along with 13 other tenant commands. The primary land use at DNA and CP is mission support. DNA offers a number of training facilities that support the major command missions including small-arms firing ranges, weapons gunline, Fleet Composite Squadron Six (VC-6) detachment, helicopter pads, weapons compound, and beach and dune training areas. The developed portion of the base includes mission support along with operational, administrative, personnel, and housing activities. CP is used for training in special warfare, ordnance, overland assault, beach assault, and tactical air operations radar. A number of the base facilities have associated noise and safety buffers that constrain land use and resource management.

3.2 Soil Resources

The U.S. Department of Agriculture (USDA), National Resources Conservation Service (NRCS) (formerly the Soil Conservation Service [SCS]) prepared a soil survey report for Virginia Beach in 1985. The survey indicates that approximately half of the soils on DNA and CP have properties that severely constrain development. These restrictive soils include the Newhan-Duckston-Corolla association of the beaches and dunes and the very poorly drained, flood-prone Backbay-Nawney association in the marshes and swamps. The hydric soils at DNA and CP are Acredale silt loam, Backbay mucky peat, Nawney silt loam, Nimmo loam, and Tomotley loam (NRCS 1993). Forty-two percent of the soils at DNA and 57 percent of the soils at CP are hydric. Several of the soils that occur at DNA and CP are considered prime farmland soil types (USDA, SCS 1985). Forty-two percent of the area at DNA, particularly the south outparcel, and 43 percent of the area at CP is prime farmland. Other soil types mapped at DNA and CP are soils indicative of developed lands.

3.3 Water Resources

3.3.1 Groundwater

The shallow aquifer system at Virginia Beach is composed of the Columbia aquifer, the Yorktown confining unit, and the Yorktown-Eastover aquifer. The Columbia aquifer is predominantly composed of sandy surficial deposits that lie above the Yorktown confining unit. The Yorktown confining unit is composed of a series of very fine sandy to silty clay units at or near the top of the Yorktown Formation. The Yorktown-Eastover aquifer is predominantly composed of sandy deposits of the Yorktown Formation and the upper part of the Eastover Formation. The shallow aquifer system is separated from deeper units by the continuous St. Mary's confining unit.

Because of concerns about the groundwater withdrawals and declining water levels in southeastern Virginia, the entire region, including Virginia Beach, was designated a Groundwater Management Area by the state in 1976 (Smith and Harlow 2002). Potable water for DNA and CP, supplied by the City of Norfolk, comes primarily from surface water resources including Lake Prince in Suffolk and Lake Gaston on the border of Virginia and North Carolina (City of Virginia Beach 2003a).

3.3.2 Surface Water

Surface water that occurs on DNA includes approximately 56 acres of Redwing Lake, which lies in the northern portion of the base; Sadler Pond, which is within the central support area; and several small ponds such as Lotus Pond and Lilly Pond and areas of open water, which are associated with the extensive marsh system. Lake Tecumseh (also known as Brinson Lake Inlet) forms the southern boundary of DNA. The base surface water is connected to Back Bay and the Inland Coastal Waterway by open canal.

CP has no surface water other than a small portion (0.5 acre) of Lake Christine, which lies almost entirely within the State Military Reservation to the north of CP. Areas of Lovetts Marsh and a wetland mitigation site in the central portion of CP may be seasonally flooded and have minimal areas of surface water.

3.3.3 Watersheds

DNA and CP lie within the Back Bay watershed unit of the Southern Watersheds Area. The Southern Watersheds Area, as designated by the Virginia Beach Planning Department, is a collective of the North Landing River, Northwest River, and Back Bay Watersheds in Virginia Beach and Chesapeake (City of Virginia Beach 2003b). It covers approximately 325 square miles and is bordered by the Atlantic Ocean on the east, the Great Dismal Swamp on the west, and the North Carolina border on the south. The Southern Watersheds area contains extensive wetlands, including a variety of rare swamp, pocosin, and marsh communities that drain into the Albemarle-Pamlico Sound (Virginia Department of Environmental Quality 2003).

3.3.4 Floodplains

Federal Emergency Management Agency (FEMA) flood insurance rate maps indicate a large portion of DNA and CP lies within the 100-year or 500-year floodplains associated with Redwing Lake, Lake Tecumseh, the extensive wetlands on each base, and drainageways. FEMA defines the 100-year flood as an area that has a 1 percent chance of being equaled or exceeded in any given year and is the standard used by federal agencies for floodplain management. The 500-year floodplain is an area that has a 0.2 percent chance of a flood in a year. Since floodplains cover much of DNA and CP, many buildings, infrastructure, and developed areas occur within floodplains.

3.3.5 Wetlands

Wetlands mapping efforts at DNA have included the USFWS National Wetlands Inventory (NWI), which was produced through photo-interpretation of 1994 color infrared and 2000 black and white aerial photography (USFWS 2003) and a delineation of the 181-acre south outparcel for which a USACE jurisdictional determination was obtained (U.S. Navy 1995). Additional field work was conducted in the northern portion of the base by Geo-Marine Inc., wetland scientist in support of the INRMP in areas that appeared to have a higher percentage of wetlands than were previously mapped. Currently, approximately 522 acres of wetlands are mapped at DNA.

Wetlands mapping efforts at CP include a planning-level wetlands delineation produced in the early 1990s through a memorandum of agreement between the Navy and the USFWS. This delineation indicates a total of 269 acres of wetlands occur on CP. Site-specific delineations and a jurisdictional determination would be required prior to land use changes or site development that could impact wetlands at DNA and CP.

Several wetland mitigation and restoration efforts have been undertaken at DNA and CP to mitigate the loss of wetlands during site development. Included are a 13.2-acre wetland mitigation site on the north side of Redwing Lake at DNA, which was created in the early 1990s; a 2.4-acre mitigation site at CP, which was created in 1994; and an extensive restoration of Lovetts Marsh, which lies on both DNA and CP, which was undertaken in 1996. This restoration project requires additional monitoring to meet USACE requirements.

3.4 Coastal Zone Resources

The federal CZMA of 1972 provides a procedure for the states to review federal actions for consistency with their own approved coastal management program. The CZMA encourages states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife supported by those habitats. Virginia's coastal management area includes the entire Tidewater region. Although federal lands are excluded from state coastal management areas, activities on federal lands that are reasonably likely to affect use of lands or waters, or natural resources of Virginia's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of the Virginia Coastal Resources Management Program (CRMP).

The Virginia CRMP establishes policies and objectives to guide the use and development of coastal management areas to ensure their protection and preservation. Included are policies on fisheries management, subaqueous lands management, wetlands, primary dunes, point and nonpoint source water pollution, air pollution, shoreline sanitation, and coastal lands management.

3.5 Vegetation

DNA and CP are located in an ecoregion classified as the Outer Coastal Plain Mixed Forest Province (Bailey 1995). This ecoregion is characterized by extensive coastal marshes and interior swamps. At DNA, however, a large portion (approximately 390 acres) of the base has been developed and now has an urban landscape that consists of impermeable surface, mowed lawn, shade trees, and ornamental trees and shrubs. Most of the remaining landscape has forested wetlands that are dominated by a mix of hardwood species (181 acres) or a mix of pine and hardwood (121 acres pine/hardwood and 117 acres hardwood/pine). Nonforested communities at DNA include marshes (70 acres), which are equivalent to the palustrine emergent and scrub shrub wetland classifications, and fallow agricultural fields (68 acres).

Other than approximately 21 acres of developed area, CP is undeveloped and is dominated by forested wetlands. Hardwood forests (145 acres) are most abundant, followed by areas of mixed hardwood/pine (53 acres) and pine/hardwood (45 acres). Planted pine occurs on about 23 acres. The beaches and dunes complex occupies 71 acres, and very small amounts of marsh (5 acres) and open water (2 acres).

A number of coastal maritime communities also occur on both installations within the beaches and dunes system. Though the specific communities have not been mapped, they include the beaches and foredunes, maritime dune woodlands, maritime evergreen forests, maritime dune grasslands, maritime scrub, and interdune ponds.

3.6 Fish and Wildlife

The diverse assemblage of forested, wetland, and coastal ecological communities at DNA and CP provides habitat that supports a wide variety of fauna. Faunal surveys at the bases have primarily consisted of observations made by VDCR-DNH during threatened and endangered species inventories (Buhlmann et al. 1992; Van Alstine et al. 2001; VDRC-DNH 1990) and incidental observations made by biologists and naturalists during other field visits (U.S. Navy 1998a, 1998b). Marine resources were assessed in a comprehensive marine resources assessment of the region (U.S. Navy 2003).

In 1990 and 1992, VDCR-DNH trapped or observed a total of 17 mammal species on DNA and CP. Large and medium-sized mammals observed were white-tailed deer, gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), nutria (*Myocastor coypus*), opossum (*Didelphis virginianus*), eastern gray squirrel (*Sciurus carolinensis*), and eastern cottontail (*Sylvilagus floridana*). Smaller mammals were captured in pitfall traps and included several species of shrews (*Cryptotis parva*, *Blarina carolinensis*), mice (*Reithrodontomys humulus*, *Peromyscus leucopus*), voles (*Microtus pennsylvanicus*, *Microtus pinetorum*), moles (*Scalopus aquaticus*), and rats (*Oryzomys palustris*). Of the marine mammals that are likely

to utilize the waters adjacent to DNA and CP, bottlenose dolphins (*Tursiops truncatus*) are the most common.

The extensive wetlands, lakes, and wooded areas at DNA and CP provide habitat for a number of reptile and amphibian species. A total of 8 turtle species, 14 amphibian species, four lizard species, and 11 snake species are known to occur on the bases (Buhlmann et al. 1992; VDRC-DNH 1990). The most common herpetofauna to occur include the red-backed salamander (*Plethodon cinereus*), bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), leopard frog (*Rana utricularia*), gray treefrog (*Hyla chrysocelis*), Fowler's toad (*Bufo woodhousii*), red-eared slider (*Trachemys scripta elegans*), five-lined skink (*Eumeces fasciatus*), northern fence lizard (*Sceloporus undulatus*), northern water snake (*Nerodia sipedon*), black rat snake (*Elaphe obsoleta*) and eastern garter snake (*Thamnophis carolina*). Five species of sea turtles have been recorded in the area off the DNA and CP coast. These include the loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempi*), leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), and hawksbill (*Eretmochelys imbricata*) turtles. The loggerhead is the most common sea turtle in the area and has been known to nest at DNA on occasion.

The avifaunal community at DNA and CP is diverse and reflects the wide variety of habitats available. A total of 167 species has been observed during various bird surveys conducted on the bases. DNA and CP are located in the Atlantic migratory flyway and are particularly important as stopover grounds for neotropical migrants during spring and fall migration. One large group of birds on the bases is the Passeriformes (perching birds), which utilize the forested, open grounds, and other terrestrial portions of the bases. Typical perching birds include eastern wood-pewee (*Contopus virens*), brown thrasher (*Toxostoma rufum*), ovenbird (*Seiurus aurocapillus*), red-eyed vireo (*Vireo olivaceus*), northern mockingbird (*Mimus polyglottos*), American robin (*Turdus migratorius*), northern cardinal (*Cardinalis cardinalis*), and house finch (*Carpodacus mexicanus*). Many other birds are migratory seabirds and shorebirds that can be found along the bases' shoreline at different times of the year. Common seabirds include pelicans (*Pelecanus occidentalis*), loons (*Gavia* spp.), grebes (*Podiceps auritus* and *Podilymbus podiceps*), and cormorants (*Phalacrocorax* spp.) and common shorebirds include plovers (*Charadrius semipalmatus* and *Pluvialis squatarola*) and sandpiper (*Actitis macularia*). Several species of gulls (*Larus* spp.), terns (*Sterna* spp.), ducks (*Anas* spp.), and geese (*Branta* spp.) are also common offshore and in the beach area. The DNA's lakes and ponds support a number of waterfowl, including resident and migratory ducks and geese, and wading birds such as herons, egrets, and rails. Several birds of prey that utilize various habitats at the bases are the red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), merlin (*Falco aesalon*), sharp-shinned hawk (*Accipiter velox*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), osprey (*Pandion haliaetus*), and bald eagle (*Haliaeetus leucocephalus*).

The ichthyofauna of DNA and CP include a number of native coastal plain freshwater fishes, such as gizzard shad (*Dorosoma cepedianum*), common carp (*Cyprinus carpio*), eastern mudminnow (*Umbra pygmaea*), brown bullhead catfish (*Ictalurus nebulosus*), bowfin (*Amia calva*), black crappie (*Pomoxis nigromaculatus*), and several sunfish species (*Enneacanthus obesus* and *E. gloriosus*), as well as a number of sport fishes that have been introduced into Redwing Lake, Lake Tecumseh, and Sadler Pond for recreational fishing. Introduced sport

fishes include largemouth bass (*Micropterus salmoides*), pumpkinseed (*Lepomis gibbosus*), and bluegill (*Lepomis macrochirus*) (Galvez and Swihart 2000). A large number of saltwater species are also known to occur in the coastal waters off the shore of DNA and CP. Because the area is in a transition zone between temperate and subtropical regions, the fish fauna is extremely diverse and up to 685 species are known to occur (U.S. Navy 2003).

3.7 Rare, Threatened, and Endangered Species and Significant Ecological Communities

The federally threatened loggerhead turtle, bald eagle, and piping plover (*Charadrius melodus*) are the only federally listed species known to occur at DNA, though the loggerhead turtle is the only one of these species known to nest on the base. The bald eagle is known to feed at Lake Tecumseh, but is not known to nest on either base (Watts and Byrd 2003). The piping plover has been observed along the beach at DNA, but has not been reported as nesting (Beatty 2003). No federally listed species have been documented at CP.

Besides the federally listed species, a number of species that are considered rare in the state have also been documented at DNA and CP. These species were identified during inventories of rare, threatened, and endangered species through cooperative agreements between Atlantic Division, Naval Facilities Engineering Command (LANTDIV) and the VDCR-DNH (Buhlmann et al. 1992; Van Alstine et al. 2001; VDCR-DNH 1990). The only state-rare animal species recorded at DNA is the king rail (*Rallus elegans*). The king rail is a bird that is considered very rare for breeding in Virginia. The Pungo mouse (*Peromyscus leucopus easti*), greater siren (*Siren lacertina*), and marsh rabbit (*Sylvilagus paulustris*) were documented at DNA in 1990. These species are no longer considered rare by the VDCR-DNH, though they do remain on the watch list.

State-rare plants identified in VDCR-DNH surveys at DNA, to date, include white-topped fleabane (*Erigeron vernus*), bluejack oak, fasciculate beakrush (*Rhynchospora fascicularis* var. *fascicularis*), glossy-seeded star-grass (*Hypoxis sessilis*, formerly *H. longii*), and a rush (*Juncus elliotii*). Several other plant species found at DNA that were considered rare at the time of the 1990 survey are no longer tracked by VDCR-DNH. Included are the American frog's-bit (*Limnobium spongia*), sea-coast marsh elder (*Iva imbricata*), bog rush (*Juncus validus* var. *validus*), and Carolina fimbry (*Fimbristylis caroliniana*). The bog rush and Carolina fimbry are still considered watch list species.

At CP, state-rare plant species recorded during VDCR-DNH surveys include American lipocarpa (*Lipocarpa maculata*), fasciculate beakrush, black-fruited spikerush (*Eleocharis melanocarpa*), umbrella sedge (*Fuirena breviseta*), creeping seedbox (*Ludwigia repens*), long beach seedbox (*Ludwigia brevipes*), bluejack oak, and white-topped fleabane. Several other plant species documented at CP that were previously considered rare include twig rush (*Cladium mariscoides*), spoon-leaved sundew (*Drosera intermedia*), bog rush, Carolina fimbry, and Virginia Beach pinweed (*Lechea maritima* var. *virginica*). The spoon-leaved sundew, bog rush, Carolina fimbry, and Virginia Beach pinweed are still on the state watch list.

Only one state-rare animal species, a tiger beetle (*Cicindela trifasciata*), has been documented at CP. The 2001 survey (Van Alstine et al. 2001) indicated, however, that suitable habitat exists for two other state-rare species, the comet darter (*Anax longipes*) and another rare tiger beetle (*Cicindela lepida*), and better weather may have yielded different results. Future surveys were recommended. Additional surveys for eastern or Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) and a monitoring program for piping plover were also recommended.

In addition to the rare plant and animal species known to occur on DNA and CP, a number of marine species that occur in the nearshore area off the coast of the bases are state and federally listed as threatened or endangered. Included are the loggerhead turtle, green turtle, leatherback turtle, hawksbill turtle, North Atlantic right whale, humpback whale, and West Indian manatee.

Several of the ecological communities that occur on the bases are also considered significant, rare natural communities in Virginia. The interdune ponds, maritime wet grasslands, maritime evergreen forests, and maritime dune woodlands, which occur in the beaches and dunes areas, are rare natural communities that are severely threatened by coastal development throughout their natural range.

3.8 Cultural Resources

Although cultural resources are not a natural resource, their protection is discussed in the INRMP as well as this EA because of potential impacts from project implementation and development at DNA and CP. Several cultural resources surveys were conducted at DNA during the 1980s and although the base has been heavily disturbed, there have been no recent surveys of the facility. A reconnaissance level survey of areas with archaeological potential is planned in fiscal year (FY) 2007. Except for the family housing complex, which was surveyed in 2003, and found to be not eligible, no architectural surveys have been completed for DNA. The report findings are under review by the SHPO. A survey is planned in FY07 to determine the presence of historic buildings or districts.

To date, four archaeological sites have been identified at DNA that require additional evaluation to determine eligibility for the NRHP. Included are an eighteenth and nineteenth century farm site and graveyard, the dam neck mills and Coast Guard life-saving station, an earthworks dating before 1859, an antebellum farm site (called the Fresh Pond site), and a built-up earthen roadbed. A Phase I survey was conducted for the north and south outparcels at the time of acquisition and no sites were found.

An archaeological survey of CP (U.S. Navy 1987a) found no archaeological sites and recommended no further investigation. However, formal concurrence on this finding has not been obtained from the SHPO.

3.9 Air Quality

National Ambient Air Quality Standards (NAAQS) have been established by the EPA for six criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO₂), particulate matter with a diameter less than or equal to a nominal 10 micrometers (PM₁₀), ozone (O₃), nitrogen dioxide

(NO₂), and lead (Pb). In addition, the CAA of 1970 requires that states with designated ozone nonattainment areas regulate volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) because they are precursor pollutants to ozone formation.

DNA and CP are in EPA Region 3, Hampton Roads Air Quality Control Region. In April 2004, Hampton Roads was designated as marginal nonattainment for ozone (EPA 2004). Section 107(d)(3)(E) of the 1990 Clean Air Act Amendments (CAAA) states that the following criteria must be met in order for an area to be redesignated from nonattainment to attainment:

- The EPA has determined that the NAAQS has been attained. This standard is 0.12 parts per million (ppm) for ozone.
- The applicable State Implementation Plan (SIP) has been fully approved by the EPA under Section 110(k).
- The EPA has determined that the improvement in air quality is due to permanent and enforceable reductions in emissions.
- The state has met all applicable requirements for the area under Section 110 and Part D.
- The EPA has fully approved a maintenance plan, including a contingency plan, for the area under Section 175A.

The CAAA states that federal agencies cannot support any action that does not conform to an EPA-approved SIP. A General Conformity Rule applicability analysis is required to demonstrate that the proposed federal action conforms to the SIP. Ongoing actions and actions that are identified in the SIP are exempt from demonstrating conformity. Other actions are assumed to be in conformity if total project emissions are below a minimum threshold level (*de minimis* level) and less than 10 percent of the regional emission inventory. Projects below the *de minimis* level are not subject to the General Conformity Rule; those projects at or above the levels are required to perform a conformity analysis. *De minimis* emissions levels for areas of ozone nonattainment areas are presented in Table 3-1.

Table 3-1. *De Minimis* Exemption Levels in Nonattainment Areas.

Pollutant/Maintenance Classification	Emissions (tons/year)
Ozone (NO _x)	
Marginal nonattainment areas	100
Ozone (VOCs)	
Marginal nonattainment areas	100

3.10 Socioeconomics and Environmental Justice

Socioeconomic analyses generally provide a detailed investigation of the prevailing population, income, employment, and housing conditions of a community or area of interest. This section provides a description of these demographics within the region of influence (ROI) for the social and economic environment, which is defined as the independent cities of Norfolk and Virginia Beach in Virginia.

Environmental justice is another important aspect of a socioeconomic analysis. EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires that each federal agency ensure that achieving environmental justice is part of its mission by identifying and addressing, as appropriate, disproportionately high human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. Each year the U.S. Census Bureau (USCB) defines the national poverty thresholds, which are measured in terms of household income dependent upon the number of persons within the household. In 2000, the average threshold was \$17,603 for a family of four and \$13,738 for a family of three (USCB 2001).

3.10.1 Demographics

In 2000, the total population within the ROI had reached 659,660, an approximate increase of 0.8 percent over the 1990 population. The population within Norfolk declined by approximately 10.3 percent to 234,403 during the period, while the population of Virginia Beach increased by 8.2 percent to 425,257 (USCB 1993, 2003).

In 2000, the demographic profile of the ROI was 61.4 percent White non-Hispanic, 27.4 percent Black or African American, 0.4 percent American Indian or Alaska Native, 4.1 percent Asian, 4.1 percent Hispanic, and 2.8 percent all other races or combination of races. The ROI would not be considered an area with a concentrated minority population. However, Norfolk with 53.1 percent of the population being minority would be considered an area with a concentrated minority population. The largest minority component population within Norfolk was Black or African American, accounting for 43.3 percent of the total population (USCB 2003).

3.10.2 Employment and Income

Unemployment in the ROI varied approximately 3.0 percent between the highest unemployment rates in 1992 and the lowest unemployment rates in 2000. Norfolk had higher unemployment rates than either Virginia Beach or the state during this period. The labor forces increased in the state and in Virginia Beach between 1990 and 2000, while the labor force in Norfolk decreased by approximately 11.4 percent. Norfolk had the highest unemployment rate of 7.4 percent in 1992. During this period, the unemployment rate in Virginia Beach was 5.3 percent, and in the state it was 6.4 percent. In 2000, the unemployment rates were 4.0 percent, 2.2 percent, and 2.2 percent in Norfolk, Virginia Beach, and the state, respectively (Bureau of Labor Statistics [BLS] 2004). Total full- and part-time employment between 1990 and 2000 fell by approximately 34,000 positions in Norfolk (Bureau of Economic Analysis [BEA] 2002a). Total employment positions during this period in Virginia Beach increased by approximately 49,000 positions (BEA 2002a).

Total personal income within the ROI nominally increased 47.9 percent to \$18.5 billion between 1990 and 2001 (BEA 2002b). Total nonfarm personal income increased 48.0 percent to \$18.5 billion and total farm personal income declined by 64.8 percent to \$3.3 million during this period (BEA 2002b). Total nonfarm earnings increased 44.5 percent to \$16.0 billion (BEA 2002b). Total personal earnings from wage and salary employment increased 117.6 percent in the finance, insurance, and real estate industry and 71.6 percent in services between 1990 and 2001 (BEA 2002b). In 2001, private earnings accounted for 57.5

percent of total earnings from wage and salary employment (BEA 2002b). Government and government enterprises accounted for the remaining 42.5 percent (BEA 2002b).

In 2000, the median household income in the ROI ranged from \$48,705 in Virginia Beach to \$31,815 in Norfolk. The per capita personal income also varied in 2000, from \$22,365 in Virginia Beach to \$17,372 in Norfolk. In 2000, the poverty rate (10.8 percent) within the ROI declined 0.1 percent over the 1990 rate (10.9 percent) (USCB 1993, 2003). Within the immediate area of DNA and CP, the combined poverty rate of the census tracts in 2000 was 11.2 percent, and in the combined block groups it was 11.0 percent (USCB 2003). None of these areas would be considered a concentrated poverty area.

4.0 ENVIRONMENTAL CONSEQUENCES

This section presents an analysis of the potential environmental consequences of the alternatives described in Section 2.0. The potential impacts to the human and natural environment are evaluated relative to the existing environment described in Section 3.0. Resource areas analyzed in this EA include land use, soil, water, vegetation, marine resources, coastal zone resources, fish and wildlife, threatened and endangered species, cultural resources, air quality, socioeconomics, and environmental justice. Environmental consequences are evaluated relative to the existing environment

Land use would be impacted if natural resources management activities caused inconsistencies that reduced the viability of existing land use activities; created threats to public health, safety, and welfare of adjacent or nearby land users; or conflicted with the military mission. Soils would be impacted if current or proposed activities resulted in severe soil loss such that the areas could no longer maintain the existing land use or caused sedimentation in adjacent water bodies. Impacts to biological resources would be significant if species or habitats of concern are adversely affected or disturbances cause reductions in population size or distribution of a species of concern. Water resources would be impacted if activities resulted in a change to the groundwater or surface water quantity or quality and wetlands. Impacts to cultural resources would occur if natural resources management activities resulted in disturbance to significant historic structures or archaeological deposits. Air quality would be impacted if activities resulted in an exceedance of the NAAQS, exceedance of *de minimis* exemption levels, or the exposure of sensitive receptors to increased pollutant concentrations. Socioeconomic resources would be impacted if activities resulted in a change to the population, employment, or income potential of DNA, CP and the ROI. Environmental justice impacts would be considered if minority and/or low-income populations within or adjacent to DNA and CP would experience disproportionate adverse effects from implementing the current or proposed natural resources management activities.

The natural resources management activities evaluated were designed to avoid negative environmental impacts and include planning measures for compliance with applicable laws and regulations. Therefore, none of the activities are currently being conducted nor any of the project actions recommended in the preferred or enhanced alternatives would have the potential to cause significant environmental impacts. The proposed action (Alternative 2) would provide greater environmental benefits than continuing the no action alternative (Alternative 1) because many additional management issues are addressed in the proposed INRMP and most management recommendations provided in the current natural resources plans have been completed. The enhanced alternative (Alternative 3) would provide additional benefits to the environment through the implementation of projects that are beyond the compliance level. The environmental consequences of each alternative are summarized in Table 4-1.

Table 4-1 Comparison of Alternatives.

Resource	Alternative 1 No Action Alternative	Alternative 2 Proposed action	Alternative 3 Enhanced Alternative
Land Use	No change	Positive effects on the bases' ability to sustain military land use through protecting soil and water resources and providing information for future land planning.	Same as Alternative 2 with enhancement of existing land use resulting from landscaping of select urban areas.
Soil Resources	No change	Positive effects from review of soil erosion and control plans, implementation of dune protection and monitoring, and installation of vehicle exclusion fencing.	Same as Alternative 2 with additional benefits to soil resources resulting from implementing BMPs around Sadler Pond drainage ditches to reduce soil erosion.
Water Resources	No change	Positive effects from review of permitting requirements, compliance with wetlands regulations, and implementation of projects including basewide wetlands delineation and implementing BMPs to minimize impacts to water quality from sedimentation.	Same as Alternative 2 with additional benefits from use of BMPs and reduced mowing around Sadler Pond drainage ditches, conducting water quality monitoring at Sadler Pond, and increasing riparian buffers in other areas.
Marine Resources	No change	Positive impacts to marine resources could result from nightly surveys of beaches for sea turtle tracks and nests and providing sea turtle identification training.	Same as Alternative 2
Coastal Zone Resources	No change	Positive effects from protecting implementing dune protection and monitoring, installation of vehicle exclusion fencing, and from the review of projects to ensure consistency with the Virginia CZMP.	Same as Alternative 2
Vegetation	No change	Positive effects from invasive species control, monitoring tree disease and insect infestation, and conducting controlled burns.	Same as Alternative 2 with additional benefits from improved landscaping at select urban locations

Table 4-1. Comparison of Alternatives (cont'd).

Resource	Alternative 1 No Action Alternative	Alternative 2 Proposed action	Alternative 3 Enhanced Alternative
Fish and Wildlife	No change	Positive effects from game and nongame management and habitat management, the conservation and enhancement of the natural habitats, administering installation hunting and fishing programs, and maintenance of early successional habitat, improved base awareness of feral pet issues.	Same as Alternative 2 with additional benefits from the distribution, maintenance, and monitoring of osprey platforms, bat, bluebird and wood duck boxes.
Threatened and Endangered Species	No change	Positive effects from rare species surveys, tracking of species status, and compliance with regulations.	Same as Alternative 2 with additional benefits resulting from consultations with VDCR-DNH to ensure that future land use changes would not affect rare species habitat.
Cultural Resources	No change	Positive impacts to undiscovered cultural resources from consultation with SHPO during project planning.	Same as Alternative 2
Air Quality	No change	Minimal effect from prescribed fire; action is in conformity with State Implementation Plan.	Same as Alternative 2
Socioeconomics	No change	No change to population, income, or employment.	Same as Alternative 2
Environmental Justice	No change	No disproportionately high adverse impact on minority or low-income populations.	Same as Alternative 2

4.1 Alternative 1 – No Action Alternative

Under the no action alternative, natural resources would continue to be managed in accordance with existing plans and programs. However, without implementation of the INRMP, future actions and projects would not be planned and accounted for as required by the SAIA. Baseline conditions of the affected environment would not change under the no action alternative, nor would the full benefits realized under the INRMP be achieved.

4.1.1 Land Use

Selecting the no action alternative would not adversely impact land use on DNA and CP since the continuation of the current natural resources program would not reduce the capability of lands to support the military mission nor affect surrounding land use. Whereas mission activities must consider protection measures for natural resources as part of standard operating procedures, implementation of the natural resources program does not formally constrain mission activities or dictate land use. Mission security and safety and/or regulatory requirements are primary considerations for imposing land use restrictions.

4.1.2 Soil Resources

Under the no action alternative, baseline conditions for soil resources would continue at DNA and CP. Digital maps of base soils would continue to be used for planning purposes to protect and manage soil resources. In addition, sediment control plans and BMPs would continue to be used to minimize potential impacts from soil disturbance.

4.1.3 Water Resources

Selection of the no action alternative would not result in changes to the baseline condition of water resources at DNA and CP. Management actions would continue to be conducted in accordance with state and federal regulations for water quality and wetlands protection. Review of permitting requirements for storm water management plans and compliance with wetlands regulations would continue under the current management program. Implementation of current natural resources management practices such as erosion and sediment control measures and BMPs would continue to protect water resources.

4.1.4 Marine Resources

Selecting the no action alternative would not change baseline conditions for marine resources due to the continuation of current management practices. The Navy would continue to comply with any relevant regulations prior to implementing an action having the potential to impact these protected resources. Sightings of stranded marine mammals or sea turtles on DNA and CP beaches would also continue to be reported to the Virginia Marine Science Museum's Stranding Center.

4.1.5 Coastal Zone Resources

There would be no change to coastal zone resources under the no action alternative. All projects and actions would continue to be consistent to the maximum extent possible with the Virginia CRMP.

4.1.6 Vegetation

Selecting the no action alternative would not result in adverse impacts to vegetation resources since current management practices would continue. No additional vegetative management actions would be implemented; therefore, benefits from invasive species control, oversight of the regional tree protection and replacement instruction, riparian buffer enhancements, and other habitat enhancement would not be achieved.

4.1.7 Fish and Wildlife

Selecting the no action alternative would not result in adverse impacts to fish and wildlife resources since current management practices would continue. Positive effects would continue through the management of important habitats.

4.1.8 Rare, Threatened, and Endangered Species

Under the no action alternative, there would be no effect to threatened and endangered species since current management practices and abidance of regulations would continue. Prior to any planned disturbance appropriate regulatory agencies would be contacted concerning threatened and endangered species protection.

4.1.9 Cultural Resources

Selecting the no action alternative would not change baseline conditions for cultural resources due to the continuation of current management practices. Protection and management of cultural resources under the no action alternative would continue as a compliance requirement in the natural resources program. Section 106 consultations would be conducted as necessary with the SHPO prior to implementing any ground-disturbing activities.

4.1.10 Air Quality

Implementing the no action alternative would not change the local or regional air quality. There are no stationary pollution sources involved in the current natural resources management programs.

4.1.11 Socioeconomics and Environmental Justice

Implementing the no action alternative would not result in significant impacts to the social or economic resources within the ROI. Under this alternative, natural resources management at DNA and CP would continue to follow existing natural resources management plans and no additional activities would be undertaken. This alternative would not increase regional spending; therefore, there would not be any effects to the employment or income of the ROI.

Additionally, since there would be no new employment opportunities, there would be no changes to the population or demographics due to this alternative. Since there would be no social or economic impacts associated with this alternative, there would be no impacts to minority or low-income populations within the ROI. Therefore, implementing this alternative would not result in environmental justice impacts.

4.2 Alternative 2 – Proposed Action

Selecting the proposed action would implement a broad range of natural resources management activities and practices, which support Navy policy ecosystem management. Adaptive management would be used to assess and improve management practices and help ensure stated objectives are achieved. Baseline conditions would remain unchanged or improve under this alternative.

4.2.1 Land Use

Implementing the proposed action would not result in change to land use, would not impact existing or future land uses in terms of achieving the military mission, and would not affect planned land uses in the regional area. However, benefits to DNA's and CP's ability to sustain military training and other land use by maintaining ecosystem integrity would result by protecting soil and water resources and providing information for future land use management decisions. Delineation of wetlands and other natural resources management actions would provide basic information for planning purposes. Implementing the proposed action would not result in adverse impacts to land use or impact planned land uses in the regional area.

4.2.2 Soil Resources

Implementation of the proposed action would not result in adverse impacts, but would create positive effects on soil resources. Review of erosion and sediment control plans; implementation of dune protection, restoration, and monitoring; and installation of vehicle exclusion fencing would protect soil resources at DNA and CP.

4.2.3 Water Resources

Implementation of the proposed action would result in positive effects on water resources. Under Alternative 2, water resources would continue to be protected in accordance with state and federal water quality and wetlands protection laws. Additional projects that would enhance water quality and protect and enhance wetlands include: conducting basewide wetlands delineation and obtaining jurisdictional determination; obtaining required state and federal wetlands protection permits; developing wetlands mitigation plans as needed; ensuring that wetlands at Southeast Redwing Lake Special Interest Area are not impacted by runoff; and conducting water quality surveys at Sadler Pond. Avoiding development in wetland areas and forest riparian buffers and implementing other BMPs would minimize impacts to water quality and wetlands from sedimentation. In addition, wetlands protection would enhance groundwater recharge, surface water quality, and floodplain protection.

4.2.4 Marine Resources

Positive effects would occur as a result of implementation of the proposed action. As with Alternative 1, the Navy would continue to comply with any relevant regulations prior to implementing an action having the potential to impact these protected resources. Sightings of stranded marine mammals or sea turtles on DNA and CP beaches or in the bay would also continue to be reported to the Virginia Marine Science Museum's Stranding Center. Additionally, nightly beach monitoring for sea turtles and training in the identification of sea turtle tracks and nests will ensure that nests are identified and protected.

4.2.5 Coastal Zone Resources

There would be benefits to coastal zone resources as a result of implementing the proposed action. Proposed management activities that would benefit coastal zone resources include the protection, enhancement, and monitoring of dunes, interdunal swales and their vegetation, vehicle exclusion in significant dune habitats, and maintenance of designated beach access walkways. All projects and actions would be reviewed to ensure consistency with the Virginia CZMP to the maximum extent practicable.

4.2.6 Vegetation Resources

Under the proposed action, there would be overall positive short- and long-term impacts to vegetation resources at DNA and CP. Implementing hardwood control measures in Lovetts Marsh and monitoring and controlling common reed at Redwing Lake and other sites would enhance the integrity of the natural ecological communities. The use of beneficial landscape practices including use of native species in landscaping and the review of development plans to minimize or mitigate the loss of trees would provide benefits to vegetative communities. Using controlled burning to reduce fuel loads and maintaining firebreaks and fire lines will help prevent the occurrence of wildfire that could destroy vegetative communities.

4.2.7 Fish and Wildlife Resources

Implementing the proposed action would result in positive effects on fish and wildlife populations and game and nongame management activities. Because of the high level of development in the region and at DNA and CP, the conservation and enhancement of the remaining natural habitats is important to protecting the bases' wildlife resources. Conservation efforts would focus on maintaining a diversity of habitats that provide year-round food and cover for wildlife. Administering the hunting and fishing programs and reporting deer harvest data to VDGIF would support the game management on the installation.

4.2.8 Rare, Threatened, and Endangered Species

Implementation of the proposed action would have positive effect on federally listed species. All state and federal threatened and endangered species protection laws would continue to be complied with under the proposed action. Because state and federal lists of threatened and endangered species change over time, careful tracking and periodic field surveys are needed to monitor the potential presence of threatened and endangered species. In addition to these

ongoing activities, obtaining an updated rare, threatened, and endangered species survey, would result in positive impacts to these resources.

4.2.9 Cultural Resources

Implementation of the proposed action would result in positive impacts to cultural resources due to the integration of natural resources programs and projects with the cultural resources management plans for DNA and CP. The four archaeological sites that have been identified at DNA that require additional evaluation to determine eligibility for the NRHP would continue to be protected under Alternative 2. Although no structures at CP are eligible for list on the NRHP, it is possible that unknown archaeological resources may be disturbed by ground-disturbing activities. To avoid accidental disturbance, the SHPO would be consulted during the planning of any activity with the potential to impact cultural resources to ensure compliance with applicable laws.

4.2.10 Air Quality

Under the proposed action, impacts to air quality would be the same or slightly greater than the no action alternative. Prescribed burning would be the only activity proposed in the INRMP with the potential to impact air quality. Prescribed fire would be used for the hazardous fuels reduction and wildlife habitat enhancement. Prescribed fires would be implemented in compliance with all applicable laws and regulations related to air quality, including the 1998 EPA Interim Air Quality Policy of Wildland and Prescribed Fires, to minimize air pollutant emissions and prevent deterioration of air quality and NAAQS violations. Potential air quality impacts have been addressed by conducting an applicability analysis and estimating emissions.

Applicability Analysis

The major pollutants from prescribed fires would be PM₁₀, CO, and VOCs. NO_x emissions would be emitted at a relatively low rate and SO_x emissions would be negligible (EPA 1996). To ensure federal actions do not interfere with the state's timely attainment of the NAAQS, the CAA requires that federal agencies demonstrate that their actions in nonattainment and maintenance areas conform to the purposes of the SIP.

Section 93.153 of the General Conformity Rule of the CAA sets the applicability requirements for projects subject to the rule through the establishment of *de minimis* levels for annual criteria pollutant emissions. These *de minimis* levels are set according to criteria pollutant nonattainment area designations. Projects below the *de minimis* threshold are not subject to the rule, while those at or above the levels are required to perform a conformity analysis as established in the rule.

To determine the applicability of the General Conformity Rule to the proposed action, potential emissions were estimated for the ozone precursor pollutants NO_x and VOC. VOC emissions are represented by total hydrocarbon (as methane [CH₄] a primary source of VOC from wildfires). The *de minimis* for marginal nonattainment areas for ozone is 100 tons per year for each ozone precursor pollutant. Emissions from other management activities, such as heavy equipment operation and soil disturbance, were considered to be negligible and

were not included in this analysis. The following assumptions and methodology were used to estimate potential emissions from the proposed action:

7. Emissions factors were based on estimated fuel consumed by wildfires in forests in the southern U.S. (EPA 1996).
8. Emissions were estimated using the following equation, in accordance with EPA procedures for estimating atmospheric emissions from forest fires:

$$E_i = P_iLA$$

Where:

- P_i = yield for pollutant "i" (mass of pollutant/unit mass of forest fuel consumed)
 - = 24 pounds/ton for total hydrocarbon (as CH₄)
 - = 4 pounds/ton as NO_x
- L = fuel loading consumed (average fuel loading for the southern United States is 9 tons/acre [mass forest fuel/unit land area burned])
- A = land area burned
- E = total emissions of pollutant "i" (mass pollutant)

Total estimated emissions for CH₄ and NO_x would be 0.12 tons per acre burned and 0.02 ton per acre burned, respectively. As shown in Figure 4-1, the *de minimis* value of 100 ton per year for CH₄ would be exceeded if controlled burning were conducted on more than 900 acres per year. The *de minimis* value for NO_x would not be exceeded. Under no circumstances would the number of acres burned approach 900 acres and exceed the *de minimis* levels for CH₄ emissions. Therefore, impacts to air quality would not be significant and the General Conformity Rule does not apply to the proposed action. A signed Record of Non-Applicability (RONA) of the General Conformity Rule is in Appendix D.

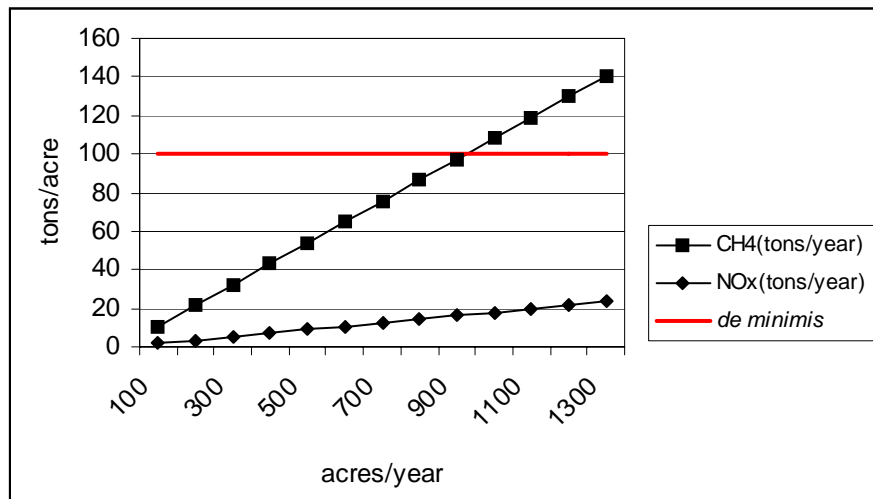


Figure 4-1. Estimated CH₄ and NO₂ Emissions from Prescribed Fire.

4.2.11 Socioeconomics and Environmental Justice

Selecting Alternative 2 would not result in negative impacts to the social or economic resources within the ROI. Under this alternative, DNA and CP would undertake those Navy Level 1 natural resources management activities recommended in the INRMP. Social and economic benefits generated through implementation of this alternative include improved water quality, increased conservation benefits, increased recreational opportunities, and increased conservation awareness through educational programs. Since there would be no adverse social or economic impacts associated with this alternative there would be no adverse impacts to minority or low-income populations within the ROI. Therefore, selecting this alternative would not result in environmental justice impacts.

4.3 Alternative 3 – Enhanced Alternative

Selecting the enhanced alternative would implement all of the projects proposed under the proposed action as well as additional projects not considered compliance or maintenance projects. Like the proposed action, the enhanced alternative would support Navy ecosystem management, as well as environmental stewardship.

4.3.1 Land Use

As with the proposed action, the enhanced alternative would not result in change to land use, would not impact existing or future land uses in terms of achieving the military mission, and would not affect planned land uses in the regional area. The benefits to DNA's and CP's ability to sustain military training and other land use by maintaining ecosystem integrity would be the same as that realized by implementing the proposed action. Under the enhanced alternative, enhancement to current land use would result from the proposed landscaping of the ball fields at Sadler Pond.

4.3.2 Soil Resources

Under the enhanced alternative, all the projects proposed by the proposed action would be carried out and benefits to soil resources would be the same. Additional benefits would result from an additional project, improving vegetative and structural BMPs around the Sadler Pond drainage ditches, which would stabilize banks and reduce soil erosion.

4.3.3 Water Resources

Implementing the enhanced alternative would result in the all of the programs and benefits to water resources described for the proposed action. Additional benefits to water resources would result from the establishment of riparian buffers, and the implementation of BMPs including reduced mowing and no-mowing areas adjacent to drainage ditches and wetlands including Sadler Pond.

4.3.4 Marine Resources

If the enhanced alternative were chosen, the same projects proposed by the proposed action would be carried out and benefits to marine resources would be the same as those resulting from the proposed action.

4.3.5 Coastal Zone Resources

If the enhanced alternative were chosen, the same projects proposed by the proposed action would be carried out and benefits to coastal zone resources would be the same as those resulting from the proposed action.

4.3.6 Vegetation Resources

If the enhanced alternative were chosen, the same projects proposed by the proposed action would be carried out and benefits to vegetation resources would be the same as those resulting from the proposed action.

4.3.7 Fish and Wildlife Resources

Implementing the enhanced alternative would result in all of the programs and benefits to fish and wildlife resources described for the proposed action. Additional benefits to nongame wildlife would be realized from the distribution, maintenance, and monitoring of osprey platforms, bat, bluebird, and wood duck boxes, and education efforts concerning loose pets and feral animals.

4.3.8 Rare, Threatened, and Endangered Species

Implementation of the enhanced alternative would result in the same projects proposed by the proposed action being carried out and the same benefits to threatened and endangered species as those recognized under the proposed action. In addition to those projects proposed by the proposed action, the enhanced alternative proposes consultations with VDCR-DNH on any changes in land use or management practices for special interest areas were contemplated, reducing the risk that future development would have on these resources.

4.3.9 Cultural Resources

Under the enhanced alternative, the same coordination described for the proposed action is proposed. Therefore, the positive impacts to cultural resources would be the same under this alternative.

4.3.10 Air Quality

The impacts to air quality under the enhanced alternative are expected to be the same as those resulting from implementation of the proposed action. None of the additional projects proposed by the enhanced alternative is expected to result in measurable impacts to air quality.

4.3.11 Socioeconomics and Environmental Justice

The impacts to socioeconomics and environmental justice under the enhanced alternative are expected to be the same as those resulting from implementation of the proposed action. None of the additional projects proposed by the enhanced alternative is expected to result in measurable impacts to these resources.

4.4 Cumulative Impacts

Cumulative impacts are the incremental impacts of an action when added to the impacts of other federal or nonfederal past, present, or reasonably foreseeable future actions. Implementing any of the alternatives analyzed in this EA would not result in any negative cumulative impacts to the environment at or in the vicinity of DNA and CP.

In addition to the current management practices conducted at the installation, the proposed action and enhanced action alternatives would implement projects that directly support regional ecosystem management initiatives and would enhance and protect the human and natural environment, including state and federally listed threatened and endangered species. Monitoring programs, annual reviews, and five-year reviews of the INRMP would allow continuous reassessment of management goals and objectives (adaptive management) and would help to avoid undesirable cumulative impacts. Additionally, appropriate NEPA procedures and coordination with stakeholders such as the USFWS and VDGIF would be undertaken for any actions that could result in cumulative impacts.

DNA and CP are two of 22 Navy installations (including annexes and other supporting facilities) in the Mid-Atlantic region. In order to minimize cumulative impacts and conflicts with current and future planned actions on Navy lands, the Navy has developed a Regional Shore Infrastructure Plan (RSIP) (U.S. Navy 2002). The goal of the RSIP is to optimize use of Navy land, facilities, and infrastructure to achieve maximum cost-effectiveness and operational efficiency. The RSIP is a planning process that includes facility programming and site planning. Land use changes, construction, renovations, and other actions resulting from RSIP recommendations would require appropriate NEPA analysis and documentation. No cumulative impacts would result from any foreseeable future actions of the RSIP and implementation of the proposed INRMP.

The proposed INRMP would complement Navy planning efforts and would provide information on sensitive resources and other natural resources issues that must be considered in developing an overall regional vision and land use zones. Regional and base environmental protection and land use planning initiatives consulted during the development of the proposed INRMP that would avoid or minimize cumulative impacts and conflicts in management include:

- Mid-Atlantic RSIP (U.S. Navy 2002);
- Draft Dam Neck and Camp Pendleton Ocean Coast Beach and Dune Assessment Evaluation (VIMS 2004);
- Spill Prevention, Control, and Countermeasures Plan and Oil Discharge Contingency Plan, Naval Air Station Oceana, Dam Neck Annex (U.S. Navy. 2000a); and

- Storm Water Pollution Prevention Plan, Naval Air Station Oceana, Dam Neck Annex, Virginia Beach, Virginia (U.S. Navy 2000b).

4.5 Irreversible and Irrecoverable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (such as energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (such as extinction of a threatened or endangered species or the disturbance of a cultural resources site).

For the preferred and enhanced alternatives, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term and temporary, or longer lasting but negligible. Implementation of the proposed action would, however, require the use of energy for natural resources management activities. This energy would be in the form of fossil fuels and labor and would be used as these activities continue.

5.0 COORDINATION AND PUBLIC INVOLVEMENT

In accordance with the SAIA, DNA and CP have worked cooperatively with the USFWS and VDGIF to ensure that the INRMP reflects the mutual agreement of these agencies concerning the conservation, protection, and management of fish and wildlife resources on the installations. Copies of the Draft INRMP were provided to these agencies for review. All comments were considered in the preparation of the final INRMP, and letters of mutual agreement from each agency were obtained (Appendix D).

To facilitate public involvement, also required by the SAIA, a copy of the Draft INRMP was placed in the Virginia Beach Public Library, Central Library Branch for one month and a notice announcing its availability was published in *The Virginian-Pilot* newspaper for three days (see Appendix D). No comments were received from the public.

The following persons and agencies were consulted in preparation of the INRMP:

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APPENDIX A
Applicable Laws and Regulations

Navy Instructions and Policies Related to Natural Resources

OPNAVINST P80.3-Airfield Safety

OPNAVINST 5090.1B CH 3- Environmental Natural Resources Program Manual

OPNAVINST 6250.4A -Pest Management Program

DoD Publications Related to Natural Resources

DoD Directive 4150.7-Pest Management

DoD Directive 4165.59-DoD Implementation of the Coastal Zone Management Program

DoD Instruction 4715.3-Environmental Conservation Program, 3 May 1996

DoD Instruction 4715.9-Environmental Planning and Analysis, 3 May 1996

EOs Related to Natural and Cultural Resources Management

EO 11593-Protection and Enhancement of the Cultural Environment, 13 May 1971

EO 11644-Use of Off-Road Vehicles on the Public Lands, 8 Feb 1972

EO 11988-Floodplain Management, 24 May 1977

EO 11989-Off-Road Vehicles on Public Lands, 24 May 1977

EO 11990-Protection of Wetlands, 24 May 1977

EO 12777-Implementation of the Federal Water Pollution Control Act and Oil Pollution Act, 18 Oct 1991

EO 12898-Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 11 Feb 1994

EO 12962-Recreational Fisheries, 7 Jun 1995

EO 13112-Invasive Species, 3 Feb 1999

EO 13148-Greening the Government, 14 Sep 1998

Federal Statutes Related to Natural and Cultural Resources Management

American Indian Religious Freedom Act of 1978 (42 USC § 1996)

Antiquities Act of 1906 (16 USC § 431-433)

Animal Damage Control Act of 1931 (7 USC § 426-426b)

Archaeological Resources Protection Act of 1979 (16 USC § 470aa-470mm)

Bald and Golden Eagle Protection Act of 1940 (16 USC § 668 et seq.)

Endangered Species Act of 1973, as amended (16 USC § 1531-1544)

Farmland Protection Policy Act of 1994 (7 USC § 4201 et seq.)

Federal Facilities Compliance Act of 1992 (42 USC § 6901 et seq.)

Federal Environmental Pesticide Control Act of 1972, as amended (USC 136-136y)
Federal Land Policy and Management Act of 1976 (43 USC § 1701)
Federal Noxious Weed Act of 1974 (7 USC § 2809 et seq.)
Federal Water Pollution Control Act of 1947 (Clean Water Act) as amended (33 USC § 1251-1376)
Fish and Wildlife Conservation Act of 1980 (16 USC § 2901 et seq.)
Fish and Wildlife Coordination Act of 1934, as amended (16 USC § 661 et seq.)
Forest and Rangeland Renewable Resources Planning Act of 1974 (16 USC § 1601 et seq.)
Lacey Act of 1900 (16 USC § 701; 31 Stat. 187, 32 Stat. 285)
Migratory Bird Treaty Act of 1918 (16 USC § 703)
Multiple Use Sustained Yield Act of 1960 (16 USC §528 et seq.)
National Environmental Policy Act of 1969 (42 USC § 4321 et seq.)
National Forest Management Act of 1976 (16 USC § 1600 et seq.)
National Historic Preservation Act of 1996, as amended through 1992 (16 USC § 470 et seq.)
Rivers and Harbors Act of 1899 (33 USC § 401 et seq.)
Safe Drinking Water Act of 1974, as amended (42 USC § 201 et seq.)
Sikes Act Improvement Act of 1997 (16 USC §670 a-f)
Soil and Water Resources Conservation Act of 1977, as amended (16 USC §2001)
Military Construction Authorization Act (Timber Sales on Military Lands) (10 USC § 2665)
Wilderness Act of 1964 (16 USC § 1131-1136; 78 Stat. 890)

APPENDIX B
Project Summary Table

DNA and CP Natural Resources Implementation Schedule (2005-2009).

Project #	Project Description	INRMP Page Ref.	Implementation Schedule (FY)	Prime Legal Driver/ Initiative¹	Class²	Navy Level³	NEPA	CCD
Coastal Zone Protection								
1	Review base plans and proposed actions to ensure consistency with the Virginia CZMP and help obtain a coastal zone consistency determination.	4-8, 4-13 5-1, 5-5	As needed	H	0	1	No	No
Wetlands/Water Quality Protection								
2	Conduct basewide wetlands mapping.	4-3, 4-6	2006	G, K, L, Q	II	1	No	No
3	Obtain USACE jurisdictional determinations as required.	4-3, 4-6	As needed	G, K, L, Q	II	1	No	No
4	Coordinate with the ROICC to identify additional areas to enhance or establish riparian buffers.	4-3, 4-6	2006	K, Q	III	2	No	No
5	Establish reduced mowing and no mowing zones along identified ditches and wetlands, and plant appropriate native trees and shrubs where practicable.	4-3, 4-6	2006	K, Q	III	2	No	No
6	Maintain a no mowing zone around the perimeter of Sadler Pond to reduce bank erosion and improve water quality.	4-4, 4-7	Ongoing	K, Q	III	2	No	No
7	Coordinate with the ROICC and establish improved vegetative and structural BMPs in and around the drainage ditches that drain into Sadler Pond.	4-5, 4-7	2005	G, I, K, Q	III	2	No	No
8	Review sedimentation control plans for disturbances > 10,000 square feet and SWP3s for disturbances > than 1 acre.	4-3, 5-3	Ongoing	G, I, K, Q	0	1	Yes	Yes
9	Assist action proponents in applying for, reviewing, and obtaining required state and federal wetlands protection permits.	4-3, 5-3	Ongoing	G, H, I, K, Q	0	1	Yes	Yes
10	Develop site-specific plans on an as-needed basis for wetland mitigation sites on the fallow agricultural fields in the south outparcel.	4-8	Recurring	G, K	II	1	Yes	Yes

DNA and CP Natural Resources Implementation Schedule (2005-2009) (cont'd).

Project #	Project Description	INRMP Page Ref.	Implementation Schedule (FY)	Prime Legal Driver/ Initiative¹	Class²	Navy Level³	NEPA	CCD
11	Reassess conditions in the Southeast Redwing Lake Wetlands Special Interest Area to determine if sewage and runoff are impacting the wetlands. Work with PWC personnel to correct the issue, if necessary	4-9	2005	G, K	II	1	No	No
12	Contact the Norfolk District USACE to pursue obtaining mitigation credit for removal of pine in swale wetlands in the Interdunal Swale, Dune, and Freshwater Marsh Special Interest Area	4-9	2005	G, K	III	4	No	No
13	Monitor the Lovetts Marsh wetland mitigation site, and implement additional hardwood control and water level manipulations as required to achieve restoration goals.	5-3	Annual	G, K	I	1	No	No
Rare, Threatened, and Endangered Species Protection								
14	Restrict use of special interest areas to protect state and federal rare species and significant habitats.	4-15, 5-5	Ongoing	A, B, C, F	0	1	No	No
15	Arrange a consultation with the VDCR-DNH if changes in land use or management practices for special interest areas are contemplated	4-13	As Needed	A, B, C, F	III	2	No	No
16	Schedule an update to the rare, threatened, and endangered species and significant natural communities survey..	4-13, 5-5	2006	A, B, C, F	II	1	No	No
17	Conduct nightly beach monitoring from mid-May through mid-August following the sea turtle monitoring protocol (Appendix E).	4-13, 5-5	Annual	F, T	0	1	No	No
18	Provide annual sea turtle track and nest identification training and assist in the identification of marine resources as needed.	4-14, 5-5	Recurring	F, T	0	1	No	No
Marine Resources Protection								
19	Coordinate with and obtain the required permits from the state and federal agencies for any installation activities with potential to impact marine resources.	4-14, 5-5	Recurring	F, H, T	0	1	Yes	Yes

DNA and CP Natural Resources Implementation Schedule (2005-2009) (cont'd).

Project #	Project Description	INRMP Page Ref.	Implementation Schedule (FY)	Prime Legal Driver/ Initiative¹	Class²	Navy Level³	NEPA	CCD
20	Maintain a database of all strandings that occur on DNA and CP.	4-14, 5-5	Ongoing	F, T	0	1	No	No
21	Ensure any sea turtle and marine mammal strandings are reported to the Virginia Marine Science Museum's Stranding Center.	4-14, 5-5	Ongoing	F, T	0	1	No	No
Habitat Conservation and Restoration								
22	Implement dune protection and restoration measures including installing fencing, posting informational signs, and planting beach grasses.	4-14, 5-5	Recurring	A, B, C, H	II	1	No	No
23	Initiate a long-term monitoring plan to assess the effectiveness of dune protection efforts.	4-14, 5-5	2005	A, B, C, H	II	1	No	No
24	Install vehicle exclusion fencing and use signage to protect interdunal swale wetlands.	4-13	As Needed	A, G, H, O	II	1	No	No
25	Monitor interdunal swale wetlands for impacts from training and off road vehicles.	4-13	Recurring	A, G, H, O	0	1	No	No
26	Conduct periodic inspections and repairs on the beach access walkways to ensure safety and utilization.	4-15	Recurring	H	II	1	No	No
27	Maintain vegetation within portions of the north and south outparcels through a combination of mowing and controlled burning to provide a variety of grassland and scrub shrub habitats.	4-10	Annual	A, B, C	III	2	No	No
Shade Tree and Urban Forest Management								
28	Review all development plans and actions where tree removal is proposed and provide recommendations for tree protection, mitigation for lost trees, or selection of alternate sites.	4-4	Ongoing	C, P, S	0	1	No	No
29	Promote the use of beneficial landscaping practices and the importance of using native species in landscaping.	4-4	Ongoing	C, P, S	0	1	No	No

DNA and CP Natural Resources Implementation Schedule (2005-2009) (cont'd).

Project #	Project Description	INRMP Page Ref.	Implementation Schedule (FY)	Prime Legal Driver/ Initiative¹	Class²	Navy Level³	NEPA	CCD
	Develop and implement landscaping plans for:	4-3						
30	Picnic area and ball fields at Sadler Pond		2006	A, C, P, S	III	2	No	No
31	Parking lot at Shifting Sands Club		2007	A, C, P, S	III	2	No	No
32	Parking lot on Regulus Ave. across from Build. 127.		2008	A, C, P, S	III	2	No	No
33	Coordinate with VDOF to provide pruning and tree care instruction for the ROICC, Disaster Preparation Team, and others concerned with tree care. Provide training sessions on an as-needed basis.	4-4	Recurring	C, P, S	0	1	No	No
34	Assist with identifying and removing hazard trees.	4-4	Ongoing	A, C, P, S	0	1	No	No
Forest Management								
35	Coordinate with the regional forester to assess the impacts of any proposed MILCON projects on forestlands and, where practicable, arrange timber sales.	4-9	Ongoing	A, B, C	0	1	Yes	Yes
36	Coordinate timber harvesting or salvage operations with the regional forester.	4-9	Recurring	A, B, C	0	1	Yes	Yes
37	Monitor forest stands to control southern pine beetle and other insect and disease outbreaks.	4-9	Recurring	A, B, C, E	0	1	No	No
Prescribed Fire								
38	Implement controlled burning to reduce fuel loads and enhance wildlife habitat in accordance with the NAS Oceana controlled burn plan.	4-9	Recurring	A, B, C, E	0	1	No	No
39	Update the NAS Oceana controlled burn plan annually to reflect accomplishments and set new goals.	4-9	Annual	A, B, C, E	0	1	No	No
40	Maintain the firebreaks and fire lines for each burn unit as needed.	4-9	Recurring	A, B, C, E	0	1	No	No
Fish and Wildlife Management								
41	Administer base hunting and fishing program.	4-10	Annual	A, B, C, E	0	1	No	No

DNA and CP Natural Resources Implementation Schedule (2005-2009) (cont'd).

Project #	Project Description	INRMP Page Ref.	Implementation Schedule (FY)	Prime Legal Driver/ Initiative¹	Class²	Navy Level³	NEPA	CCD
42	Develop and implement a redistribution plan for wood duck boxes. GPS new locations and correct the GIS data layer for nest box locations and update the nest box data log.	4-10, 5-3	2006	A, B, C, E	III	2	No	No
43	Conduct annual inspections and maintenance of bluebird, bat, and wood duck boxes and osprey platforms.	4-10	Annual	A, B, C, D, E	III	2	No	No
44	Monitor nesting activity at osprey nesting platforms and bluebird nest boxes throughout the nesting season.	4-10	Annual	A, B, C, D, E	III	2	No	No
45	Conduct water quality surveys at Sadler Pond to assess the effectiveness of management activities.	4-5	Recurring	A, B, C, N	III	2	No	No
46	Collect, summarize, and report deer harvest data to VDGIF to help assess deer population levels and herd condition.	4-10	Annual	A, B, C, E	0	1	No	No
Outdoor Recreation and Environmental Awareness								
47	Assist the Regional Outreach Specialist with the National Arbor Day Foundation's Tree City USA program.	4-4	Annual	A, B, C	III	2	No	No
48	Submit a recertification application, forest workplan, and proclamation in support of Arbor Day to the VDOF by Dec. 31 each year.	4-4	Annual	A, B, C	III	2	No	No
49	Assist the Regional Outreach Specialist with annual Arbor Day and Earth Day celebration events.	4-4	Annual	A, B, C	III	2	No	No
Pest/Invasive Species Control								
50	Coordinate common reed control and monitor in areas identified in regional control plan.	4-11	Annual	M	II	1	Done	Yes
51	Monitor the Redwing Lake mitigation site and MACS 24 wetland mitigation site for potential problems and infestations of common reed.	4-11	Recurring	M	II	1	No	No

DNA and CP Natural Resources Implementation Schedule (2005-2009) (cont'd).

Project #	Project Description	INRMP Page Ref.	Implementation Schedule (FY)	Prime Legal Driver/ Initiative¹	Class²	Navy Level³	NEPA	CCD
52	Assist with the removal of miscellaneous nuisance wildlife in the administrative and housing areas.	4-5	Recurring	A, B, C	0	1	No	No
53	Assist in educating base personnel about the impacts and health risks of loose pets and feral animals.	4-6	Recurring	A, B, C, R	III	2	No	No
54	Purchase large cage for animal transport.	3-36	2005	R	0	1	No	No
Cultural Resources Protection								
55	Consult with the SHPO during the planning process of activities with potential to impact cultural resources.	4-6	Ongoing	A, B, C, U	0	1	No	No
Training/Professional Development							No	No
56	Attend annual law enforcement refresher courses.	4-11	Annual	A, B, C	0	1	No	No
57	Attend basic ArcView and product update training.	1-12	As needed	A, B, C	0	1	No	No
58	Attend wetlands delineation and regulatory training.	3-3	As needed	A, B, C, G	0	1	No	No
59	Attend marine mammal stranding training.	1-9	As needed	A, B, C, T	0	1	No	No
60	Attend invasive species control workshop.	3-36	As needed	A, B, C, M	0	1	No	No
61	Attend coastal ecology and shoreline stabilization workshop.	3-16	As needed	A, B, C	0	1	No	No
62	Develop a 5-year update to the INRMP	7-1	2008	A, B, C, E	II	1	No	No

¹Legal Drivers and Initiatives:

A OPNAVINST 5090.1B

B DoDI 4715.3, Environmental Conservation Program

C 32 CFR 190, Natural Resources Management Program

D Migratory Bird Treaty Act

E Sikes Act Amendment Act

F Endangered Species Act

G Clean Water Act

H Coastal Zone Management Act

I Soil and Water Conservation Act

J National Environmental Policy Act

K Executive Order 11990, Protection of Wetlands

L Executive Order 11988, Floodplain Management

M Executive Order 13112, Invasive Species

N Executive Order 12962, Recreational Fisheries

O Executive Order 11989, Use of Off-Road Vehicles on the Public Lands

P Executive Order 13148, Greening the Government through Leadership in Environmental Management

Q Southern Watershed Areas requirement

R CNO Guidance of Feral Cats and Dogs

S Draft Regional Tree Preservation and Replacement Instruction

T Marine Mammal Protection Act

U National Historic Preservation Act

³ Class 0: recurring staff costs; Class I: current compliance; Class II: maintenance requirements; Class III: enhancement actions beyond compliance

³ Navy Assessment Level: Level 1 = legal requirement; Level 2 = Navy policy; Level 3 = pending regulation; Level 4 = future requirement; Level 5 = leadership initiative

APPENDIX C
Record of Non-Applicability

RECORD OF NON-APPLICABILITY
IN ACCORDANCE WITH THE
CLEAN AIR ACT - GENERAL CONFORMITY RULE
FOR
IMPLEMENTATION of the INTEGRATED NATURAL RESOURCE MANAGEMENT PLAN
(INRMP)
AT
NAVAL AIR STATION OCEANA, DAM NECK ANNEX and CAMP PENDLETON,
VIRGINIA

August 15 2006

The Clean Air Act (CAA) requires federal actions in air pollutant non-attainment or maintenance areas to conform to an applicable State Implementation Plan (SIP). The SIP is designed to achieve or maintain an attainment designation of air pollutants as defined by the National Ambient Air Quality Standards (NAAQS). The regulations governing this requirement are found in 40 CFR Parts 51 and 93, also known as the "General Conformity Rule". The subject facilities are located in the Hampton Roads Intrastate Air Quality Control Region in Virginia, which is currently under a maintenance plan for the control of ozone through the control of the ozone precursor compounds: Nitrogen oxides (NO_x) and Volatile Organic Compounds (VOCs). As a result, the proposed action must comply with the requirements of the General Conformity Rule.

The Navy proposes to develop and implement an INRMP consistent with the military use of the property and the goals and objectives established in the SAIA. The goal of the INRMP is to implement an ecosystem-based natural resources program that provides for conservation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations.

Provisions in the CAA regulations (40 CFR Sect 51.853(c)(1)) allow for exemptions from performing a conformity determination if total emissions of individual non-attainment or maintenance area pollutants resulting from the action fall below specific threshold values (i.e., *de minimis* levels). As demonstrated by the information in Figure 1, the change in the levels of NO_x and VOCs caused by this proposed action do not exceed the *de minimis* levels of 100 tons per year for each. Therefore, the action is exempt from requirements of the General Conformity Rule.

To the best of my knowledge, the information provided is correct and accurate and I concur in the finding that the proposed implementation of the INRMP will conform to the SIP.

Approved by

Sean Hare
Dir Tech Support Dept

21 Aug 06
Date

**IMPLEMENTATION of the INTEGRATED NATURAL RESOURCE MANAGEMENT PLAN
(INRMP)**

AT

**NAVAL AIR STATION OCEANA, DAM NECK ANNEX and CAMP PENDLETON,
VIRGINIA**

Applicability Analysis

To determine the applicability of the General Conformity Rule to the proposed action, potential emissions were estimated for actions related to prescribed burning, for the ozone precursor pollutants NO_x and VOC. VOC emissions are represented by total hydrocarbon (as methane [CH_4] a primary source of VOC from wildfires). The *de minimis* for marginal nonattainment areas for ozone is 100 tons per year for each ozone precursor pollutant. Emissions from other management activities, such as heavy equipment operation and soil disturbance, were considered to be negligible and were not included in this analysis. The following assumptions and methodology were used to estimate potential emissions from the proposed action:

Assumptions:

- Emissions factors were based on estimated fuel consumed by wildfires in forests in the southern U.S. (EPA 1996).
- Emissions were estimated using the following equation, in accordance with EPA procedures for estimating atmospheric emissions from forest fires:

$$E_i = P_i LA$$

Where:

P_i = yield for pollutant "i" (mass of pollutant/unit mass of forest fuel consumed)
= 24 pounds/ton for total hydrocarbon (as CH_4)
= 4 pounds/ton as NO_x

L = fuel loading consumed (average fuel loading for the southern United States is 9 tons/acre [mass forest fuel/unit land area burned])

A = land area burned

E = total emissions of pollutant "i" (mass pollutant)

Summary:

Total estimated emissions for CH₄ and NO_x would be 0.12 tons per acre burned and 0.02 ton per acre burned, respectively. As shown in Figure 1, the *de minimis* value of 100 tons per year for CH₄ would be exceeded if controlled burning were conducted on more than 900 acres per year. The *de minimis* value for NO_x would not be exceeded. Under no circumstances would the number of acres burned approach 900 acres and exceed the *de minimis* levels for CH₄ emissions. Therefore, impacts to air quality would not be significant and the General Conformity Rule would not apply to the proposed action.

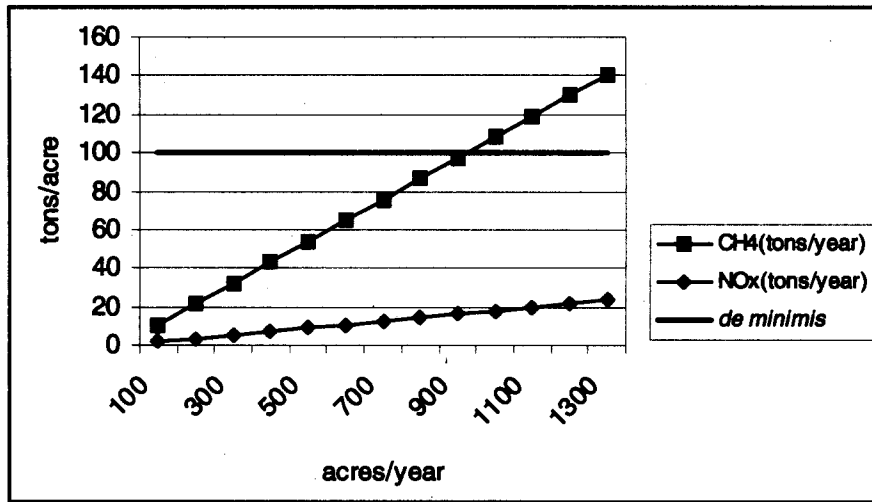


Figure 1 . Estimated CH₄ and NO_x Emissions from Prescribed Fire.

APPENDIX D

State and Federal Agency Coordination and Public Notification



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
6669 Short Lane
Gloucester, VA 23061



September 10, 2004

Mr. Brian Hostetter
Regional Natural Resources Manager
Regional Environmental Group
U.S. Navy
1450 Gator Boulevard
Norfolk, Virginia 23521

Re: Integrated Natural Resources
Management Plan, Naval Air Station
Oceana, Dam Neck Annex and
Naval Amphibious Base, Little
Creek, Camp Pendleton Annex, City
of Virginia Beach, Virginia

Dear Mr. Hostetter:

The U.S. Fish and Wildlife Service (Service) received your Draft Integrated Natural Resources Management Plan (INRMP) for Naval Air Station Oceana, Dam Neck Annex and Naval Amphibious Base, Little Creek, Camp Pendleton Annex, City of Virginia Beach, Virginia. The following comments are provided under provisions of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) and the Fish and Wildlife Coordination Act of 1958 (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*).

The Virginia Field Office (VAFO) and the Gloucester Fishery Resources Office (GFRO) have reviewed the INRMP and provide the following comments.

- 1) The Service considers sea turtle nesting season in Virginia to run from May 15 to August 31. Please make changes to pages 3-10, 4-13, and 5-5.
- 2) Page 3-10: The citation, Mayne 2003, is a concurrence letter, not a Biological Opinion. Biological Opinions are submitted when there is an adverse effect to a federally listed species. They typically provide an incidental take statement. The concurrence letter is the Service's statement that a proposed action is not likely to adversely affect federally listed species.

Mr. Hostetter

Page 2

Please make the changes, submit the final INRMP to this office, and we will forward it to our Regional Office in Hadley, Massachusetts for signature. The Service appreciates this opportunity to work with the U.S. Navy. The point of contact is Mr. Eric Davis (VAFO) at (804) 693-6694, extension 104.

Sincerely,

A handwritten signature in cursive script that reads "Karen L. Mayne".

Karen L. Mayne
Supervisor
Virginia Field Office

cc: VDGIF, Richmond, VA (Andy Zadnik)
VDCR, DNH, Richmond, VA (René Hypes)



11846 Rock Landing Dr., Suite C Newport News, VA 23606

ph: 757.873.3702 fax: 757.873.3703

www.geo-marine.com

September 22, 2004

Ms Karen Mayne, Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services
6669 Short Lane
Gloucester, VA 23061

Dear Ms Mayne:

Thank you for your comments on the Draft Integrated Natural Resources Management Plan (INRMP) for Naval Air Station Oceana, Dam Neck Annex and Camp Pendleton dated September 10, 2004. Your comments are appreciated and were incorporated into the Final INRMP. Please note that subsequent to issuing the Draft INRMP, NAS Oceana assumed command of Camp Pendleton. Minor edits were made to the document to reflect this change. Included are the document title and references to NAVPHIBASE Little Creek in Section 1.2, page 1-1 and Section 1.5.2, page 1-5.

As requested, I am enclosing a Final INRMP for you to forward to your regional office for final concurrence. If you have any questions, please contact Mr. Brian Hostetter (757) 462-8564 ext. 391. Please send the final letter of concurrence to:

Mr. Brian Hostetter
Regional Natural Resources Manager
Regional Environmental Group Little Creek
1450 Gator Blvd.
Norfolk, VA 23521

Sincerely,

Meegan Wallace
Environmental Project Manager
Geo-Marine, Inc.
mwallace@geo-marine.com

Encl: Final Integrated Natural Resources Management Plan, Naval Air Station Oceana, Dam Neck Annex and Camp Pendleton (1 copy)



United States Department of the Interior



FISH AND WILDLIFE SERVICE

300 Westgate Center Drive
Hadley, MA 01035-9589

In Reply Please Refer To:
FWS/Region 5/ES

FEB 10 2005

Ms. Meegan Wallace
Environmental Project Manager
Geo Marine Inc.
11846 Rock Landing Drive, Suite C
Newport News, Virginia 23606

Dear Ms. Wallace:

We have received your final Integrated Natural Resources Management Plan (Plan) for the Naval Air Station Oceana, Dam Neck Annex, and the Naval Air Station Oceana, South Virginia, Beach Annex (Camp Pendleton), Virginia Beach, Virginia. Our Virginia Ecological Services Field Office (VAFO) has consulted with you on this Plan based on the provisions of the Sikes Act (16 U.S.C. 670 et seq.).

Based on the VAFO's concurrence with this Plan, please accept this letter as confirmation of the U.S. Fish and Wildlife Service's approval of this Plan. If you have any questions, please contact Karen Mayne, Project Leader, VAFO, at 804-693-6694.

Sincerely,

Marvin E. Moriarty
Regional Director



COMMONWEALTH of VIRGINIA

W. Taylor Murphy, Jr.
Secretary of Natural Resources

Department of Game and Inland Fisheries

William L. Woodfin, Jr.
Director

August 17, 2004

Brian Hostetter
Regional Natural Resources Manager
Regional Environmental Group
1450 Gator Blvd.
Norfolk, VA 23521

RE: Naval Air Station Oceana, Dam Neck Annex
Naval Amphibious Base Little Creek, Camp
Pendleton Annex – Virginia Beach, Virginia
Draft Integrated Natural Resources Management Plan
ESSLOG# 19789

Dear Mr. Hostetter:

We have reviewed the above referenced draft Integrated Natural Resource Management Plan (INRMP) and offer the following comments. The Department of Game and Inland Fisheries (VDGIF), as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over those resources, inclusive of state or federally endangered or threatened species, but excluding listed insects. We are a consulting agency under the U.S. Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and we provide environmental analysis of projects or permit applications coordinated through the Virginia Department of Environmental Quality, the Virginia Marine Resources Commission, the Virginia Department of Transportation, the U. S. Army Corps of Engineers, the Federal Energy Regulatory Commission, and other state or federal agencies. Our role in these procedures is to determine likely impacts upon fish and wildlife resources and habitats, and to recommend appropriate measures to avoid, reduce, or compensate for those impacts.

The draft INRMP sufficiently addresses issues that relate to the operation of the Naval Air Station Oceana, Dam Neck Annex and Naval Amphibious Base Little Creek, Camp Pendleton Annex to minimize conflicts between facility operations and natural resources in the project area. The draft INRMP addresses the habitat needs and management of wildlife populations in the project area and we generally support the plan of action described in this document. We offer the following comments and recommendations related primarily to habitat management.

We support all efforts to protect wetlands and water quality through the establishment and maintenance of riparian buffer zones. This includes establishing "No Mowing" areas and introducing native trees and shrubs to improve diversity and habitat value. We recommend undisturbed vegetated buffer zones of at least 100 - 300 feet in width around all wetlands.

Brian Hostetter
ESSLOG 19789
Page 2

We support the establishment of warm season grasses where practicable. This management strategy is beneficial to a large number of grassland species. We recommend mowing these areas in late summer and implementing prescribed burns in late winter or early spring to maximize habitat value for wildlife while avoiding the breeding season for most grassland species.

We support all efforts to restore wetlands on-post. As described, this could be accomplished by plugging drainage ditches to restore hydrology, as well as by planting appropriate wetland vegetation. We generally do not support proposals to create wetlands by excavating upland areas.

We support the placement, annual monitoring, and maintenance of artificial nesting and roosting structures in areas containing appropriate habitat.

We support all efforts to control exotic invasive species, particularly common reed.

We support the continued program to monitor sea turtle and marine mammal activities. This includes conducting nightly beach monitoring during the sea turtle nesting season, providing sea turtle track and nest identification training coordinated through VDGIF, and reporting any strandings to the Virginia Marine Science Museum's Stranding Center.

Thank you for the opportunity to comment on this draft INRMP. Please call Andrew Zadnik or me at (804) 367-6913 if we may be of further assistance.

Sincerely,



For Raymond T. Fernald, Manager
Nongame and Environmental Programs



11846 Rock Landing Dr., Suite C Newport News, VA 23606

ph: 757.873.3702 fax: 757.873.3703

www.geo-marine.com

September 22, 2004

Mr. Raymond T. Fernald, Manager
Nongame and Environmental Programs
Virginia Department of Game and Inland Fisheries
4010 West Broad Street
P.O. Box 11104
Richmond, Virginia 23230-1104

Dear Mr. Fernald:

Thank you for your comments and support of the Draft Integrated Natural Resources Management Plan (INRMP) for Naval Air Station Oceana, Dam Neck Annex and Camp Pendleton dated August 17, 2004. Your comments are appreciated. Please note that subsequent to issuing the Draft INRMP, NAS Oceana assumed command of Camp Pendleton. Minor edits were made to the document to reflect this change. Included are the document title and references to NAVPHIBASE Little Creek in Section 1.2, page 1-1 and Section 1.5.2, page 1-5.

On behalf of the Navy, I have enclosed a copy of the Final INRMP for your office. The Navy requests the Division's concurrence with the Final INRMP via a signed letter. If you have any questions, please contact Mr. Brian Hostetter (757) 462-8564 ext. 391. Please send the final letter of concurrence to:

Mr. Brian Hostetter
Regional Natural Resources Manager
Regional Environmental Group Little Creek
1450 Gator Blvd.
Norfolk, VA 23521

Sincerely,

Meegan Wallace
Environmental Project Manager
Geo-Marine, Inc.
mwallace@geo-marine.com

Encl: Final Integrated Natural Resources Management Plan, Naval Air Station Oceana, Dam Neck Annex and Camp Pendleton (1 copy)



COMMONWEALTH of VIRGINIA

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Department of Game and Inland Fisheries

William L. Woodfin, Jr.
Director

December 20, 2004

Meegan Wallace
Geo-Marine Inc.
11846 Rock Landing Drive, Suite C
Newport News, VA 23606

RE: Naval Air Station Oceana, Dam Neck Annex
South Virginia Beach Annex (Camp Pendleton)
Integrated Natural Resources Management Plan
ESSLOG# 19789

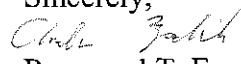
Dear Ms Wallace:

This letter is to serve as the Virginia Department of Game and Inland Fisheries' (VDGIF) letter of concurrence for the Integrated Natural Resources Management Plan (INRMP) for the above referenced Navy installations. The VDGIF, as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over those resources, inclusive of state or federally endangered or threatened species, but excluding listed insects. We are a consulting agency under the U. S. Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and we provide environmental analysis of projects or permit applications coordinated through the Virginia Department of Environmental Quality, the Virginia Marine Resources Commission, the Virginia Department of Transportation, the U. S. Army Corps of Engineers, the Federal Energy Regulatory Commission, and other state or federal agencies. Our role in these procedures is to determine likely impacts upon fish and wildlife resources and habitats, and to recommend appropriate measures to avoid, reduce, or compensate for those impacts.

This INRMP sufficiently addresses issues that relate to the operation of the Naval Air Station Oceana, Dam Neck Annex and South Virginia Beach Annex (Camp Pendleton) to minimize conflicts between facility operations and natural resources in the project area. The INRMP addresses the habitat needs and management of wildlife populations in the project area and we generally support the plan of action described in this document.

Thank you for the opportunity to comment on this INRMP. Please call Andrew Zadnik or me at (804) 367-6913 if we may be of further assistance.

Sincerely,


Raymond T. Fernald, Manager
Nongame and Environmental Programs

July 28, 2004

Dear Librarian:

The Department of the Navy is seeking public comment on the enclosed Integrated Natural Resources Management Plan for NAS Oceana, Dam Neck Annex and Naval Amphibious Base Little Creek, South Virginia Beach Annex. We respectfully request that you make this plan available to the public for their review. The public is encouraged to send written comments to the address shown in the following Public Notice (as published in the Virginian Pilot), by September 7th, 2004. After September 7th, you may return the plan to the address shown in the Public Notice or discard the plan.

Public Notice

The Department of the Navy is seeking public comment on the Integrated Natural Resources Management Plan (INRMP) for NAS Oceana, Dam Neck Annex and NAB Little Creek, Camp Pendleton Annex. Under the authority of the Sikes Act (16 USC Section 670a), the Department of Defense is required to prepare an INRMP for the conservation and rehabilitation of natural resources on military installations. A draft INRMP has been prepared for Dam Neck and Little Creek Annex, and is available for public review and comment at the Virginia Beach Public Library, Central Library Branch, 4100 Virginia Beach Boulevard.

Written comments must be post-marked by September 7th 2004. Mail comments to Mr. Brian Hostetter, Regional Natural Resources Specialist, 1450 Gator Blvd. Norfolk, VA 23521.

Encl: Draft Integrated Natural Resources Management Plan for NAS Oceana, Dam Neck Annex and NAB Little Creek, Camp Pendleton Annex (1 copy)

THE VIRGINIAN-PILOT
NORFOLK, VIRGINIA
AFFIDAVIT OF PUBLICATION

The Virginian-Pilot

GEO-MARINE, INC.
STE. C
11846 ROCK LANDING DR
NEWPORT NEWS VA 23606

REFERENCE: 39060831
11770096 PUBLIC NOTICE

State of Virginia
City of Norfolk

This day, D. Johnson personally appeared before me
and after being duly sworn, made oath that:

1) She is affidavit clerk of The Virginian-Pilot,
a newspaper published by Landmark Communications
Inc., in the cities of Norfolk, Portsmouth,
Chesapeake, Suffolk, and Virginia Beach, Common-
wealth of Virginia and in the state of North
Carolina 2) That the advertisement hereto annexed
has been published in said newspaper on the date
stated.

PUBLISHED ON: 08/01 08/02 08/03

TOTAL COST: 317.23 AD SPACE: 30 LINE
FILED ON: 08/06/04

Legal Affiant: D. Johnson

Subscribed and sworn to before me in my city and state on the day and year
aforesaid this 9 day of August.

Notary: [Signature] My commission expires January 31, 2008

Public Notice
The Department of the Navy is seeking public comment on the Integrated Natural Resources Management Plan (INRMP) for NAS Oceana, Dam Neck Annex and H4E Little Creek, Camp Pendleton Annex. Under the authority of the Site Act (16 USC Section 670a), the Department of Defense is required to prepare an INRMP for the conservation and rehabilitation of natural resources on military installations. A draft INRMP has been prepared for Dam Neck and Little Creek Annex, and is available for public review and comment at the Virginia Beach Public Library, Central Library Branch, 4100 Virginia Beach Boulevard. Written comments must be postmarked by September 7th 2004. Mail comments to Mr. Brian Hottel, Regional Natural Resources Specialist, 1450 Colonel John S. Cochran Blvd., Norfolk, VA 23504. VI Aug 12, 2004 11770096

DNA/CPA INRMP

Enclosure 2. Project Planning Environmental Checklist

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NAVFAC ENVIRONMENTAL CHECKLIST – ALL INSTALLATIONS

This Environmental Checklist (EC) is utilized to determine the environmental requirements associated with a proposed project. Complete this form and attach a site map. Then forward it to the NAVFAC Environmental Planning Program. The Environmental Department will respond within 2 weeks. Type responses in the **GRAY** boxes (as seen in Microsoft Word).

GENERAL PROJECT INFORMATION

1	Activity Requesting:	
2	Activity POC / Phone / email:	
3	Name of Project:	
4	Project Number (if any):	
5	Project Location:	Select from pulldown menu - click here
6	Project Type:	Select from pulldown menu - click here
7	Brief Description of the Project:	
8	Why is this project needed?	
9	When project scheduled to begin?	

PLANNING QUESTIONS

10a	Total Project Area (sq. ft.) - (Include clear zones, laydown areas, etc)	Square Feet or	Acres
10b	Percentage of Project Area - that is currently Impervious (asphalt, bldgs, etc.)	% of Project Area	
10c	Percentage of Project Area - that will be Impervious once project completed	% of Project Area	
10d	Percentage of Project Area - that will be disturbed (excavated, graded, etc)	% of Project Area	
11	How will StormWater be managed in the long-term (post-construction)?	Select from pulldown menu - click here	
12	How will Sanitary Sewage (wastewater) be managed in the long-term?	Select from pulldown menu - click here	
13	Will there be actions conducted in the water (dredging, new pilings, etc.)?	Select from pulldown menu - click here	
14	Will there be actions conducted in an area under an Agriculture outlease?	Select from pulldown menu - click here	

DESIGN RELATED QUESTIONS

		YES	NO	UNSURE
15	Will trees be removed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Will emission-generating equipment be utilized during construction (bulldozer, backhoe, etc)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Will the project remove, install or utilize a petroleum storage tank, that is >=55-gallons?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Will the project remove or install an Oil Water Separator?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Will the project relocate excavated material at the Installation?; if yes – Where:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Will the construction / repair actions generate by-products (powerwashing water; haz. waste)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Will the construction / repair actions require de-watering?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

OPERATIONAL RELATED QUESTIONS

		YES	NO	UNSURE
22	Will emission-generating equipment be installed (ex. paint booth, emergency generators)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Will there be any new processes or maintenance activates conducted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ADDITIONAL COMMENTS

Type here:

Checklist Preparer, phone number and e-mail (if Same as Question #2 – Type “SAME”)	Date

NAVFAC ENVIRONMENTAL CHECKLIST – ALL INSTALLATIONS

SUMMARY OF ENVIRONMENTAL REQUIREMENTS

PLEASE NOTE: The Environmental review provided is only valid for 1 year. If the project scope has been modified or checklist has expired, please contact the NAVFAC Environmental Planning Program to re-evaluate the project.

Name of Project:

Project Number:

PLANNING REQUIREMENTS (Issues That Can Effect the Project's Timeline, Cost or Site Location)

Environmental Aspect	YES	NO	Environmental Requirement	Project Impacts
National Env Policy Act (NEPA)	TBD		CATEX = 1 week; EA = 12 months; EIS = 24 months.	Can't award till NEPA complete
Threatened, Endangered Species	<input type="checkbox"/>	<input type="checkbox"/>	Consultations with Regulators required.	Process may take 6 months.
Wetland Impacts	<input type="checkbox"/>	<input type="checkbox"/>	Permits and possibly mitigation required.	May take 7 months -after NEPA
Navigable Water Impacts	<input type="checkbox"/>	<input type="checkbox"/>	Permits required.	Takes 2-7 months – after NEPA
Agriculture Outlease	<input type="checkbox"/>	<input type="checkbox"/>	Consultations with NAVFAC Real Estate required.	Process may take 1 to 3 months.
Tree Mitigation	<input type="checkbox"/>	<input type="checkbox"/>	Compensation for tree loss or mitigation is required.	This may add costs to project.
Coastal Zone Mgmt Act	<input type="checkbox"/>	<input type="checkbox"/>	Coastal Consistent Determination (CCD) is required.	Process takes 90 days.
Cultural Resources	<input type="checkbox"/>	<input type="checkbox"/>	Consultations with SHPO required	Process may take 1 to 6 months.
Major Air Emission Source	<input type="checkbox"/>	<input type="checkbox"/>	Permit is required.	Process takes 6 months.
Construction Emissions	<input type="checkbox"/>	<input type="checkbox"/>	Air Conformity Record of Non-Applicability is required.	This process takes a week.
Installation Restoration	<input type="checkbox"/>	<input type="checkbox"/>	Land-use controls exist or Consultation w/ EPA required	Process may take 4 months.
Petroleum Contamination	<input type="checkbox"/>	<input type="checkbox"/>	Follow guidance in NAVFAC POL SOP.	This may add costs to project.

DESIGN REQUIREMENTS (Issues To Be Addressed In Design Phase)

StormWater Best Mgmt Practice	<input type="checkbox"/>	<input type="checkbox"/>	Required for projects that will disturb >= 1 acre of land.	Incorporate into the design.
Erosion & Sediment Control	<input type="checkbox"/>	<input type="checkbox"/>	Required for projects that will disturb >= 10,000 sq ft.	Incorporate into the design.
State StormWater Mgmt Permit	<input type="checkbox"/>	<input type="checkbox"/>	Required for projects that will disturb >= 1 acre of land.	Obtain before construction.
De-watering, Wastewater Mgmt	<input type="checkbox"/>	<input type="checkbox"/>	Protective Measures required for managing excess waters.	Incorporate into the design.
Beach & Dune Management	<input type="checkbox"/>	<input type="checkbox"/>	Protective Measures required for impact beaches & dunes	Incorporate into the design.
Spill Preventative Measures	<input type="checkbox"/>	<input type="checkbox"/>	Secondary containment required for tanks >= 55-gal	Incorporate into the design.

OPERATIONAL REQUIREMENTS (Issues To Be Addressed Prior To Use)

New Industrial Process	<input type="checkbox"/>	<input type="checkbox"/>	Environmental Department Site Inspection required.	Required before operation.
New Waste Generating Activity	<input type="checkbox"/>	<input type="checkbox"/>	Environmental Department Site Inspection required.	Required before operation.

ADDITIONAL REQUIREMENTS or COMMENTS

Cmmt 1	
Cmmt 2	
Cmmt 3	
Cmmt 4	
Cmmt 5	

Environmental POC: phone number and email	Signature	Date

Enclosure 3. Documentation of Public Review

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Enclosure 4. Coastal Consistency Determination

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Enclosure 5. Environmental Assessment for Treatment of Invasive Species at Hampton Roads Naval Installations

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Appendix B

Agency Correspondence

Enclosure 1 State and Federal Agency Comments

Enclosure 2 Mutual Agreement

Enclosure 3 LCAC and Beach Operations Training Area

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Enclosure 1. State and Federal Agency Comments

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United States Department of the Interior

FISH AND WILDLIFE SERVICE



Virginia Field Office
6669 Short Lane
Gloucester, Virginia 23061

May 3, 2016

Mr. Michael H. Jones
Director, Environmental Planning and Conservation
Navy Region Mid-Atlantic
1510 Gilbert Street
Norfolk, VA 23511-2737

Re: Sea Turtle Management, Naval Air
Station Oceana – Dam Neck Annex
and Virginia Army National Guard –
Camp Pendleton, Virginia Beach, VA,
Project # 2016-F-2328

Dear Mr. Jones:

This letter acknowledges the U.S. Fish and Wildlife Service's March 3, 2016 receipt of your February 29, 2016 letter requesting initiation of formal section 7 consultation under the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended. The referenced action involves sea turtle management activities, which include sea turtle stranding response, sea turtle nest monitoring and nest management at Naval Air Station Oceana – Dam Neck Annex and Virginia Army National Guard – Camp Pendleton, Virginia Beach, VA. The federally listed endangered Kemp's ridley (*Lepidochelys kempii*) and federally listed threatened green (*Chelonia mydas*) North Atlantic distinct population segment, and loggerhead sea turtle (*Caretta caretta*) Northwest Atlantic Ocean distinct population segment are likely to be adversely affected by the proposed action. All information required to initiate consultation was either included with your letter or is otherwise accessible for our consideration and reference.

We concur with your determination that the federally listed endangered leatherback (*Dermochelys coriacea*) and hawksbill (*Eretmochelus imbricata*) sea turtles are not likely to be adversely affected by the proposed action.

Section 7 implementing regulations (50 CFR 402.14) provide the U.S. Fish and Wildlife Service up to 90 days to conclude formal consultation and an additional 45 days to prepare our biological opinion, unless we mutually agree to an extension. Therefore, we expect to provide the biological opinion on or before July 15, 2016.

As a reminder, the Endangered Species Act requires that after initiation of formal consultation, the Federal action agency shall make no irreversible or irretrievable commitment of resources that limits future options. This practice ensures agency actions do not preclude the formulation or implementation of avoidance and minimization measures or development of reasonable and prudent alternatives that avoid jeopardizing the continued existence of endangered or threatened species or destroying or modifying their critical habitat.

If you have any questions, please contact Sarah Nystrom of this office at (804) 824-2413, or via email at Sarah_Nystrom@fws.gov.

Sincerely,

For Cindy Schulz
Field Supervisor
Virginia Ecological Services

cc: Navy Region Mid-Atlantic, Norfolk, VA (Attn: Jessica Bassi)
Service, Virginia Beach, VA (Attn: Lauren Billodeaux)
DNH, Richmond, VA (Attn: Rene Hypes)
VDGIF, Richmond, VA (Attn: Ernie Aschenbach)
VDGIF, Machipongo, VA (Attn: Ruth Boettcher)

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

NAVAL AIR STATION OCEANA, DAM NECK ANNEX
and
NAVAL AIR STATION OCEANA, SOUTH VIRGINIA BEACH ANNEX
(CAMP PENDLETON)

Plan Years
2007 – 2011

Approving Officials:



Installation Commanding Officer
Naval Air Station Oceana


24 SEP 2008
Date

Atlantic Division
Naval Facilities Engineering Command
Natural Resources Section

Date

Regional Natural Resources Program Manager

Date



Installation Natural Resources Manager

24 Sep 2008
Date



COMMONWEALTH of VIRGINIA

L. Preston Bryant, Jr.
Secretary of Natural Resources

Department of Game and Inland Fisheries

December 20, 2007

G. Michael Bise
Acting Director

Taura Huxley
Code EV52TH
Natural Resources Specialist
NAVFAC Atlantic
6506 Hampton Boulevard
Norfolk, VA 23508

RE: Naval Facilities
Integrated Natural Resources Management Plan
Yorktown, Northwest Annex, Oceana Fentress, Dam Neck
Camp Pendleton
ESSLog#s 19076, 20545, 19789, 19789; respectively

Dear Ms. Huxley:

We have reviewed the Integrated Natural Resources Management Plans (INRMP) for the following Naval Facilities: Yorktown, Northwest Annex, Oceana Fentress, Dam Neck Camp Pendleton. We offer the following comments regarding the INRMPs. The Department of Game and Inland Fisheries (VDGIF), as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over those resources, inclusive of state or federally endangered or threatened species, but excluding listed insects. We are a consulting agency under the U. S. Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and we provide environmental analysis of projects or permit applications coordinated through the Virginia Department of Environmental Quality, the Virginia Marine Resources Commission, the Virginia Department of Transportation, the U. S. Army Corps of Engineers, the Federal Energy Regulatory Commission, and other state or federal agencies. Our role in these procedures is to determine likely impacts upon fish and wildlife resources and habitats, and to recommend appropriate measures to avoid, reduce, or compensate for those impacts.

Yorktown

Pg 1-9; 1.7 Partnerships - We recommend expanding on the definition of the partnership between the Navy and the VDGIF. VDGIF provides input and recommendations regarding wildlife and fisheries management as well as the management and protection of rare, threatened and endangered species.

Pg 2-21; 2.6.1 Mammals. Throughout the INRMP, whitetail deer are referred to as "White-tailed deer", which is incorrect. We recommend updating the spelling for this animal throughout the entire document.

Pg 2-22; 2.6.2 Herpetofauna. We recommend making the changes to the text as suggested in the revised paragraph below. Please note that the southern toad is not known from York County and has been removed from the text.

A variety of reptiles and amphibians is known to inhabit the area. The most common snakes include the northern watersnake (*Nerodia sipedon*), eastern (=black) rat snake (*Elaphe alleganiensis*), black racer (*Coluber constrictor*), and rough green snake (*Opheodrys aestivus*). The copperhead (*Agkistrodon contortix*) is the only species of venomous snake known to occur on the Station, though eastern cottonmouth (*Agkistrodon piscivorus piscivorus*) and state-listed timber (canebrake) rattlesnake [(*Crotalus horridus*) Coastal Plain population] have known populations in York County. Common turtles include the eastern snapping turtle (*Chelydra serpentina serpentina*), northern red-bellied cooter (*Pseudemys rubriventris*), eastern mud turtle (*Kinosternon subrubrum subrubrum*), and eastern box turtle (*Terrapene carolina carolina*). Lizards found on the Station include the ground skink (*Scincella lateralis*) and the five-lined skink (*Plestiodon (=Eumeces) fasciatus*). Of the amphibians that inhabit the area, frogs and toads comprise the largest group. Common frogs and toads found on the Station include the northern green frog (*Lithobates (=Rana) clamitans melanota*), southern leopard frog (*Lithobates (=Rana) sphenoccephala utricularia*), spring peeper (*Pseudacris crucifer*), green treefrog (*Hyla cinerea*), southeastern chorus frog (*Pseudacris feriarum*) and American toad (*Anaxyrus (=Bufo) americanus*). Salamanders include spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), red-spotted newt (*Notophthalmus viridescens*), and the state-listed Mabee's salamander (*Ambystoma mabeei*).

Pg 2-22; 2.6.3 Fish. We recommend adding some text to this section that describes the anadromous fish resources known to occur at the installation and which are described below

CAX – The York River has been designated a Confirmed Anadromous Fish Use Area. In addition, Queen Creek, King Creek, and Jones Millpond Creek have been designated Potential Anadromous Fish Use Areas. These resources are particularly valuable fisheries resources that should be protected to the greatest extent possible.

WPNSTA – The York River and Indian Field Creek have been designated Confirmed Anadromous Fish Use Areas. Felgates Creek, Black Swamp and its tributaries, and King Creek have been designated Potential Anadromous Fish Use Areas. These resources are particularly valuable fisheries resources that should be protected to the greatest extent possible.

Pg 2-23; 2.6.4 Birds. The common names do not need capitalization unless part of the name is a proper noun.

Pg 2-23; 2.7 Rare, Threatened and Endangered Species and Significant Natural Communities. Throughout the document, including table 2-4, the bald eagle is referred to as federally listed. This species has been de-listed at a federal level, but continues to retain state Threatened status. We recommend updating the document to reflect the change in federal status.

Pg 3-30; 3.5.6 Water Quality and Wetlands Protection. We recommend that at least 100-foot naturally vegetated buffers be maintained on all streams and wetlands on site. In those waters that have been designated anadromous fish use areas, we recommend that all instream work adhere to a time of year restriction from February 15 through June 30 of any year. We recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures. Due to future maintenance costs associated with culverts, and the loss of riparian and aquatic habitat, we prefer stream crossings to be constructed via clear-span bridges. However, if this is not possible, we recommend countersinking any culverts below the streambed at least 6 inches, or the use of bottomless culverts, to allow passage of aquatic organisms. We also recommend the installation of floodplain culverts to carry bankfull discharges.

Pg 3-32; 3.6.1 Game Species. We recommend that waterfowl hunting be allowed at the installations. We recommend updating the deer herd and population section with updated data from VDGIF. It has come to our attention that this installation has not met the Deer Management Objectives. We recommend evaluation of this and an increase in the number of hunter hours/days at the installation.

Pg 3-64; 3.11.2 Nuisance Species – Beaver. VDGIF discourages trapping and relocating of beavers because it is unlawful, not because habitats that support beaver already have them. Beaver can lawfully be killed in the event they are damaging crops or property. We recommend clarification in this section.

Pg 3-64; 3.11.2 Nuisance Species – Groundhog (Woodchuck). It is unlawful to trap and relocate this species, or any species of wildlife. As they are defined as a nuisance species, they may lawfully be killed at any time of year. We recommend clarification in this section.

Northwest Annex

Pg 2-15; 2.5.1 Mammals. Throughout the INRMP, whitetail deer are referred to as “White-tailed deer”, which is incorrect. We recommend updating the spelling for this animal throughout the entire document.

Pg 2-17; 2.5.3 Birds. The common names do not need capitalization unless part of the name is a proper noun.

Pg 2-18; 2.6 Rare, Threatened and Endangered Species. Timber and canebrake rattlesnakes are listed as occurring on the base. These species are one in the same. However, VDGIF recognizes the Coastal Plain population (canebrake) as a unique geographic variation of the timber rattlesnake. The canebrake rattlesnake should be referred to as: **timber (canebrake) rattlesnake [(*Crotalus horridus*) Coastal Plain population]**. This information needs to be updated in the document text as well as in Table 2-5. To further protect this species, we recommend that the mowing of any areas adjacent to forested wetlands be performed only during the winter months (hibernation periods for the species) to avoid striking them with mowers. Other areas should be mowed frequently enough (weekly) so that the grass does not obscure the location of canebrake rattlesnakes which make them more vulnerable to strikes. We further recommend that all mowing contractors be appropriately trained in the identification and status of this species. This could be accomplished via an appropriate information sheet distributed to those working on the project (see attached). Information also can be found on our website, <http://www.dgif.virginia.gov/wildlife/species/display.asp?id=030013>. If a canebrake rattlesnake is observed, please report this observation to the Base Environmental Manager and avoid harming the animal.

Pg 2-19; 2.6 Rare, Threatened and Endangered Species. We recommend re-writing the paragraph regarding jurisdictional authorities to clearly state that VDGIF is responsible for the protection and management of all of the Commonwealth's wildlife species, including Threatened or Endangered species, excluding listed insects.

Pg 3-4; 3.3 Wetlands and Water Quality Protection. We recommend that at least 100-foot naturally vegetated buffers be maintained on all streams and wetlands on site. We recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures. Due to future maintenance costs associated with culverts, and the loss of riparian and aquatic habitat, we prefer stream crossings to be constructed via clear-span bridges. However, if this is not possible, we recommend countersinking any culverts below the streambed at least 6 inches, or the use of bottomless culverts, to allow passage of aquatic organisms. We also recommend the installation of floodplain culverts to carry bankfull discharges.

Oceana Fentress

None of the maps were included with the version of the document we were provided to review. We recommend making sure these are available to all reviewers of the document.

Pg 27; 2.5 Mammals. Throughout the INRMP, whitetail deer are referred to as "White-tailed deer", which is incorrect. We recommend updating the spelling for this animal throughout the entire document.

Pg 27; 2.5 Reptiles and Amphibians. We recommend making the changes to the text as suggested in the revised paragraph below.

A variety of reptiles and amphibians is known to inhabit the area. The most common snakes include the northern watersnake (*Nerodia sipedon*), eastern (=black) rat snake (*Elaphe alleghaniensis*), black racer (*Coluber constrictor*), and rough green snake (*Opheodrys aestivus*). The copperhead (*Agkistrodon contortix*) is the only species of venomous snake known to occur on the Station, though eastern cottonmouth (*Agkistrodon piscivorus piscivorus*) and state-listed timber (canebrake) rattlesnake [(*Crotalus horridus*) Coastal Plain population] have known populations in York County. Common turtles include the eastern snapping turtle (*Chelydra serpentina serpentina*), northern red-bellied cooter (*Pseudemys rubriventris*), eastern mud turtle (*Kinosternon subrubrum subrubrum*), and eastern box turtle (*Terrapene carolina carolina*). Lizards found on the Station include the ground skink (*Scincella lateralis*) and the five-lined skink (*Plestiodon* (= *Eumeces*) *fasciatus*). Of the amphibians that inhabit the area, frogs and toads comprise the largest group. Common frogs and toads found on the Station include the northern green frog (*Lithobates* (= *Rana*) *clamitans melanota*), southern leopard frog (*Lithobates* (= *Rana*) *sphenocephala utricularia*), spring peeper (*Pseudacris crucifer*), green treefrog (*Hyla cinerea*), southeastern chorus frog (*Pseudacris feriarum*), southern toad (*Anaxyrus* (= *Bufo*) *terrestris*), and American toad (*Anaxyrus* (= *Bufo*) *americanus*). Salamanders include spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), red-spotted newt (*Notophthalmus viridescens*), and the state-listed Mabee's salamander (*Ambystoma mabeei*).

Pg 30; Rare, Threatened and Endangered Species. We recommend rewriting a section in the first paragraph that says "state-recommended-endangered species, the canebrake rattlesnake" to read "state Endangered species, the canebrake rattlesnake".

Pg 39; 3.3 Wetlands/Water Quality Protection. We recommend that at least 100-foot naturally vegetated buffers be maintained on all streams and wetlands on site. We recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures. Due to future maintenance costs associated with culverts, and the loss of riparian and aquatic habitat, we prefer stream crossings to be constructed via clear-span bridges. However, if this is not possible, we recommend countersinking any culverts below the streambed at least 6 inches, or the use of bottomless culverts, to allow passage of aquatic organisms. We also recommend the installation of floodplain culverts to carry bankfull discharges.

Pg 82; 3.10 Habitat Conservation. We recommended including language in this section that states that coordination with VDGIIF regarding the protection and management of wildlife including threatened or endangered species, exclusive of listed insects, and their habitats is

performed. We also recommend including reference to VDGIF's online wildlife database, the Virginia Fish and Wildlife Information Service (VAFWIS).

Dam Neck Camp Pendleton

Pg 1-10; 1.6 Partnerships. We recommend including in the pertinent paragraph that VDGIF also provides guidance regarding the management and protection of Threatened or Endangered wildlife, exclusive of listed insects.

Pg 2-19; 2.5.2 Mammals. Throughout the INRMP, whitetail deer are referred to as "White-tailed deer", which is incorrect. We recommend updating the spelling for this animal throughout the entire document.

Pg 2-20; 2.6 Rare, Threatened and Endangered Species and Significant Ecological Communities. The bald eagle has been de-listed federally. It continues to be listed state Threatened. We recommend updating the status of this species throughout the document.

Pg 3-2; 3.2 Wetlands and Water Quality Protection. We recommend that at least 100-foot naturally vegetated buffers be maintained on all streams and wetlands on site. We recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures. Due to future maintenance costs associated with culverts, and the loss of riparian and aquatic habitat, we prefer stream crossings to be constructed via clear-span bridges. However, if this is not possible, we recommend countersinking any culverts below the streambed at least 6 inches, or the use of bottomless culverts, to allow passage of aquatic organisms. We also recommend the installation of floodplain culverts to carry bankfull discharges.

Pg 3.36; 3.12.1 Nuisance Wildlife. It is unlawful to trap and relocate wildlife. Any species defined as a nuisance species may lawfully be killed at any time of year. We recommend clarification in this section.

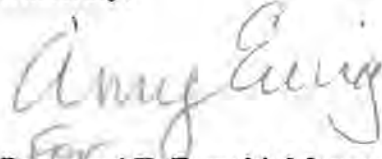
Pg 3-37; Miscellaneous Vertebrates. We recommend clarification on this section. As stated above, the relocation of wildlife is unlawful.

Pg 3-38; 3.12.3 Invasive Species. We recommend adding red-eared slider (*Trachemys scripta elegans*) to the current list of invasive species. We further recommend that a removal plan for this species be developed and reviewed by VDGIF.

Taura Huxley
ESSLog# 19076, 20545, and 19798
December 20, 2007
Page 7 of 7

Thank you for the opportunity to comment on the INRMPs. We are willing to assist the Navy, when possible, in implementing the actions identified in this plan. Please contact our Region 1 Wildlife, Fisheries, and Wildlife Diversity biologists at 804-829-6580 if we can be of further assistance in this regard. Please contact Amy Ewing at 804-367-2211 with any questions regarding this environmental review.

Sincerely,

A handwritten signature in cursive script that reads "Amy Ewing".

For
Raymond T. Fernald, Manager
Nongame and Environmental Programs

CC: Ellie Irons, VDEQ

Enclosure 2. Mutual Agreement



Enclosure 3 LCAC and Beach Operations Training Area



DEPARTMENT OF THE NAVY

NAVAL AMPHIBIOUS BASE, LITTLE CREEK
NORFOLK, VIRGINIA 23521-5000

11010
Ser N4/5789
10 SEP 1992

From: Commanding Officer, Naval Amphibious Base, Little Creek
To: Commander, Naval Surface Force, U.S. Atlantic Fleet (N9)

Subj: LCAC TRAINING AREA AT CAMP PENDLETON

Encl: (1) Camp Pendleton Permit for LCAC Training

1. Enclosure (1) delineates the responsibilities of the Navy regarding the LCAC training area at Camp Pendleton. In summary, the LCAC's can do anything they want in the operating area. The Navy's only responsibility is to maintain the protected area.

2. Should you have any questions concerning this issue, please call CDR Branigan at 464-2785.

DANIEL S. BRANIGAN
By direction

Kim,

9/10/92

FYI, then

FILE PLS.

THANKS!

AL



1493



DEPARTMENT OF THE NAVY

NAVAL AMPHIBIOUS BASE, LITTLE CREEK
NORFOLK, VIRGINIA 23521-5000

11010
Ser N493/ 4286
30 APR 1992

From: Commanding Officer, Naval Amphibious Base, Little Creek
To: Commander, Assault Craft Unit FOUR

Subj: CAMP PENDLETON PERMIT

Ref: (a) PHONCON NAB Little Creek P. Maddox (PWD)/ACU FOUR
LT Vendryzk of 22 Apr 92
(b) VMRC ltr of 21 Apr 92
(c) PHONCON NAB Little Creek P. Maddox (PWD)/SWCB D. Bird
of 22 Apr 92

Encl: (1) COE ltr of 8 Apr 92

1. As discussed in reference (a), enclosure (1) is the permit for Delineation of LCAC Training Area at Camp Pendleton. As stated in enclosure (1), Virginia Marine Resources Commission (VMRC) and the State Water Control Board (SWCB) must also approve the proposal prior to any work. References (b) and (c) provided approval. Enclosure (1) also stipulates the boundary for the LCAC training area be marked. The marking plan which is being forwarded to the Corps of Engineers (COE) is anticipated to be approved promptly.

2. A field trip to Camp Pendleton is scheduled for 5 May 1992 to designate the LCAC training border. Implementation of the training area will also be discussed. Request your training personnel and Seabee representative attend this on-site meeting. If you have any further questions, please call Patty Maddox at 464-7062.

W. W. PUGH
BY direction

Copy to:
COMNAVBEACHGRU TWO
PHIBCB TWO



1798



WILLIAM A. PRUITT
Commissioner
ROBERT D. CRAFT
Chief, Administration and Finance
ROBERT W. GRABB
Chief, Habitat Management
ROBERT J. MARKLAND
Chief, Law Enforcement
JACK G. TRAVELSTEAD
Chief, Fisheries Management

COMMONWEALTH of VIRGINIA

Marine Resources Commission

P. O. Box 756

2600 Washington Avenue

Newport News, Virginia 23607-0756

ASSOCIATE MEMBERS

SIDNEY H. CAMDEN
Eastville, Virginia
GEORGE S. FORREST
Poquoson, Virginia
JOHN W. FREEMAN, SR.
Hampton, Virginia
TIMOTHY G. HAYES
Richmond, Virginia
WILLIAM A. HUDNALL
Heathsville, Virginia
DONALD L. LIVERMAN, SR.
Virginia Beach, Virginia
PETER W. ROWE
Chesapeake, Virginia
JANE C. WEBB
Newport News, Virginia

April 21, 1992

Naval Amphibious Base
c/o Mr. William L. Niven
Public Works Department
Naval Amphibious Base, Little Creek
Norfolk, VA 23521-5140

RE: VMRC #91-1782

Dear Sir:

You have inquired regarding a permit to restore a coastal primary sand dune by placing approximately 17,000 cubic yards of sand fill within a man-made breach measuring 194 feet in width at Camp Pendleton in Virginia Beach.

Provided your proposed project does not extend channelward of the mean low water mark, no authorization is required from the Marine Resources Commission.

For your information, however, you may need a permit from your local wetlands board and/or authorization from the U. S. Army Corps of Engineers, Norfolk District, 803 Front Street, Norfolk, Va. 23510, prior to commencing your project. Your application is currently being processed by both these agencies.

If we may be of further assistance, please do not hesitate to call on us.

Sincerely,


Randal D. Owen
Environmental Engineer

RDO/lm

HM

CC: U. S. Army Corps of Engineers, Norfolk District
Virginia Beach Wetlands Board
Applicant



COMMONWEALTH of VIRGINIA
STATE WATER CONTROL BOARD

Richard N. Burton
Executive Director

P. O. Box III43
Richmond, Virginia 23230-1143
(804) 527-5000
TDD (804) 527-4261

April 22, 1992

Ms. Patty Maddox
c/o Commanding Officer
Naval Amphibious Base, Little Creek
Norfolk, Virginia 23521-5140

Re: Dune Restoration and LCAC Training Area Modifications,
Application No. 91-1782

Dear Ms. Maddox:

We have received your application to restore an area of primary sand dunes, and reduce the training area for LCAC vehicles from 96 acres (including 9 acres of wetlands) to an area of approximately 20 acres with less than one acre of wetland impact in NAB Camp Pendleton annex. The purpose of the proposed project is to provide an acceptable training area for the LCAC's while reducing the impacts to wetlands within the activity zone.

We understand that less than an acre of wetland impact will occur from the modification of the training area. After careful consideration of this and other factors by staff of the State Water Control Board, we have determined that your project will have minimal impact to the water quality of state waters.

Therefore the State Water Control Board by this letter states that no Water Quality Certificate under section 401 of the Clean Water Act (33 U.S.C. 1251 et. seq.) will be required for this activity. If the proposed project should undergo significant change, modification, or addition, no further communication is required with this agency.

You are advised however, that the activity you propose may require permits from the Virginia Marine Resources Commission and the Norfolk District, U.S. Army Corps of Engineers prior to

commencing any construction activity. Should you have any questions regarding the status of your application we suggest you contact these agencies directly.

Sincerely,



David W. Byrd
Environmental Program Planner
Office of Water Resources Management

cc: File
Virginia Marine Resources
Commission
Norfolk District, USACOE



DEPARTMENT OF THE ARMY
NORFOLK DISTRICT, CORPS OF ENGINEERS
FORT NORFOLK, 803 FRONT STREET
NORFOLK, VIRGINIA 23510-1096

REPLY TO
ATTENTION OF:
CENAO-CO-R (1145b)
91-1782-27 (Atlantic Ocean)

8 April 1992

MEMORANDUM FOR Commanding Officer, Naval Amphibious Base (NAB) Little Creek,
Norfolk, Virginia 23521-5140

SUBJECT: Department of the Army Permit Application Number 91-1782-27, for the
Landing Craft Air Cushion (LCAC) activity zone at the Little Creek Annex
(Camp Pendleton), Virginia.

1. After evaluating your Permit Application Number 91-1782-27 to develop an activity zone that may result in the filling of up to 1 acre of interdunal swale wetlands, we have determined that it qualifies for our Abbreviated Standard Permit 87-ASP-18 for activities of minimal environmental consequence. If your project adheres to the proposal which you submitted (drawings enclosed), a 200-foot reduction of the activity zone length as measured from the northern most proposed project boundary, the conditions enumerated below, and the conditions of the Abbreviated Standard Permit (Enclosure), no further authorization will be required from this office. If you should decide to change any aspect of your proposal, you must first apply for and be granted a permit modification. Your authorization to perform work under this Abbreviated Standard Permit expires on December 31, 1995.

2. Prior to manipulation of the activity zone, the activity zone perimeter shall be marked and inspected by the Corps. Markers should be highly visible, permanent poles or timbers that indicate the activity zone boundary. The marking plan shall be submitted to the Corps and must be approved in writing prior to implementation.

3. As a condition of this permit, there shall be no vehicular access across the dune system. Furthermore, no training activities are authorized within the exclusion zone. Crossing of the exclusion zone on foot, by individuals who are participating in training approved by NAB Little Creek, is authorized. In the event that other activities are desired in the exclusion zone, NAB Little Creek shall restore the impacted pine forest, secondary dune, and interdunal swale habitats to the satisfaction of the Corps prior to commencement of any other activities (See condition #10 of the permit). Any violation of this condition may result in a Notice of Violation, revocation of the permit, and initiation of the agreement to completely restore the impacted habitats.

4. This permit is directly associated with training activities subject to Naval Amphibious Base Little Creek Notice 3000. A copy of this permit shall be provided to the Port Operations Department (N3) and any other Department or Division associated with activities at the Pendleton annex.

5. NAB Little Creek should review and implement, to the maximum extent practicable, the Virginia Department of Natural Heritage report entitled An Inventory of the Rare, Threatened & Endangered Species of Camp Pendleton, dated 1 September 1990.



CENAO-CO-R

SUBJECT: Department of the Army Permit Application Number 91-1782-27, for the Landing Craft Air cushion (LCAC) activity zone at the Little Creek Annex (Camp Pendleton), Virginia.

6. Before you may begin work, you should obtain a permit from the Virginia Marine Resources Commission. You must obtain a 401 Certificate or waiver from the Virginia State Water Control Board. Any conditions which are made a part of your State Water Control Board 401 Certificate will automatically become a part of your Corps authorization under the Abbreviated Standard Permit 87-ASP-18.

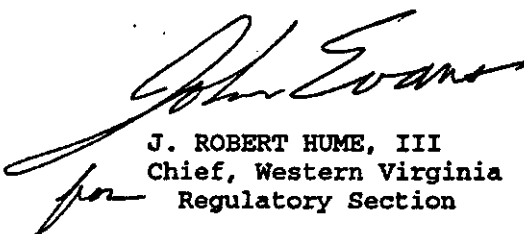
7. The party performing the work authorized by this permit will have a copy of this letter and the enclosed documents with them at the project site during earth moving activities within the activity zone. These documents will be made available to any Corps representative upon their request.

8. Dune management should be closely coordinated with the Mr. Lee Hill at the Virginia Shoreline Erosion Advisory Service (SEAS), at (804) 642-7121.

9. John Evans is the project manager for this permit application. You should address any future correspondence to Mr. Evans, who may also be reached at (804) 441-7794. Please do not hesitate to contact Mr. Evans should you have any questions regarding work authorized by this permit.

FOR THE COMMANDER:

Enclosure


J. ROBERT HUME, III
Chief, Western Virginia
Regulatory Section

CF (w/encl):

Virginia Natural Heritage Program, Richmond
Virginia Marine Resources Commission, Newport News
Virginia State Water Control Board, Richmond
Environmental Protection Agency, Philadelphia
U. S. Fish and Wildlife Service, White Marsh
Shoreline Erosion and Advisory Service, Gloucester Point



CENAO-CO-R
87-ASP-18

DEPARTMENT OF THE ARMY
NORFOLK DISTRICT, CORPS OF ENGINEERS
FORT NORFOLK, 803 FRONT STREET
NORFOLK, VIRGINIA 23510-1096

DEPARTMENT OF THE ARMY ABBREVIATED STANDARD PERMIT

The people of the Commonwealth of Virginia are hereby authorized by the Secretary of the Army and the Chief of Engineers (under provisions of Section 10 of the Rivers and Harbors Act of March 3, 1899 (33 U.S.C. 403) and Section 404 of the Clean Water Act (P.L. 92-217) to perform work determined by the district engineer to be of minimal environmental consequence.

The procedure that a prospective permittee would follow in order to qualify for this abbreviated standard permit will be very similar to the standard procedure for applying for Corps permits. A Joint Permit Application must be completed and submitted to the Virginia Marine Resources Commission (VMRC) even when VMRC does not require a permit. After copying the application, VMRC will send the original to the Corps. A public notice will be prepared and circulated. Projects will be coordinated with the U. S. Fish and Wildlife Service, the Environmental Protection Agency and the National Marine Fisheries Service at a monthly interagency permit processing meeting at which time it will be determined whether or not particular projects qualify for this abbreviated standard permit. If the Corps or the Federal agencies recommend a modification or special condition to the proposal and the applicant agrees to incorporate that recommendation into his final plans, the modified project will be determined to qualify for the abbreviated standard permit. In either case, a letter will be sent to the applicant advising that no additional Corps permit will be necessary, but that necessary State and/or local permits should be obtained before he begins work. If the project is determined not to qualify for this abbreviated standard permit, the application will continue to be processed as per 33 CFR 320-330. This abbreviated standard permit is subject to the following conditions:

1. Prior to the commencement of any work authorized by this permit, the permittee shall advise the district engineer, in writing, of the time the authorized activity will be commenced and of the name, address, and telephone number of all contractors or other persons undertaking the work and shall furnish to them, before the commencement of the work, a complete copy of this permit along with all drawings and special conditions. In addition, it is the permittee's responsibility to notify the district engineer when the authorized work has been completed.
2. The permittee and contractor will be held equally liable for any construction outside the limits and scope of this abbreviated standard permit.
3. The permittee will make every reasonable effort to prosecute the construction or operation of the work authorized by this permit in a manner so as to minimize any adverse impact on fish, wildlife and natural environmental values.
4. The construction or work authorized by this permit will be prosecuted in a manner so as to minimize any degradation of water quality.
5. The permittee shall allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of this permit.
6. The permittee shall maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit as well as all attached plans and drawings.

1798
CORPSE

16. This office may reevaluate its decision on individual authorizations under this abbreviated standard permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

- a. The permittee fails to comply with the terms and conditions of this permit.
- b. The information provided by the applicant in support of his permit applications proves to have been false, incomplete, or inaccurate.
- c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring the permittee to comply with the terms and conditions of the permit and for the initiation of legal action where appropriate. The permittee will be required to pay for any corrective measures ordered by this office, and if he fails to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and the permittee shall have a duty to reimburse this office for the cost.

17. Failure to comply with the terms and conditions of this abbreviated standard permit can result in enforcement actions against the permittee and/or contractor.

18. All dredging and/or filling will be done so as to minimize disturbance of the bottom or turbidity increases in the water which tend to degrade water quality and damage aquatic life.

19. Any deposition of dredged or excavated materials on shore, and all earthwork operations on shore will be carried out in such a way as to minimize erosion of the material and preclude its entry into the waterway.

20. Upon completion of earthwork operations, all fills on shore and other areas on shore disturbed during construction will be seeded, riprapped or given some other type of protection from subsequent soil erosion.

21. The permittee will employ measures to prevent or control spills of fuels or lubricants from entering the waterway.

22. This abbreviated standard permit does not authorize any activity which might affect a threatened or endangered species as identified under the Endangered Species Act (16 U. S. C. 1531) or adversely modify designated critical habitat of such species without consultation with the U. S. Fish and Wildlife Service and the National Marine Fisheries Service.

23. If the Craney Island Disposal Area becomes unavailable for use as a disposal area during the terms of this permit, the permittee will be responsible for finding an upland disposal area and having it approved by this office prior to any further dredging.

24. Quantities of material dredged and placed in the Craney Island Rehandling Basin and/or the Craney Island Disposal Area will be furnished by the applicant to . Before and After Dredging Hydrographic Surveyors and Yardage Calculations shall be performed and certified by a Professional Engineer or Land Surveyor. For local survey and tidal datum information, the applicant is referred to Mr. Brian Shannon at the District Office (441-7664). All surveys, maps, and calculations will conform to recognized professional standards and be sent to the district engineer. The attached form will be completed prior to the deposition of material into the Craney Island Disposal Area or the Craney Island Rehandling Basin.



7. This permit does not obviate the need to obtain other Federal, State or local authorization required by law, nor does it grant any property rights or exclusive privileges or authorize any injury to the property rights of others.

8. In issuing this abbreviated standard permit, the Federal Government does not assume any liability for the following:

- a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.
- b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
- c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
- d. Design or construction deficiencies associated with the permitted work.
- e. Damage claims associated with any future modification, suspension, or revocation of this permit.

9. The use of this abbreviated standard permit may be summarily suspended, in whole or in part, upon a finding by the district engineer that immediate suspension would be in the general public interest. Such suspension shall be effective upon receipt by the permittee of a written notice thereof which shall indicate (1) the extent of the suspension, (2) the reasons for this action, and (3) any corrective or preventative measures to be taken by the permittee which are deemed necessary by the district engineer to abate imminent hazards to the general public interest. The permittee shall take immediate action to comply with the provisions of this notice. Within ten days following receipt of this notice of suspension, the permittee may request a hearing in order to present information relevant to a decision as to whether his permit should be reinstated, modified or revoked. If a hearing is requested, it shall be conducted pursuant to procedures prescribed by the Chief of Engineers. After completion of the hearing, or within a reasonable time after issuance of the suspension notice to the permittee if no hearing is requested, the permit will either be reinstated, modified or revoked.

10. Should the permittee wish to cease to maintain the authorized activity or desire to abandon it without a good faith transfer, he must obtain from this office a modification of his authorization under this permit, which may require restoration of the area. In order to transfer this permit, the transferee must supply the district engineer with a written agreement to comply with all of the terms and conditions of this abbreviated standard permit.

11. All provisions of the abbreviated standard permit shall be binding on any assignee or successor in interest of the permittee.

12. The permittee's use of the permitted activity must not interfere with the public's right to free navigation on all navigable waters of the United States.

13. The permittee shall advise the district engineer verbally or in writing when unusual or complicated foundation conditions are encountered requiring debris removal (e.g. stumps, broken concrete, etc.) and shall not take measures to remove the obstruction or change the location of the structure until written or verbal approval by the district engineer or his authorized representative is received.

14. This permit does not authorize interference with any existing or proposed Federal project.

15. The permittee must install and maintain, at his expense, any safety lights and signals prescribed by the United States Coast Guard (USCG), through regulations or otherwise, on the authorized facilities. The USCG may be reached at the following address and telephone number: Commander (oan), Fifth Coast Guard District, Federal Building, 431 Crawford Street, Portsmouth, Virginia 23704, ATTN: Mr. John Walters, telephone number (804) 398-6230.



25. VDOT shall pay to the district engineer certain tolls which have been established to cover the Federal legislation authorizing construction of the Craney Island DMMA Project. The rates are established at amounts which will cover amortization of the facilities used plus operation, maintenance and rehandling costs. Since cost of operation, maintenance and rehandling vary from year to year, the tolls will vary. The applicable rate in effect on the date of issuance of this letter of permission is listed below. A review of the rates will be made annually on or about 1 July to determine whether any revisions should be made. If changes in these rates become necessary during the life of this letter of permission, VDOT will be notified of the change and the effective date thereof.

Deposit in Rehandling Basin (Scow)	\$2.06 per cu.yd. (Place and/or Scow measurement less 10%)
Direct deposit in DMMA	86¢ per cu.yd. (Place measurement)
Deposit in DMMA by Barge Rehandler	9¢ per cu.yd. (Place measurement)
Deposit in DMMA by Hopper Dredge	4¢ per cu.yd. (Place measurement)

The above toll is for use of dredged material management facilities only, and is in addition to any charges for inspection, supervision and surveys.

26. The following security requirements must be adhered to for all dredging projects where direct pumping into Craney Island is proposed: Entry to the Reservation for vehicular traffic shall be through the main gate on the entrance road. This gate will be open during normal working hours. At all other times this gate shall remain locked in order to deny access to unauthorized persons. The permittee shall assure that satisfactory arrangements are made for security at the gate. In the event security at the gate is considered unsatisfactory by the Chief of the Craney Island Project Office, the permittee will be required to furnish a watchman who shall be responsible for keeping the gate locked and admitting only authorized personnel.

27. Bottom dump scows can only be filled to a point where no overflow occurs. No overflow pipes can be used by the scows.

28. The permittee must have a copy of this permit available on the vessel used for the authorized transportation and placement of dredged material.

29. Any discharge will be carried out in conformity with the goals and objectives of the EPA Guidelines established pursuant to Section 404(b) of the Clean Water Act and published in 40 CFR 230.

30. Any discharge will consist of suitable material free from toxic pollutants in toxic amounts.

31. Any fill will be properly maintained to prevent erosion and other non-point sources of pollution.

32. Should the permittee discover any previously unknown historic or archaeological remains while accomplishing the activity authorized by this permit, he must immediately notify this office of what he has found. The Norfolk District Corps of Engineers will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic places.

33. If a conditioned water quality certification has been issued for the project, the permittee must comply with the conditions specified in the certification as special conditions to this permit.



34. This abbreviated standard permit, unless modified, suspended or revoked, will be in effect until 10 September 1992. Before expiration, it may, if the public interest so dictates, be considered for revalidation.

26 Aug 91
Date

R. C. Johns
R. C. Johns
Colonel, Corps of Engineers
District Engineer



← EXISTING
DIAT ROAD

DETERIORATED
CONCRETE ROAD →

North
Access
(Closed)

U. S. ARMY CORPS OF ENGINEERS

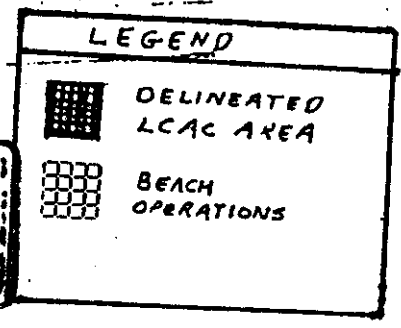
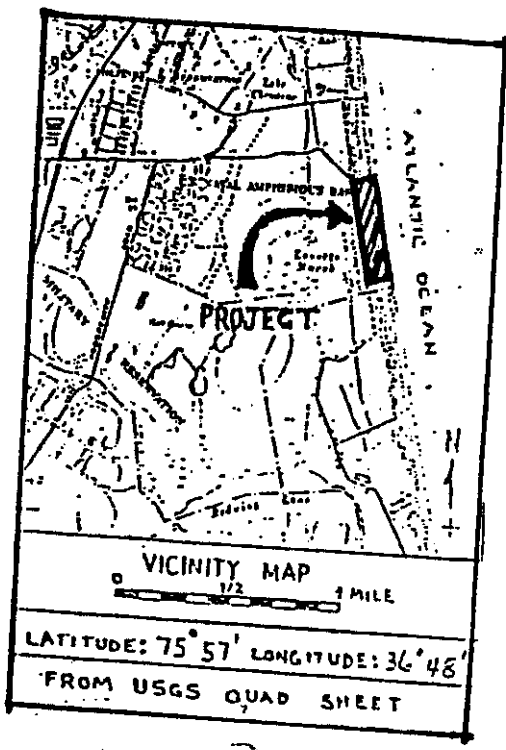
JAN 2 1991

South
Access
(Open)

Property
Boundary

PLAN VIEW

0 400 1" = 400'



PURPOSE: PHASE II
DELINEATE LCAC AREA

DATUM MLW

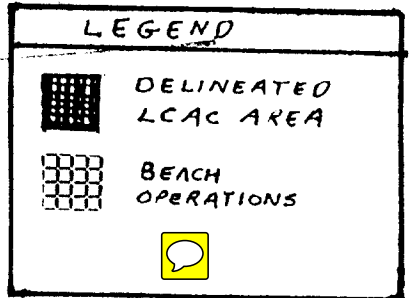
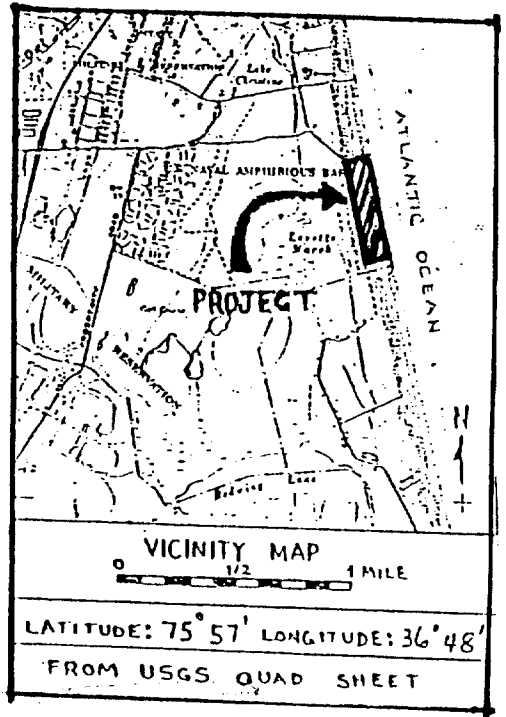
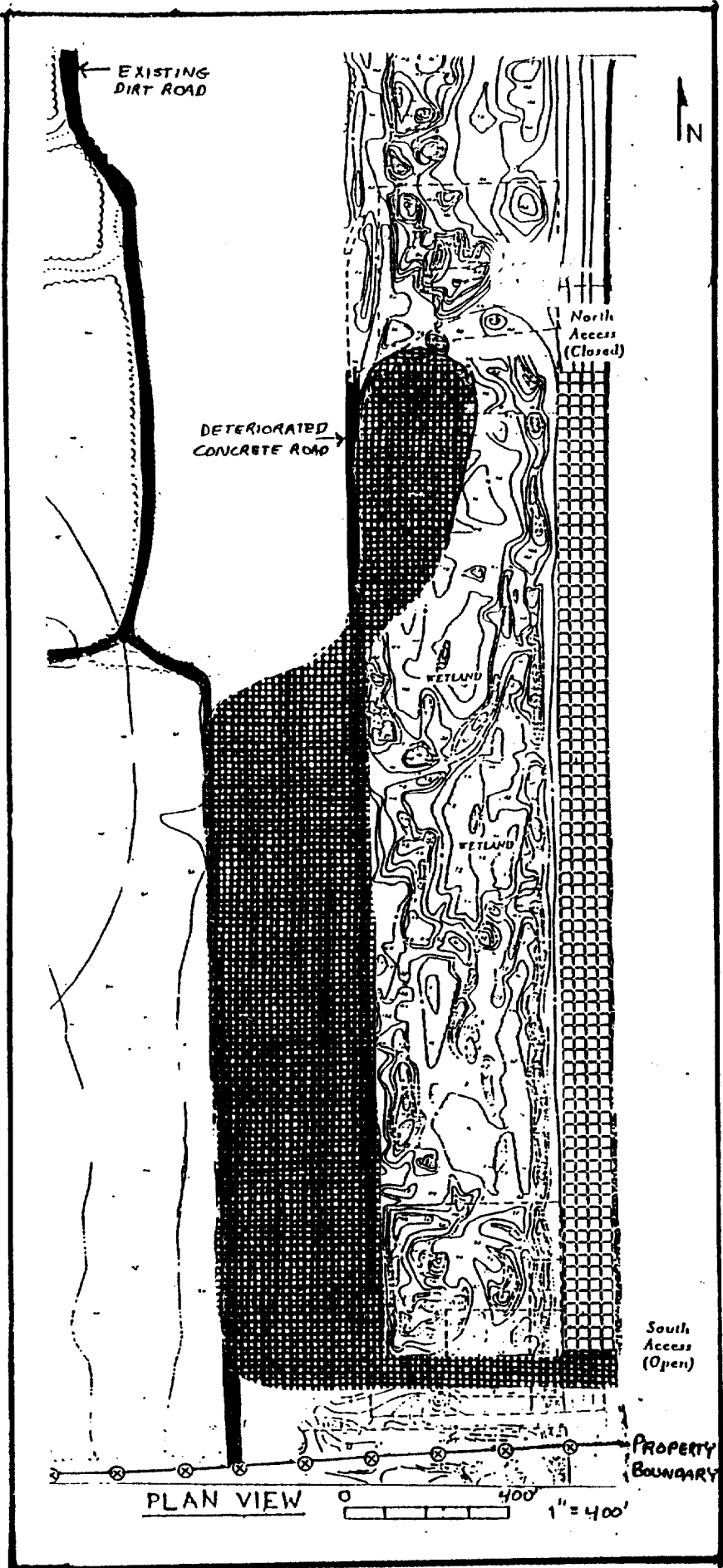
ADJACENT PROPERTY OWNERS:

- VIRGINIA STATE MILITARY RESERVATION
- FCTC DAM NECK

IN NAB ANNEX
AT CAMP PENDLETON
COUNTY OF VA BEACH, VA

APPLICATION NO.
SHEET 3 OF 3 DATE 11-18-91





PURPOSE: PHASE II
 DELINEATE LCAC AREA

DATUM MLW

ADJACENT PROPERTY OWNERS

① VIRGINIA STATE MILITARY RESERVATION

② FCTC DAM NECK

IN NAB ANNEX
 AT CAMP PENDLETON
 COUNTY OF VA BEACH, VA

APPLICATION BY

SHEET 3 OF 3 DATE 11-18-91

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Appendix C
Designation Letter

- Enclosure 1** Natural Resources Managers
- Enclosure 2** ICO Environmental Policy
- Enclosure 3** Authorization to Carry/Use Firearms

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Enclosure 1 Natural Resources Managers



DEPARTMENT OF THE NAVY

NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO
5090
Ser N4/375
13 Nov 14

From: Commanding Officer, Naval Air Station Oceana
To: Ms. Michael F. Wright, Natural Resources Manager

Subj: APPOINTMENT AS NAVAL AIR STATION OCEANA NATURAL RESOURCES MANAGER

Ref: (a) OPNAVINST 5090.1D Manual 5090.1
(b) INRMP NASO & NALFF
(c) INRMP NASO DNA

1. Reference (a) requires that Naval Installations have a formally appointed Natural Resources Manager/Coordinator. By notice of this letter, you are appointed to this position for Naval Air Station Oceana.

2. Your responsibilities are:

a. Develop, coordinate and ensure implementation of the installation Integrated Natural Resource Management Plans (INRMP), references (b) and (c), and that they are reviewed and updated annually.

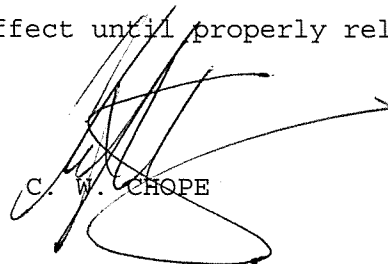
b. Function as the primary point of contact for the installation's natural resource management program and serve as natural resource management liaison between public works, environmental, medical, supply, housing, tenant commands and pest management program.

c. Ensure that the Commanding Officer is informed regarding natural resources issues, conditions of natural resources, objectives of the INRMP (if applicable) and potential or actual conflicts between mission requirements and natural resources mandates.

d. Ensure that applicable governmental decisions made on behalf of the installation and Commanding Officer are in compliance with the Sikes Act.

e. Function as the primary point of contact for acquiring and maintaining consistency with all natural resources permits.

3. This designation will remain in effect until properly relieved or upon your transfer.



C. W. CHOPE

Copy to:
PRA4 Installation Environmental Program Director
PRA42 Natural Resources Manager/Team Leader
EV2 NAVFAC MIDLANT Conservation and Planning Office



DEPARTMENT OF THE NAVY

COMMANDER
NAVY REGION, MID-ATLANTIC
1510 GILBERT ST.
NORFOLK, VA 23511-2737

IN REPLY REFER TO:

From: Commander, Navy Region Mid-Atlantic
To: Emmett Carawan, Natural Resources Manager, NAVFAC MIDLANT
SUBJ: APPOINTMENT AS THE INSTALLATION INTEGRATED NATURAL
RESOURCE COORDINATOR

Ref: (a) OPNAV Instruction 5090.1C, Chapter 24: Natural Resource Management Program

1. Reference (a) requires that Navy installations have a formally appointed Natural Resource Coordinator. By notice of this letter, you are appointed to this position for all Navy installations in Hampton Roads under your cognizance.

2. Your responsibilities are:

- a. Develop, coordinate, and ensure implementation of the installation Integrated Natural Resource Management Plan (INRMP), if applicable, and that it is reviewed and updated annually.
- b. Function as the primary point of contact for the installation's natural resource management program and serve as natural resource management liaison between public works, environmental, medical, supply, housing, tenant commands, and pest management program as needed.
- c. Ensuring that the CO is informed regarding: natural resources issues, conditions of natural resources, objectives of the INRMP (if applicable), and potential or actual conflicts between mission requirements and natural resources mandates.
- d. Ensuring that inherently governmental decisions made on behalf of the installation and CO with regards to Sikes Act compliance.
- e. Function as the primary point of contact for acquiring and maintaining consistency with all natural resources permits and the State Coastal Zone Program.

3. This appointment is effective immediately and remains in effect unless revoked or until you are properly relieved.

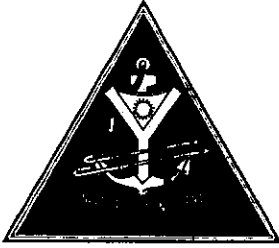
Sincerely,

W. DAVID NOBLE

W. DAVID NOBLE
By Direction
Commanding Officer


Copy to:
NAVFAC MIDLANT

Enclosure 2 ICO Environmental Policy



NAVAL AIR STATION OCEANA ENVIRONMENTAL POLICY

1. Environmental stewardship is essential to the safe, healthful and compliant execution of our mission and the protection and preservation of our natural resources. I expect all commands and personnel onboard Naval Air Station (NAS) Oceana, Dam Neck Annex and Naval Auxiliary Landing Field Fentress to be active stewards of the environment in their day-to-day operations and planning
2. To that end, NAS Oceana will establish, maintain and communicate an Environmental Management System that will:
 - a. Comply with applicable laws, regulations and policies.
 - b. Integrate environmental stewardship with operational decisions.
 - c. Implement, modify and sustain practices that minimize and prevent creation of waste and pollutants at their source.
 - d. Develop objectives and targets to minimize environmental risk and monitor progress towards those goals.
 - e. Educate our workforce and supported commands on their responsibility to the environment.
 - f. Foster communication throughout the installation on our environmental commitments and performance.
 - g. Sustain our partnerships with public agencies and community organizations to mutually monitor and improve the quality of the environment.
3. These actions can be summarized through the acronym "CARE". We will:
 - a. Comply with the rules
 - b. Always improve
 - c. Reduce waste
 - d. Eliminate pollution


R. J. MEADOWS

Enclosure 3 Authorization to Carry/Use Firearms



DEPARTMENT OF THE NAVY

NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO

11015

Ser N4/174

14 May 14

From: Commanding Officer, Naval Air Station Oceana
To: Public Works Officer, Naval Air Station Oceana

Subj: AUTHORIZATION TO CARRY FIREARMS IN PERFORMANCE OF
OFFICIAL DUTIES

Ref: (a) NASO PWD Environmental, PRA4 MEMO of 30 April 2014
(b) COMNAVREGMIDLANTINST 11015.3
(c) OPNAVINST 5530.14E
(d) OPNAVIST 3591.1F
(e) DoDI 5525.17
(f) NASOINST 8000.16

1. Per references (a) through (f), authorization is granted for Mr. Lawrence McGrogan (GS-9), Mr. Mark Edwards (GS-9), Ms. Michael Wright (GS-12), and Mr. Wilbur Carawan (GS-12) to carry firearms (specifically .22 caliber rifles, .177 and .22 caliber air rifles, 12-gauge shotguns and 15mm launchers) onboard Naval Air Station (NAS) Oceana, Dam Neck Annex and Naval Auxiliary Landing Field Fentress in performance of official duties. Additional approval is granted to Mr. Lawrence McGrogan (GS-9) to carry a 9mm pistol. This approval is subject to the following conditions:

a. Use of firearms is restricted to disposal of wounded, nuisance and/or diseased wildlife, or control of invasive species.

b. Personnel listed will be in radio or phone contact with Security Dispatch at all times when performing disposal or control procedures and keep Security Dispatch aware of their location.

c. Weapons will not be used for law enforcement purposes, except in cases where warranted under the Conservation Law Enforcement Program via a qualified Conservation Law Enforcement Officer (CLEO). Mr. McGrogan is currently the only designated CLEO for the Hampton Roads installations of Mid-Atlantic Region.

d. Per reference (c), all weapons will be government-owned. The use of privately-owned weapons is prohibited, unless additional authorizations/exceptions are obtained. The only ammunition authorized will be government-owned, officially procured and issued for use in the specific weapon carried, unless additional authorizations/exceptions are obtained.

Subj: AUTHORIZATION TO CARRY FIREARMS IN PERFORMANCE OF
OFFICIAL DUTIES

e. Personnel listed will receive documented training in the use of these firearms. Training will be equivalent, or similar to the training and qualification program outlined in references (d) and (f). Specifically, for the 12-gauge shotgun, the course of fire outlined in reference (d) shall be utilized. Additionally, personnel listed shall be familiar with safety precautions for weapons handling that are detailed in reference (d).

f. Weapons and ammunition will be properly stored, secured and checked at the NAS Oceana, Natural Resources Center, Building 78.

g. Personnel listed will keep tenant commands informed of disposal or control procedures conducted in restricted areas.

2. My point of contact for this matter is Michael Wright, Natural Resources Team Leader, and can be reached at 433-3461 or via e-mail at michael.f.wright@navy.mil.



O. W. CHOPE

Copy to:
NASO Security Officer
NASO Safety Officer

Appendix D

Urban Forestry, Grounds Maintenance, and Landscaping Management

- Enclosure 1 Tree City USA Recertification Application**
- Enclosure 2 Tree City USA Proclamation**
- Enclosure 3 Pruning and Planting Guidelines**
- Enclosure 4 Native Plants for Landscaping**
- Enclosure 5 NAS Oceana Instruction 5090.2E (Procedures for Cutting Firewood and Use of Tree Products)**

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Enclosure 1. Tree City USA Recertification Application

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Print this page

Tree City USA

2014 Application for Certification



The Tree City USA award is in recognition of work completed by the community during the 2014 calendar year.

As Mayor or Equivalent of the Community of NAS Dam Neck Annex

I herewith make application for this community to be officially certified/recertified as a Tree City USA for 2014, having achieved the standards set forth by the Arbor Day Foundation as noted below.

Standard 1: A Tree Board or Department

Community has a Tree Board only

Tree Board Chair

Michael Wright Tree Board Chairperson 757-433-3461 michael.f.wright@navy.mil

Standard 2: A Community Tree Ordinance

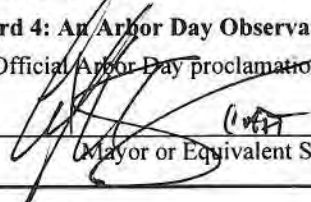
✓ Our community ordinance is on record

Standard 3: A Community Forestry Program with an Annual Budget of at Least \$2 Per Capita

Total Community Forestry Expenditures	\$351433.34
Community Population	5100
Per Capita Spending	\$68.91

Standard 4: An Arbor Day Observance and Proclamation

✓ Official Arbor Day proclamation is on record

	Commanding Officer	31 Dec 14
Mayor or Equivalent Signature	Title	Date

Application Certification
To Be Completed By The State Forester:
NAS Dam Neck Annex

The above named community has made formal application to this office. I am pleased to advise you that we reviewed the application and have concluded that, based on the information contained herein, said community is eligible to be certified as a Tree City USA community, for the 2014 calendar year, having in my opinion met the four standards required for recognition.

State Forester Signature	Title	Date
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Enclosure 2. Tree City USA Proclamation

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DEPARTMENT OF THE NAVY

NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO

Naval Air Station Oceana Dam Neck Annex

Proclamation

Whereas, In 1872, Arbor Day founder, J. Sterling Morton set aside a special day for the planting of trees; that first Arbor Day resulted in the planting of more than a million trees in Nebraska; and

Whereas, Naval Air Station Oceana Dam Neck Annex is committed to managing and enhancing its natural resources for multiple uses while fulfilling its assigned missions in support of the Departments of Defense and Homeland Security; and

Whereas, Naval Air Station Oceana Dam Neck Annex celebrates Arbor Day with the planting of a tree; and

Whereas, trees reduce erosion, clean the air, produce oxygen, cut heating and cooling costs, and provide habitat for wildlife; and

Whereas, the personnel assigned to Naval Air Station Oceana Dam Neck Annex take great pride in their installation through participation in activities and programs designed to improve the appearance and the quality of life onboard Naval Air Station Oceana Dam Neck Annex; and

Whereas, Naval Air Station Oceana Dam Neck Annex takes pride in supporting various community environmental events and activities including Arbor Day, Earth Day, and National Public Lands Day; and

Whereas, I, Lieutenant Commander Roger W. Mitchell, Officer in Charge of Naval Air Station Oceana Dam Neck Annex, on behalf of the Installation Commanding Officer, Captain Christopher W. Chope, do hereby proclaim 23 April 2014 as,

“The Annual Naval Air Station Oceana Dam Neck Annex Arbor Day Celebration”

In Witness Whereof, I sign this proclamation,

A handwritten signature in black ink, appearing to read "Roger W. Mitchell".

Roger W. Mitchell
Lieutenant Commander, U.S. Navy
Officer in Charge

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Enclosure 3. Pruning and Planting Guidelines

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TREE PRESERVATION AND REPLACEMENT ON INSTALLTION

1. Purpose

a. This policy establishes a program for forest conservation and tree protection during development or maintenance activities. The hierarchy for tree protection initiatives begins with preservation of existing trees wherever practical, and ends with planting replacement trees at specified ratios to compensate for unavoidable loss.

b. The policy parallels the intent of local ordinances. Local municipalities have determined that the planting and preservation of trees is not only desirable but essential to the present and future health, safety and welfare of all citizens.

2. Policy

a. It is the intent of this policy to prevent the unauthorized destruction or disfigurement of existing trees. It is further intended to perpetuate tree growth, to encourage tree preservation and to provide adequate tree canopy and numbers.

b. Where tree preservation is not practicable, replacement tree establishment is required. The determination of justified loss will be made in concert with the appropriate installation and or Regional Environmental Natural Resources Manager, who will also assist with preparation of tree inventories at potential development areas. Such inventories and determinations will be made during the preliminary siting phase of a project.

c. Where concurrence with the finding of justified loss is received from the Natural Resources personnel, it is the intent to require the replacement planting of trees as mitigation. Previously planted and approved tree mitigation banks may be acceptable as replacement. The overall goal is "no net loss" of trees or tree canopy cover.

d. Commercial forestry operations, conducted under an approved Integrated Natural Resources Management Plan or Forest Management Plan are exempt from the requirements of this instruction.

3. Application

a. The terms and provisions of this policy shall apply to:

(1) Development and expansion of existing facilities, including roadway, utilities and other infrastructure development.

(2) Negligent grounds maintenance activities.

b. Actions involving tree removal necessary to meet critical military mission requirements are excluded from this instruction. All such projects will be reviewed for compliance with this instruction by the appropriate installation Natural Resources Manager who may recommend tree protection measures, mitigation for lost trees or selection of alternative sites. Forest products will not be given away, abandoned, carelessly destroyed, used to offset costs of contracts or traded for products, supplies, or services. Natural Resources personnel will review contracts involving removal of significant amounts of timber to ensure these conditions are met.

c. Maintenance activities within NAVFAC P80.3 standards for the airfield clear zones or required for maintenance of ordnance areas, communication systems, security, or right-of-ways are also exempt from the requirements of this instruction.

d. Special accommodations may be made to support Morale, Welfare and Recreation operations and improvements to comply with professional recommendations for the program involved and to assist in furthering these programs at a minimal cost to station personnel.

4. Tree Preservation Plans and Tree Protection

a. Proponents of all projects and activities, which may affect existing trees, shall team with the Natural Resources Manager to identify all trees in the affected area and to develop a project/activity-specific tree preservation plan in accordance with this policy. All trees designated in the plan to be preserved shall be identified on all applicable project drawings, and also shall be marked in the field. Existing trees designated for retention shall be protected in accordance with Attachment A.

b. Certain trees and forests are considered priority areas for tree protection, and shall be left in an undisturbed condition unless no practicable alternative is identified by the Natural Resources Manager. The following areas are designated as priority areas for tree protection:

(1) Trees in wetlands, floodplains, Chesapeake Bay Protection Areas and designated drainage ditches or riparian buffers. Drainage ditch flow routes are exempt from these requirements in order to maintain design flow volumes.

(2) Contiguous forests - forested corridors that connect with other forested tracts.

(3) Critical habitat - protection areas for rare, threatened or endangered species.

(4) Historic trees - associated with historic sites.

(5) Specimen trees - trees 30 inches in diameter or larger, or trees with 75 percent or more of the diameter of the state champion tree.

5. Compensation for Unavoidable Losses

a. Due to the difficulty and time required to replace the function provided by mature trees, replacement ratios shall be based on the size of the individual trees scheduled for removal. In lieu of performing tree replacement activities, the project proponent may elect to fund the replacement.

b. The ratio for determining the number of required replacement trees shall be one replacement tree for every 6" increment in the dbh (diameter breast height) of the tree to be removed, with the replacement ratio to be rounded upwards to the next increment. A minimum 1:1 replacement ratio shall be accomplished. As an example, the following replacement ratios shall be implemented:

- (1) Removal of 1" to 5.9" dbh tree: 1:1 replacement
- (2) Removal of 6" to 11.9" dbh tree: 2:1 replacement
- (3) Removal of 12" to 17.9" dbh tree: 3:1 replacement

c. Replacement tree species and planting locations must be approved by the installation Natural Resources Manager. Replacement planting shall be conducted in accordance with the requirements set forth in Attachment (D). The following guidelines shall be used in developing appropriate tree replacement procedures for each project:

(1) Size. At the time of planting, replacement trees shall be a minimum of two (2) inches caliper.

(2) Siting. Tree locations shall be based on sound urban forestry practices, and shall ensure adequate distance from buildings, sidewalks, roads, utilities, and other development to preclude the need for future tree removal. The location of replacement trees shall favor the benefits provided by trees in an urban setting, including noise attenuation, shading of cooling units and buildings, storm water management benefits, and sensible placement with respect to turf management areas.

(3) Reforestation. In instances where space or conditions at the project site are undesirable for tree replacement, the Natural Resources Manager will assist in identifying priority reforestation locations on installation. Priority planting areas include buffers for drainage ditches, corridors to connect existing forests, buffers

between differing land uses, plantings to achieve energy conservation and expansion of existing forests.

(4) Planting Seasons. Trees shall be planted during the proper planting season to benefit survival rates. For most shade tree species this is the dormant season or leaf-off period and runs from November through March, except when the ground is frozen.

6. Unauthorized Destruction of Trees

a. Instances where trees have been willfully damaged or are found in physically or structurally poor condition as a result of improper protection shall be adjudged as destruction of government property.

b. In instances where compensation for destruction cannot be agreed upon based on the replacement criteria outlined in Section 5 of this enclosure, the Natural Resources Manager may use procedures detailed by reference (m) to calculate tree value. The appraisal process includes valuation of the tree species, size, condition and location. Tree replacement and reimbursement will be the responsibility of the person or persons who caused the destruction.

ATTACHMENT A
TREE PROTECTION STANDARDS

1. Purpose. Proper tree protection during construction and grounds maintenance activities is essential to the long-term survival of trees in development areas.

2. Construction. Existing trees to be saved shall be protected by measures outlined in Attachment (B) to enclosure (1). In addition the following conditions apply:

a. An inventory and map of trees within the footprint of construction activity must be completed. This data should be used to minimize impacts from structures and improvements.

b. Whenever possible, protection areas should include groups rather than individual trees.

c. Excavating equipment should not be used to prune roots inside a protection area. Roots should be severed using a root pruner. If roots outside the tree protection area are encountered during construction, they should be severed using a sharp chainsaw, axe or handsaw.

d. Tunneling of utilities should be utilities whenever possible to reduce damage to tree roots. If tunneling or altering the route of utilities is not possible, roots should be pruned with a root pruner.

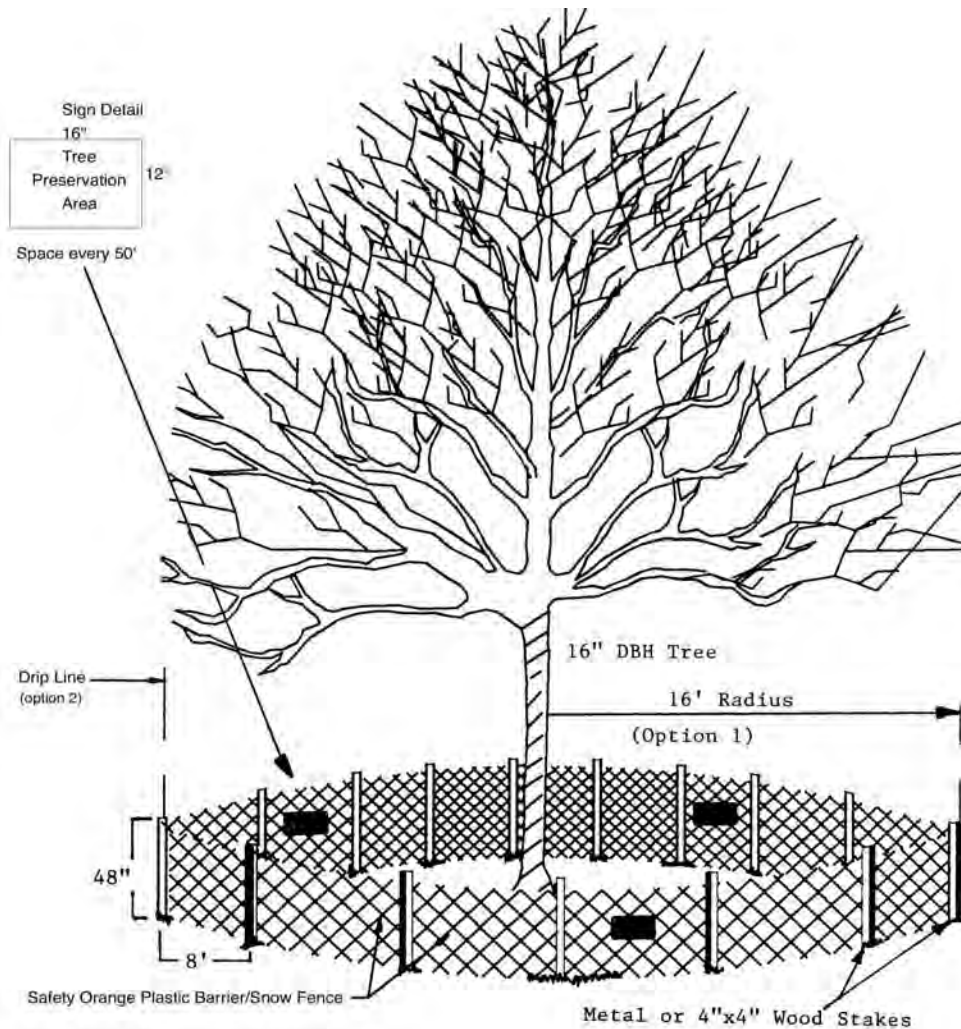
3. Grounds Maintenance. Grounds maintenance personnel shall be responsible for damage to trees and shrubbery in accordance with current grounds maintenance contract requirements. At a minimum, the following standards shall apply:

a. Contractors shall not subject trees, shrubs or hedges to damage by lawn mowers, string trimmers or other equipment. Damage includes wounds inflicted to bark, limbs or exposed roots.

b. Extreme care shall be exercised when performing grounds maintenance work around any of the defined priority areas for tree protection.

4. Tree planting and Care. All tree pruning shall be done in accordance with the information in Attachment (C) to enclosure (1). All tree plantings must be first approved by the installation Natural Resources Manager to ensure selection of proper species and siting. Planting of trees shall be done in accordance with procedures outlined in attachment (D) to enclosure (1). When determining planting locations, long-term survivability shall be considered based on sound forestry practices. Trees shall be planted in locations that favor the benefits of trees and to avoid future tree removal.

TREE PROTECTION DETAIL



1. Prior to any clearing, grading, or construction, tree protection fences (See Detail) shall be placed around all trees to be retained on the site to prevent the destruction or damaging of trees.

- Option 1. If site conditions permit, the radius of the tree protection fence shall be equal to 1 foot for every inch of tree diameter at breast height measured at four and a half (4½) feet above the surface of the ground.
- Option 2. If site conditions do not permit a fence system as large as described above then, the fence shall be located in a circular pattern with a radius equal to the length of the widest or longest branch, or drip line.

Attachment (B) to Enclosure (1)

a. Fence material shall be made of polypropylene or similar plastic material, and the color shall be safety orange and shall not be less than 48 inches in height.

b. Metal fence stakes or 4-inch x 4-inch wood posts shall be used to erect the fence. Sufficient stakes shall be used to ensure that the fence material remains upright without sagging. Spacing between wood or metal stakes shall not exceed 8 feet.

c. Signs (16 inch x 12 inch) shall be spaced every 50 feet along the fence indicating the site is a tree preservation area.

2. Materials shall not be stockpiled within the tree protection area, and vehicles and other equipment shall be excluded to avoid soil compaction and root damage. Equipment operator shall not damage tree trunks, limbs and roots during clearing, grading or construction operations.

3. Protected trees shall be kept free of nails or other fastening devices, signs, survey makers, and electrical wires.

4. In cases where the construction drawings indicate that utilities, sidewalks or other structures enter the tree protection area, the following protection measures shall be implemented.

a. Minimize disturbance to the root area by adjusting the tree protection fence and staying as far away from the tree as possible. Disturbance shall be minimized within the critical zone, which are 3 to 10 feet from the tree trunk.

b. Place 16 to 20 inches of wood chips (from trees already removed) or bark mulch over the root zone to reduce soil compaction from equipment.

c. Bridge the root area with plates of steel supported on wood ties.

d. Spread a heavy plastic tarp over the roots prior to placing excavated material on the ground. The tarp will serve as a marker for equipment operators indicating the existing grade and roots systems as they place the spoil material back into the excavated trench.

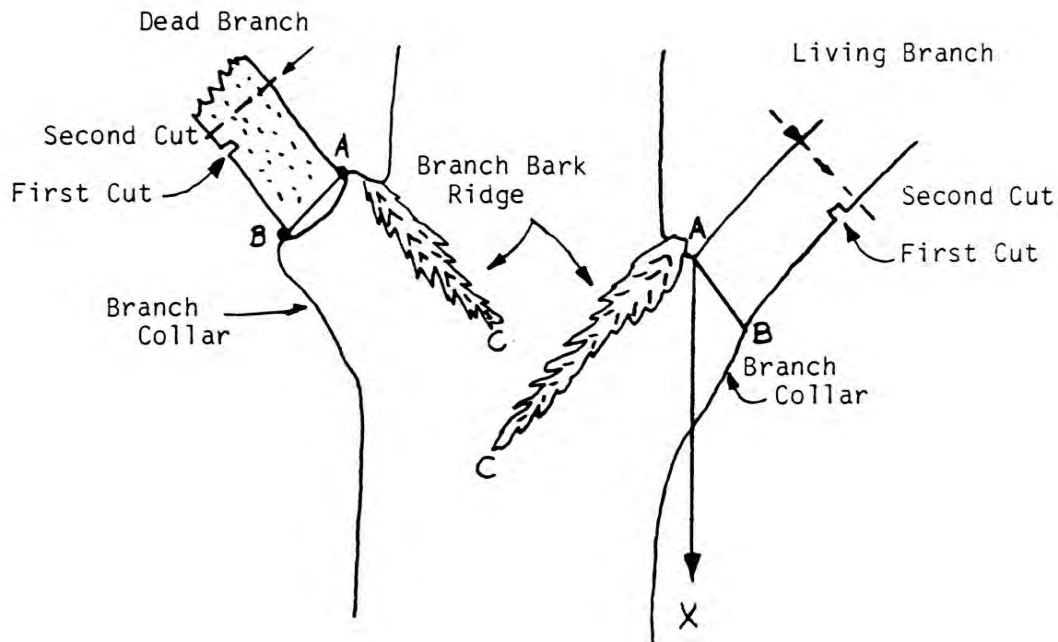
e. Pump concrete through conveyor pipes instead of driving vehicles over the tree roots.

TREE PRUNING DETAIL

1. The Contractor shall contact the Natural Resources Manager prior to initiating pruning on the trees designated for protection. Additional pruning techniques may be provided.
2. All cuts shall be made as close as possible to the trunk or parent limb without cutting into the branch collar or leaving a protruding stub (see Figure 1). Bark at the edge of all pruning cuts shall remain firmly attached.
3. All branches too large to support with one hand shall be precut (see Figure 1) to avoid splitting or tearing the bark. Where necessary, ropes or other equipment shall be used to lower large branches or stubs to the ground.
4. Treatment of cuts and wounds with wound dressing or paint shall not be permitted.
5. Equipment that will damage the bark or cambium layer shall not be used on or in the tree. The use of climbing spurs (hook, irons) shall not be permitted. Sharp tools shall be used so that clean cuts will be made at all times. Trucks and other support vehicles shall not be permitted inside the drip line of the tree canopy. Temporary removal of the tree protection fence shall be permitted to facilitate pruning, and removal of limbs and other woody material from under the drip line. The tree protection fence shall be erected immediately after pruning is complete.
6. All cut limbs and woody material shall be removed from the crown upon completion of pruning. All limbs, brush, leaves, and other woody material shall be removed from government property by the Contractor.
7. Pruning shall conform to the American National Standard for Tree Care Operations - Tree, Shrub, and Other Woody Plant Maintenance - Standard Practices, ANSI A300-1995 and International Society of Arboriculture Tree-Pruning Guidelines. Copies of both documents can be purchased by contacting the International Society of Arboriculture, PO Box 3129, Champaign, IL 61826-3129, tel 217-355-9411 or <http://www.isa-arbor.com>.
8. All work performed shall adhere to the American National Standard for Tree Care Operations-Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush - Safety Requirements, ANSI Z133.1-1994. Contact the International Society of Arboriculture, PO Box 3129, Champaign, IL 61826-3129, phone 217-355-9411, fax 217-355-9516, or web site www.isa-arbor.com to obtain a copy of ANSI Z133.1.
9. Tree maintenance contractors shall have an ISA Certified Arborist on-site during all tree maintenance operations.

TREE PRUNING DETAIL

1. Locate the branch ridge
2. Find target a - outside of branch bark ridge
3. Find target b - swelling where branch meets branch collar
4. If b is hard to find - drop a line at ax. angle $xac =$ to angle xab
5. Stub branch to be pruned
6. Make cut at line AB



Do not

- Cut behind the branch bark ridge
- Leave stubs
- Cut branch collar
- Paint cuts
- Use dull tools
- Use climbing spurs

TREE PLANTING DETAIL

Remember: Select
a Native Tree.

1. Growing Stock Inspection

a. All trees and shrubs shall meet the American Standard for Nursery Stock, ANSI Z60.1-1996. Contact the American Nursery & Landscape Association, 1250 I Street NW, Suite 500, Washington, DC 20005, tel 202-789-2900 or web site www.anla.org to obtain a copy of ANSI Z60.1-1996.

b. All trees shall be true to type or name as ordered or shown on the plans and shall be individually tagged or tagged in-groups by species and cultivar.

c. All trees shall be healthy, have a form typical for the species or cultivar, be well rooted, and stand upright without support. Tree size shall be not larger than 1-1/2" to 2" in caliper diameter.

d. All trees shall comply with federal and state laws requiring inspection for plant diseases and insect pest infestations.

e. The rootball of all trees shall be moist throughout and solid with little or no movement at the trunk. The crown shall show no signs of moisture stress. Check that the tree is free of girdling roots (roots that develop and grow across or around other roots), and free of knees (roots protruding above the soil). The roots should be abundant and white. Brown or black roots indicate a health problem.

f. Except for small-growing, multistemmed ornamentals, select trees that have a single, straight trunk and leader, and spreading branches. Reject trees with double leaders (codominant stems) or vigorous, upright branches competing with the leader. Radial and vertical distribution of branches shall form a symmetrical crown. Foliage should be evenly distributed on the upper 2/3 of the tree, and not concentrated at the top. The Government shall reject trees that have been severely pruned or headed back, with trunk injury, and without an abundance of healthy, green leaves.

2. Planting

a. Planting season is from November through March, except when the ground is frozen.

b. Site factors that influence long-term survivability must be considered: overhead and underground utilities, sidewalks, signage conflict, traffic visibility, light poles, etc. Utilities must be marked prior to excavation.

c. Balled and Burlapped (B&B) Stock: All synthetic or non-degradable material such as nylon rope or treated burlap must be

Attachment (D) of Enclosure (1) removed from the root ball prior to planting. All material including biodegradable material must be removed from the upper 1/3 of the root ball. Prevent remaining pieces from extending above the soil or they will act as wicks, drying the soil. Take extra care not to loosen or break the soil ball. If trees are planted

with wire baskets around the root ball, cut and remove the top two tiers of the wire after the ball is set in the hole.

d. Container Grown and Containerized Stock: Carefully remove the container at the planting site. Cutting the containers may be necessary. Remove all containers, including biodegradable paper-mache pots. Newly containerized stock may be only slightly rooted; the container must be removed with care so as not to disturb the root ball. In contrast, container grown stock may be rootbound. If roots are growing in a spiral around the soil ball, the plant is root bound. These roots need to be separated or they will eventually girdle the plant. Make vertical cuts on the sides of the ball just deep enough to cut the net of roots. Also, make a criss-cross cut across the bottom of the ball.

e. Mark out a planting area 3-5 times the diameter of the root ball. Use a rototiller or shovel to loosen and mix the soil in this entire area to a depth of 12 inches. Organic matter can be added to the loosened soil as long as the new material is used uniformly throughout the area. In the center of the prepared area, dig a hole as only as wide enough and deep enough to accept the root ball. The hole should allow the root ball to sit on solid ground rather than on loose soil. Once the ball is set in the hole, its upper surface should be level with or slightly above the surrounding ground.

f. Position the tree so that it is vertical and plumb to the ground and the main stem is growing straight up.

g. Backfill with soil from the planting site if the soil is not contaminated. Remove large rocks and construction debris from the soil. Amending the backfill soil with organic matter does not increase survival or growth of woody plants.

h. When the hole is half full, slowly water to saturate the soil, then continue to fill the hole. Settle the soil by watering or lightly tamping to ensure that all air pockets are eliminated. Do not pack the soil by using equipment or feet. Do not create an earthen berm around the tree.

i. Water thoroughly to remove air pockets, secure the soil around the roots, and provide nourishment.

j. Rake soil evenly around the entire planting area.

3. Mulching

a. Mulch an area at least 3 times the diameter of the root ball to a depth of 2-4 inches with wood chips, bark mulch, shredded leaves, or pine needles. Do not mound the mulch around the base of the tree.

4. Staking

a. Only stake the tree if it will not stand on its own, and use only one stake on the opposite side of the leaning tree. The stake is to be placed outside of the root ball.

b. Do not use wire even if the wire is in-cased by hose. Use a flexible tie attached to a single stake. Biodegradable material is recommended.

c. Do not wrap tree with protective tape. If tree arrives on the site with a protective tree wrap, remove it immediately after the tree is planted.

d. Remove stakes and ties after 1 year.

5. Pruning

a. At the time of planting dead, damaged and rubbing or cross branches can be removed.

b. Do not remove any other living branches. Do not apply any type of wound dressing.

c. Remove sucker sprouts from the base of the tree.

6. Watering

a. During the first growing season, irrigate the root ball with 5 gallons of water every three days after a rain event. Slow deep watering is recommended. Soil should be moistened to a depth of 12-18 inches. Water the soil within the root zone. Do not water the tree trunk.

7. Fertilizing

Fertilizer must be phosphorus free.

a. Use no fertilizer during the establishment period. The establishment period is about one year for every 1 inch of caliper. So, a 2-inch caliper tree would require two years to reestablish the top:root ratio.

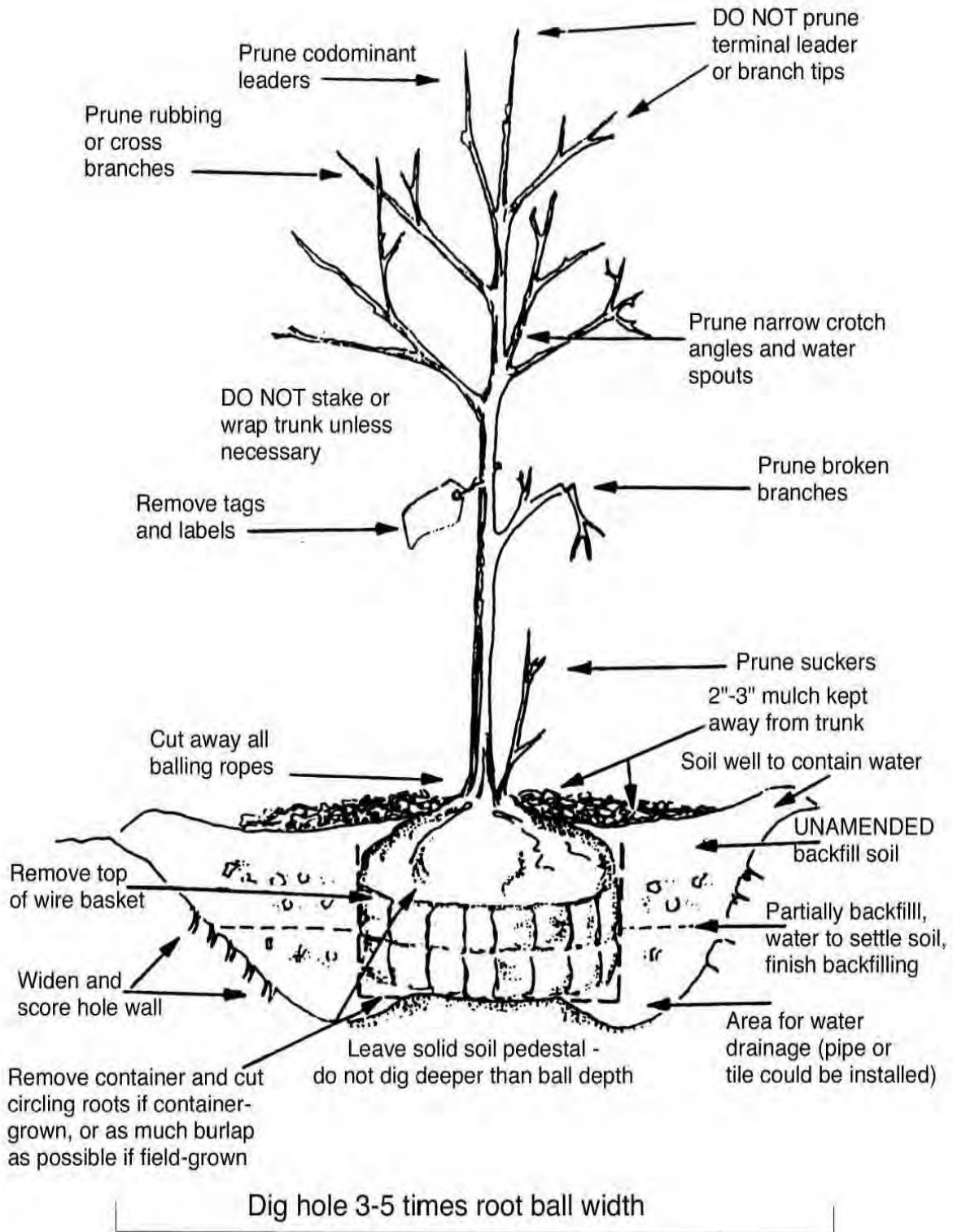
b. Once the trees are established, nitrogen fertilization should be applied at a rate of 2-lbs. N/1,000 square feet/year. Established, mature trees require minimal nitrogen, 1 lb. N/1,000 square feet/two to four years. All tree fertilizers must be slow or controlled release versus water-soluble.

c. Mature trees growing in fertilized turf should not be fertilized.

d. Apply fertilizers during October through April, except when the ground is frozen or covered with snow.

Reference: Principle and Practice of Planting Trees and Shrubs, 1997, Watson and Himelick, International Society of Arboriculture, PO Box 3129, Champaign, IL 61826-3129 or www.isa-arbor.com.

TREE PLANTING DETAIL



Pruning Trees

Pruning is the most common tree maintenance procedure. Although forest trees grow quite well with only nature's pruning, landscape trees require a higher level of care to maintain their safety and aesthetics. Pruning should be done with an understanding of how the tree responds to each cut. Improper pruning can cause damage that will last for the life of the tree, or worse, it will shorten the tree's life.

Reasons for Pruning

Since each cut has the potential to change the growth of the tree, no branch should be removed without a reason. Common reasons for pruning are to remove dead branches, to remove crowded or rubbing limbs, and to eliminate hazards. Trees may also be pruned to increase light and air penetration to the inside of the tree's crown or to the landscape below. In most cases, mature trees are pruned as a corrective or preventative measure.

When to Prune

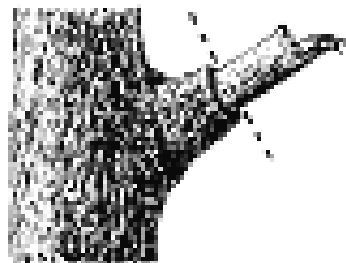
Most routine pruning to remove weak, diseased or dead limbs can be accomplished at any time during the year with little effect on the tree. As a rule, growth is maximized and wound closure is fastest if pruning takes place before the spring growth flush. Some trees, such as maples and birches, tend to "bleed" if pruned early in the spring. This may be unsightly, but is of little consequence to the tree.

A few tree diseases, such as oak wilt, can be spread when pruning wounds allow spores access into the tree. Susceptible trees should not be pruned during active transmission periods.

Heavy pruning just after the spring growth flush should be avoided. This is when trees have just expended a great deal of energy to produce foliage and early shoot growth. Removal of a large percentage of foliage at this time can stress the tree.

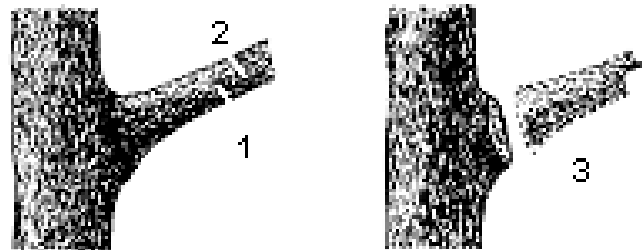
Making Proper Pruning Cuts to Mature Trees

Pruning cuts should be made just outside the branch collar. The branch collar contains trunk or parent branch tissue and should not be damaged or removed. If trunk collar has grown out on a dead limb to be removed, make the cut just beyond the collar. Do not cut the collar (see figure).



On a dead branch that has a collar of live wood, the final cut should be made just beyond the outer edge of the collar.

If a large limb is to be removed, its weight should first be reduced. This is done by making an undercut about 12-18 inches from the limb's point of attachment. A second cut is made from the top, directly above or a few inches further out on the limb. This removes the limb leaving the 12-18 inch stub. The stub is removed by cutting back to the branch collar. This technique reduces the possibility of tearing the bark



Use the 3-cut method to remove a large limb.

How Much Should be Pruned?

The amount of live tissue that should be removed depends on the tree size, species, and age, as well as the pruning objectives. Younger trees will tolerate the removal of a higher percentage of living tissue than mature trees. A common mistake is to remove too much inner foliage and small branches. It is important to maintain an even distribution of foliage along large limbs and in the lower portion of the crown. A widely accepted rule of thumb is never to remove more than one fourth of a tree's leaf bearing crown. In a mature tree, pruning even that much could have negative effects. Removing even a single, large-diameter limb can create a wound that the tree may not be able to close. The older and larger a tree becomes, the less energy it has in reserve to close wounds and defend against decay or insect attack. The pruning of large, mature trees is usually limited to the removal of dead or potentially hazardous limbs.

Wound Dressings

Wound dressings were once thought to accelerate wound closure, protect against insects and diseases, and reduce decay. However, research has shown that dressings do not reduce decay or speed closure, and rarely prevent insect or disease infestations. Most experts recommend that wound dressings not be used. If a dressing must be used for cosmetic purposes, then only a thin coating of a non-toxic material should be applied.

Newly Planted Trees

Pruning of newly planted trees should be limited to corrective pruning. Remove torn or broken branches. Save other pruning measures for the second or third year. The belief that trees should be pruned when planted to compensate for root loss is misguided. Trees need their leaves and shoot tips to provide food and the substances, which stimulate new root production. Unpruned trees establish faster, with a stronger root system than trees pruned at the time of planting.

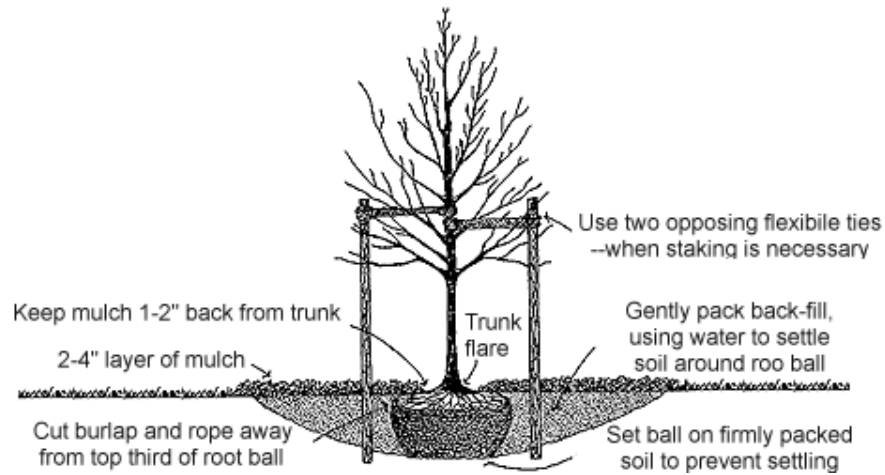
(From International Society Arboriculture at <http://www.isa-arbor.com/consumer/pruning.html>)

New Tree Planting

The ideal time to plant trees and shrubs is during the dormant season, in the fall after leafdrop or early spring before bud-break. Weather conditions are cool and allow plants to establish roots in the new location before spring rains and summer heat stimulate new top growth. However, trees properly cared for in the nursery or garden center, and given the appropriate care during transport to prevent damage, can be planted throughout the growing season. In either situation, proper handling during planting is essential to ensure a healthy future for new trees and shrubs. *Before you begin planting your tree, be sure you have had all underground utilities located prior to digging.*

If the tree you are planting is balled and burlapped, or bare rooted, it is important to understand that the tree's root system has been reduced by 90-95% of its original size during transplanting. As a result of the trauma caused by the digging process, trees will commonly exhibit what is known as **transplant shock**. Transplant shock is indicated by slow growth and reduced vigor following transplanting. Proper site preparation before and during planting, coupled with good follow up care will reduce the amount of time the plant experiences transplant shock and will allow the tree to quickly establish in its new location. Carefully follow eight simple steps and you can significantly reduce the stress placed on the plant at the time of planting.

1. **Dig a shallow, broad planting hole.** Make the hole wide, as much as three times the diameter of the root ball, but only as deep as the root ball. It is important to make the hole wide because the tree roots on the newly establishing tree must push through surrounding soil to establish. On most planting sites in new developments, the existing soils have been compacted and are unsuitable for healthy root growth. Breaking up the soil in a large area around the tree provides the newly emerging roots room to expand into loose soil to hasten establishment.
2. **Identify the trunk flare.** The trunk flare is where the roots spread at the base of the tree. This point should be partially visible after the tree has been planted (see diagram). If the trunk flare is not partially visible, you may have to remove some soil from the top of the root ball. Find it so you can determine how deep the hole needs to be for proper planting.
3. **Place the tree at the proper height.** Before placing the tree in the hole, check to see that the hole has been dug to the proper depth, and no more. The majority of the roots on the newly planted tree will develop in the top 12" of soil. If the tree is planted too deep, new roots will have difficulty developing due to a lack of oxygen. It is better to plant the tree a little high, 1-2" above the base of the trunk flare, than to plant it at or below the original growing level. This will allow for some settling (see diagram). To avoid damage when setting the tree in the hole, always lift the tree by the root ball, and never by the trunk.

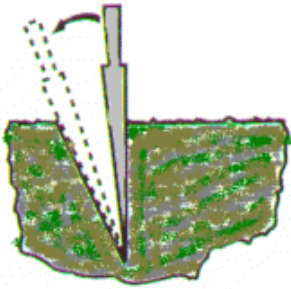


4. **Straighten the tree in the hole.** Before you begin backfilling have someone view the tree from several directions to confirm the tree is straight. Once you begin backfilling it is difficult to reposition.
5. **Fill the hole, gently but firmly.** Fill the hole about 1/3 full and gently but firmly pack the soil around the base of the root ball. Then, if the tree is balled and burlapped, cut and remove the string and wire from around the trunk and top 1/3 of the root ball (see diagram). Be careful not to damage the trunk or roots in the process. Fill the remainder of the hole, taking care to firmly pack soil to eliminate air pockets that may cause roots to dry out. To avoid this problem, add the soil a few inches at a time and settle with water. Continue this process until the hole is filled and the tree is firmly planted. It is not recommended to apply fertilizer at the time of planting.
6. **Stake the tree, if necessary.** If the tree is grown and dug properly at the nursery, staking for support is not necessary in most home landscape situations. Studies have shown that trees will establish more quickly and develop stronger trunk and root systems if they are not staked at the time of planting. However, protective staking may be required on sites where lawn mower damage, vandalism or windy conditions are concerns. If staking is necessary for support, two stakes used in conjunction with a wide flexible tie material will hold the tree upright, provide flexibility, and minimize injury to the trunk (see diagram). Remove support staking and ties after the first year of growth. Leave protective staking in place as long as necessary.
7. **Mulch the base of the tree.** Mulch is simply organic matter applied to the area at the base of the tree. It acts as a blanket to hold moisture, protect against harsh soil temperatures, both hot and cold, and reduces competition from grass and weeds. Some good choices are leaf litter, pine straw, shredded bark, peat moss, or wood chips. A two to four inch layer is ideal. More than four inches may cause a problem with gas exchange. When placing mulch, care should be taken so that the actual trunk of the tree is not covered. This may cause decay of the living bark at the base of the tree. A mulch-free area, one to two inches wide at the base of the tree, is sufficient to avoid moist bark conditions and prevent decay.

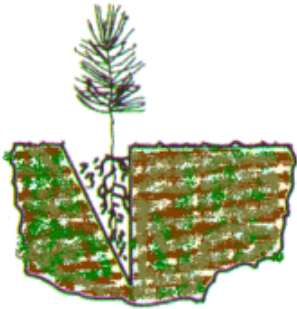
8. **Follow-up care.** Keep the soil moist but not soaked; overwatering will cause leaves to turn yellow or fall off. Water trees at least once a week, barring rain, and more frequently during hot weather. When the soil is dry below the surface of the mulch, it is time to water. Continue until mid-fall, tapering off for lower temperatures that require less frequent watering. Other follow-up care may include minor pruning of branches damaged during the planting process. Prune sparingly immediately after planting, and wait to begin necessary corrective pruning until after a full season of growth in the new location.

(Taken from the International Society of Arboriculture at <http://www.isa-arbor.com/consumer/planting.htm>)

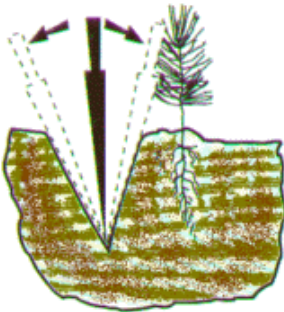
How to Plant with a Dibble Bar



1. Push the blade vertically into the soil then pull the handle toward you to open the hole.



2. Set the seedling 1 to 3 inches deeper than the nursery depth with the roots straight.



3. Push the blade into the soil just behind the planting hole then pull the handle back to close the bottom of the hole. Push the handle forward to close the top of the hole.

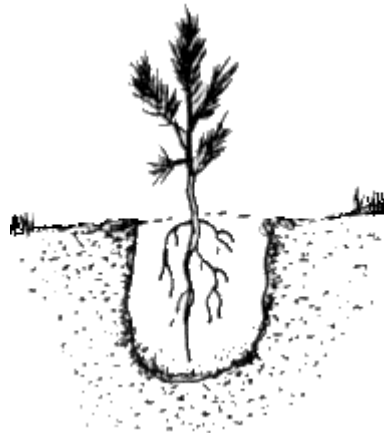


4. Pack the soil firmly with your heel.

(From South Carolina Forestry Commission at www.state.sc.us/forest/refplant.htm)

How to Plant Bare-root Trees

1. It is best to plant bare-root trees immediately, in order to keep the fragile roots from drying out. If you can't plant because of weather or soil conditions, store the trees in a cool place and keep the roots moist.
2. Unpack tree and soak in water 3 to 6 hours. Do not plant with packing materials attached to roots, and do not allow roots to dry out.
3. Dig a hole, wider than seems necessary, so the roots can spread without crowding. Remove any grass within a three-foot circular area. To aid root growth, turn soil in an area up to 3 feet in diameter.
4. Plant the tree at the same depth it stood in the nursery, without crowding the roots. Partially fill the hole, firming the soil around the lower roots. Do not add soil amendments.



5. Shovel in the remaining soil. It should be firmly, but not tightly packed with your heel. Construct a water-holding basin around the tree. Give the tree plenty of water.
6. After the water has soaked in, place a 2-inch deep protective mulch area 3 feet in diameter around the base of the tree (but not touching the trunk).
7. Water the tree generously every week or 10 days during the first year of establishment.

Recognizing Hazardous Trees

Hazardous Trees & Utility Lines. Trees that fall into utility lines have additional serious consequences. Not only can they injure people or property near the line, but hitting a line may cause power outages, surges, fires and other damage. Downed lines still conducting electricity are especially dangerous. A tree with a potential to fall into a utility line is a very serious situation.

Tree Hazard Checklist

Consider these questions . . .

1. Are there large dead branches in the tree?
2. Are there detached branches hanging in the tree?
3. Does the tree have cavities or rotten wood along the trunk or in major branches?
4. Are mushrooms present at the base of the tree?
5. Are there cracks or splits in the trunk or where branches are attached?
6. Have any branches fallen from the tree?
7. Have adjacent trees fallen over or died?
8. Has the trunk developed a strong lean?
9. Do many of the major branches arise from one point on the trunk?
10. Have the roots been broken off, injured or damaged by lowering the soil level, installing pavement, repairing sidewalks or digging trenches?
11. Has the site recently been changed by construction, raising the soil level or installing lawns?
12. Have the leaves prematurely developed an unusual color or size?
13. Have trees in adjacent wooded areas been removed?
14. Has the tree been topped or otherwise heavily pruned?

Managing Tree Hazards

One of these treatments may help make your tree safer. Reducing the risk associated with hazardous trees can take many forms.

1. **Prune the tree.** Remove the defective branches of the tree. Since in appropriate pruning may also weaken a tree,

2. **Provide routine care.** Mature trees need routine care in the form of water, fertilizer (in some cases), mulch and pruning as dictated by the season and their structure.

A number of treatments are best done by a Certified Arborist

1. **Cable and brace the tree.** Provide physical support for weak branches and stems to increase their strength and stability.
2. **Remove the tree.** Some hazardous trees are best removed. If possible, plant a new tree in an appropriate place as a replacement.

(From International Society of Arboriculture at <http://www.isa-arbor.com/consumer/hazards.html>)

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Enclosure 4. Native Plants for Landscaping



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ABOUT THE NATIVE PLANTS FOR CONSERVATION, RESTORATION AND LANDSCAPING PROJECT

This project is a collaboration between the Virginia Department of Conservation and Recreation and the Virginia Native Plant Society. VNPS chapters across the state helped to fund the 2011 update to this brochure.

The following partners have provided valuable assistance throughout the life of this project:

The Nature Conservancy – Virginia Chapter • Virginia Tech Department of Horticulture • Virginia Department of Agriculture and Consumer Services • Virginia Department of Environmental Quality, Coastal Zone Management Program • Virginia Department of Forestry • Virginia Department of Game and Inland Fisheries • Virginia Department of Transportation



FOR MORE INFORMATION

Virginia Department of Conservation and Recreation
Natural Heritage Program
804-786-7951
www.dcr.virginia.gov/natural_heritage/nativeplants.shtml

FOR A LIST OF NURSERIES THAT PROPAGATE NATIVE SPECIES, CONTACT:

Virginia Native Plant Society
400 Blandly Farm Lane, Unit 2
Boyce, VA 22620
540-837-1600 | vnpsoc@shentel.net
www.vnps.org



FOR A LIST OF NURSERIES IN A PARTICULAR REGION OF VIRGINIA, CONTACT:

The Virginia Nursery and Landscape Association
383 Coal Hollow Road
Christiansburg, VA 24073
540-382-0943 | vnla@verizon.net
To search for species in VNLA member catalogs, visit:
www.vnla.org/search.asp

ILLUSTRATIONS COURTESY OF THE FLORA OF VIRGINIA PROJECT.

Illustrators: Lara Gastinger, Roy Fuller and Michael Terry. To learn more, visit:
www.floraofvirginia.org



Native Plants

FOR CONSERVATION, RESTORATION & LANDSCAPING



VIRGINIA COASTAL PLAIN



WHAT ARE NATIVES?

Native species evolved within specific regions and dispersed throughout their range without known human involvement. They form the primary component of the living landscape and provide food and shelter for native animal species.

Native plants co-evolved with native animals over many thousands to millions of years and have formed complex and interdependent relationships. Our native fauna depend on native flora to provide food and cover. Many animals require specific plants for their survival.



BENEFITS OF NATIVE PLANTS

Using native species in landscaping reduces the expense of maintaining cultivated landscapes and minimizes the likelihood of introducing new invasive species. It may provide a few unexpected benefits as well.

Native plants often require less water, fertilizer and pesticide, thus adding fewer chemicals to the landscape and maintaining water quality in nearby rivers and streams. Fewer inputs mean time and money saved for the gardener.

Native plants increase the presence of desirable wildlife, such as birds and butterflies, and provide sanctuaries for these animals as they journey between summer and winter habitats. The natural habitat you create with native plants can become an outdoor classroom for children, or a place for you to find peace and quiet after a busy day.

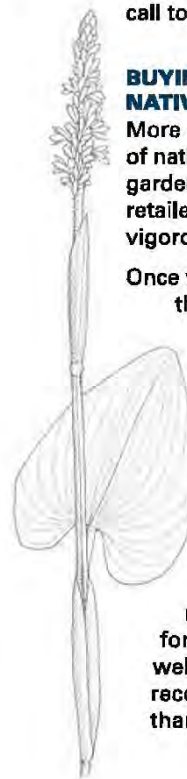
Native plants evoke a strong sense of place and regional character. For example, live oak and magnolia trees are strongly associated with the Deep South. Redwood trees characterize the Pacific Northwest. Saguaro cacti call to mind the deserts of the Southwest.

BUYING AND GROWING NATIVE PLANTS

More gardeners today are discovering the benefits of native plants and requesting them at their local garden centers. Because of this increased demand, retailers are offering an ever-widening selection of vigorous, nursery-propagated natives.

Once you've found a good vendor for native plants, the next step is choosing appropriate plants for a project. One of the greatest benefits of designing with native plants is their adaptation to local conditions. However, it is important to select plants with growth requirements that best match conditions in the area to be planted.

If you're planning a project using native plant species, use the list in this brochure to learn which plants grow in your region of Virginia. Next, study the minimum light and moisture requirements for each species, noting that some plants grow well under a variety of conditions. Many of the recommended species are well-suited to more than one of these categories.



For more information, refer to field guides and publications on local natural history for color, shape, height, bloom times and specific wildlife value of the plants that grow in your region. Visit a nearby park, natural area preserve, forest or wildlife management area to learn about common plant associations, spatial groupings and habitat conditions. For specific recommendations and advice about project design, consult a landscape or garden design specialist with experience in native plants.

WHAT ARE NON-NATIVE PLANTS?

Sometimes referred to as "exotic," "alien," or "non-indigenous," non-native plants are species introduced, intentionally or accidentally, into a new region by humans. Over time, many plants and animals have expanded their ranges slowly and without human assistance. As people began cultivating plants, they brought beneficial and favored species along when they moved into new regions or traded with people in distant lands. Humans thus became a new pathway, enabling many species to move into new locations.

WHAT ARE INVASIVE PLANTS?

Invasive plants are introduced species that cause health, economic or ecological damage in their new range. More than 30,000 species of plants have been introduced to the United States since the time of Columbus. Most were introduced intentionally, and many provide great benefits to society as agricultural crops and landscape ornamentals. Some were introduced accidentally, for example, in ship ballast, in packing material and as seed contaminants. Of these introduced species, fewer than 3,000 have naturalized and become established in the United States outside cultivation. Of the 3,500 plant species in Virginia, more than 800 have been introduced since the founding of Jamestown. The Virginia Department of Conservation and Recreation currently lists more than 100 of these species as invasive.

In the United States, invasive species cause an estimated \$120 billion in annual economic losses, including costs to manage their effects. Annual costs and damages arising from invasive plants alone are estimated at \$34 billion.

NATIVE PLANTS VS. INVASIVE PLANTS

Invasive plants have competitive advantages that allow them to disrupt native plant communities and the wildlife dependent on them. For example, kudzu (*Pueraria montana*) grows very rapidly and overtops forest canopy, thus shading other plant species from the sunlight necessary for their survival. A tall invasive wetland grass, common reed (*Phragmites australis* ssp. *australis*), invades and dominates marshes, reducing native plant diversity and sometimes eliminating virtually all other species.

Invasive species can marginalize or even cause the loss of native species. With their natural host plants gone, many insects disappear. And since insects are an essential part of the diet of many birds, the effects on the food web become far reaching. Habitats with a high occurrence of invasive plants become a kind of "green desert." Although green and healthy in appearance, far fewer native species of plants and animals are found in such radically altered places.

Virginia Coastal Plain

Virginia's Coastal Plain extends from the sands of Virginia Beach west to the fall line. Formed by marine sediments eroded from the Appalachian Highlands, the Coastal Plain varies in topography from north to south. In the north, the Northern Neck is somewhat hilly and well-drained. On the Middle Peninsula and Lower Peninsula, hills are less steep. South of the James River, the landscape levels off to about a 1-degree slope toward the ocean. In places, streams cut easily through the sands, gravels and clays to form well-developed ravine systems, and tidal rivers widen as the topography flattens. The Eastern Shore, separated from the mainland by the Chesapeake Bay, exhibits relatively little topography across the uplands extending from the Atlantic on the east to the bay on the west. From white sand beaches of the barrier islands, to tidal freshwater marshes, to blackwater swamps, to upland mixed hardwood and pine forests, the Coastal Plain has a diverse array of habitats for many native plant species.



Recommended Uses

W = Wildlife
H = Horticulture & landscaping
C = Conservation & restoration
D = Domestic livestock forage

Minimum Light Requirements

S = Shade
P = Partial sun
F = Full sun

Moisture Requirements

L = Low moisture
M = Moderate moisture
H = High moisture

Some species are marked with the following footnote symbols:

+ May be aggressive in a garden setting

* Due to the rarity and sensitivity of habitat in Virginia, these species are recommended for horticultural use only. Planting these species in natural areas could be detrimental to the survival of native populations.

Scientific Name	Common Name	Uses			Light			Moisture			
		W	H	C	D	S	P	F	L	M	H
Herbs											
<i>Achillea millefolium</i>	common yarrow	.	.	.	.	.	.	.	.	.	.
<i>Ageratina altissima</i>	white snakeroot	.	.	.	.	.	.	.	.	.	.
<i>Amsonia tabernaemontana</i>	blue star	.	.	.	.	.	.	.	.	.	.
<i>Anemone quinquefolia</i>	wood anemone	.	.	.	.	.	.	.	.	.	.
<i>Anemonella thalictroides</i>	rue anemone	.	.	.	.	.	.	.	.	.	.
<i>Aquilegia canadensis</i>	wild columbine	.	.	.	.	.	.	.	.	.	.
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	.	.	.	.	.	.	.	.	.	.
<i>Aruncus dioicus</i>	goatsbeard	.	.	.	.	.	.	.	.	.	.
<i>Asarum canadense</i>	wild ginger	.	.	.	.	.	.	.	.	.	.
<i>Asclepias incarnata</i>	swamp milkweed	.	.	.	.	.	.	.	.	.	.
<i>Asclepias syriaca</i>	common milkweed	.	.	.	.	.	.	.	.	.	.
<i>Asclepias tuberosa</i>	butterfly weed	.	.	.	.	.	.	.	.	.	.
<i>Baptisia tinctoria</i>	yellow wild-indigo	.	.	.	.	.	.	.	.	.	.
<i>Bidens cernua</i>	nodding beggar-ticks	.	.	.	.	.	.	.	.	.	.
<i>Boltonia asteroides</i> *	aster-like boltonia	.	.	.	.	.	.	.	.	.	.
<i>Caltha palustris</i>	marsh marigold	.	.	.	.	.	.	.	.	.	.
<i>Chamaecrista fasciculata</i>	partridge pea	.	.	.	.	.	.	.	.	.	.
<i>Chelone glabra</i>	white turtlehead	.	.	.	.	.	.	.	.	.	.
<i>Chrysogonum virginianum</i>	green and gold	.	.	.	.	.	.	.	.	.	.
<i>Chrysopsis mariana</i>	Maryland golden aster	.	.	.	.	.	.	.	.	.	.
<i>Cimicifuga racemosa</i>	black cohosh	.	.	.	.	.	.	.	.	.	.
<i>Clitoria mariana</i>	Maryland butterfly pea	.	.	.	.	.	.	.	.	.	.
<i>Conoclinium coelestinum</i>	blue mistflower	.	.	.	.	.	.	.	.	.	.
<i>Coreopsis lanceolata</i>	longstalk coreopsis	.	.	.	.	.	.	.	.	.	.
<i>Coreopsis tinctoria</i>	golden tickseed	.	.	.	.	.	.	.	.	.	.
<i>Coreopsis tripteris</i>	tall coreopsis	.	.	.	.	.	.	.	.	.	.
<i>Coreopsis verticillata</i>	threadleaf coreopsis	.	.	.	.	.	.	.	.	.	.
<i>Desmodium paniculatum</i>	narrow-leaf tick trefoil	.	.	.	.	.	.	.	.	.	.
<i>Equisetum hyemale</i>	horsetail	.	.	.	.	.	.	.	.	.	.
<i>Eupatoriadelphus fistulosus</i>	Joe-pye weed	.	.	.	.	.	.	.	.	.	.
<i>Eupatorium perfoliatum</i>	common boneset	.	.	.	.	.	.	.	.	.	.
<i>Helenium autumnale</i>	sneezeweed	.	.	.	.	.	.	.	.	.	.
<i>Helianthus angustifolius</i>	narrow-leaf sunflower	.	.	.	.	.	.	.	.	.	.
<i>Helianthus decapetalus</i>	ten-petaled sunflower	.	.	.	.	.	.	.	.	.	.
<i>Helianthus divaricatus</i>	woodland sunflower	.	.	.	.	.	.	.	.	.	.
<i>Heliopsis helianthoides</i>	oxyeye sunflower	.	.	.	.	.	.	.	.	.	.
<i>Hepatica nobilis</i> var. <i>obtusa</i>	round-lobed hepatica	.	.	.	.	.	.	.	.	.	.
<i>Heuchera americana</i>	alumroot	.	.	.	.	.	.	.	.	.	.
<i>Hibiscus moscheutos</i>	Eastern rosemallow	.	.	.	.	.	.	.	.	.	.
<i>Iris prismatica</i>	slender blueflag	.	.	.	.	.	.	.	.	.	.
<i>Iris virginica</i>	Virginia blue flag	.	.	.	.	.	.	.	.	.	.
<i>Kosteletskyia virginica</i>	seashore mallow	.	.	.	.	.	.	.	.	.	.
<i>Lespedeza capitata</i>	round-head bush clover	.	.	.	.	.	.	.	.	.	.
<i>Liatris pilosa</i> var. <i>pilosa</i>	grass-leaf blazing star	.	.	.	.	.	.	.	.	.	.
<i>Lilium superbum</i>	Turk's cap lily	.	.	.	.	.	.	.	.	.	.
<i>Lobelia cardinalis</i>	cardinal flower	.	.	.	.	.	.	.	.	.	.
<i>Lobelia siphilitica</i>	great blue lobelia	.	.	.	.	.	.	.	.	.	.
<i>Lupinus perennis</i>	lupine	.	.	.	.	.	.	.	.	.	.
<i>Maianthemum racemosum</i>	false Solomon's seal	.	.	.	.	.	.	.	.	.	.
<i>Mimulus ringens</i>	monkeyflower	.	.	.	.	.	.	.	.	.	.
<i>Monarda fistulosa</i>	wild bergamot	.	.	.	.	.	.	.	.	.	.
<i>Monarda punctata</i>	Horse-mint	.	.	.	.	.	.	.	.	.	.
<i>Nymphaea odorata</i>	American water lily	.	.	.	.	.	.	.	.	.	.
<i>Oenothera fruticosa</i>	sundrops	.	.	.	.	.	.	.	.	.	.
<i>Opuntia humifusa</i>	Eastern prickly-pear	.	.	.	.	.	.	.	.	.	.
<i>Packera aurea</i>	golden ragwort	.	.	.	.	.	.	.	.	.	.
<i>Peltandra virginica</i>	arrow arum	.	.	.	.	.	.	.	.	.	.
<i>Penstemon laevigatus</i>	smooth beardtongue	.	.	.	.	.	.	.	.	.	.
<i>Phlox paniculata</i>	summer phlox	.	.	.	.	.	.	.	.	.	.
<i>Podophyllum peltatum</i>	mayapple	.	.	.	.	.	.	.	.	.	.
<i>Polemonium reptans</i>	Jacob's ladder	.	.	.	.	.	.	.	.	.	.
<i>Polygonatum biflorum</i>	Solomon's seal	.	.	.	.	.	.	.	.	.	.
<i>Pontederia cordata</i>	pickerel weed	.	.	.	.	.	.	.	.	.	.
<i>Pycnanthemum incanum</i>	hoary mountain mint	.	.	.	.	.	.	.	.	.	.
<i>Pycnanthemum tenuifolium</i>	narrow-leaved mountain mint	.	.	.	.	.	.	.	.	.	.
<i>Rhexia virginica</i>	Virginia meadow-beauty	.	.	.	.	.	.	.	.	.	.
<i>Rudbeckia hirta</i>	black eyed Susan	.	.	.	.	.	.	.	.	.	.
<i>Rudbeckia laciniata</i>	cut-leaved coneflower	.	.	.	.	.	.	.	.	.	.
<i>Rudbeckia triloba</i>	three-lobed coneflower	.	.	.	.	.	.	.	.	.	.
<i>Sagittaria latifolia</i>	broadleaf arrowhead	.	.	.	.	.	.	.	.	.	.
<i>Salvia lyrata</i>	lyre-leaf sage	.	.	.	.	.	.	.	.	.	.
<i>Sanguinaria canadensis</i>	bloodroot	.	.	.	.	.	.	.	.	.	.
<i>Saururus cernuus</i>	lizard's tail	.	.	.	.	.	.	.	.	.	.
<i>Saxifraga virginiana</i>	early saxifrage	.	.	.	.	.	.	.	.	.	.
<i>Sedum ternatum</i>	wild stonecrop	.	.	.	.	.	.	.	.	.	.
<i>Senna marilandica</i>	Maryland wild senna	.	.	.	.	.	.	.	.	.	.
<i>Solidago caesia</i>	bluestem goldenrod	.	.	.	.	.	.	.	.	.	.
<i>Solidago odora</i>	sweet goldenrod	.	.	.	.	.	.	.	.	.	.
<i>Solidago pinetorum</i>	pinewoods goldenrod	.	.	.	.	.	.	.	.	.	.
<i>Solidago puberula</i>	downy goldenrod	.	.	.	.	.	.	.	.	.	.
<i>Solidago rugosa</i>	rough-stemmed goldenrod	.	.	.	.	.	.	.	.	.	.
<i>Solidago sempervirens</i>	seaside goldenrod	.	.	.	.	.	.	.	.	.	.
<i>Symphytichum concolor</i>	Eastern silvery aster	.	.	.	.	.	.	.	.	.	.
<i>Symphytichum cordifolium</i>	heart-leaved aster	.	.	.	.	.	.	.	.	.	.
<i>Symphytichum novi-belgii</i>	New York aster	.	.	.	.	.	.	.	.	.	.
<i>Symphytichum pilosum</i>	frost aster	.	.	.	.	.	.	.	.	.	.
<i>Tradescantia virginiana</i>	Virginia spiderwort	.	.	.	.	.	.	.	.	.	.
<i>Vernonia noveboracensis</i>	New York ironweed	.	.	.	.	.	.	.	.	.	.
<i>Viola cucullata</i>	marsh blue violet	.	.	.	.	.	.	.	.	.	.
<i>Viola pedata</i>	bird's foot violet	.	.	.	.	.	.	.	.	.	.
<i>Yucca filamentosa</i>	common yucca	.	.	.	.	.	.	.	.	.	.
<i>Zephyranthes atamasco</i>	Atamasco lily	.	.	.	.	.	.	.	.	.	.
Ferns & Fern Allies											
<i>Adiantum pedatum</i>	maidenhair fern	.	.	.	.	.	.	.	.	.	.
<i>Asplenium platyneuron</i>	ebony spleenwort	.	.	.	.	.	.	.	.	.	.
<i>Athyrium asplenoides</i>	Southern ladyfern	.	.	.	.	.	.	.	.	.	.
<i>Botrychium virginianum</i>	rattlesnake fern	.	.	.	.	.	.	.	.	.	.
<i>Dennstaedtia punctilobula</i>	hay-scented fern	.	.	.	.	.	.	.	.	.	.
<i>Dryopteris intermedia</i>	evergreen wood-fern	.	.	.	.	.	.	.	.	.	.
<i>Onoclea sensibilis</i>	sensitive fern	.	.	.	.	.	.	.	.	.	.
<i>Osmunda cinnamomea</i>	cinnamon fern	.	.	.	.	.	.	.	.	.	.
<i>Osmunda regalis</i>	royal fern	.	.	.	.	.	.	.	.	.	.
<i>Polystichum acrostichoides</i>	Christmas fern	.	.	.	.	.	.	.	.	.	.
<i>Thelypteris palustris</i>	marsh fern	.	.	.	.	.	.	.	.	.	.
<i>Woodwardia virginica</i>	Virginia chain fern	.	.	.	.	.	.	.	.	.	.
Grasses, Sedges & Rushes											
<i>Agrostis perennans</i>	autumn bentgrass	.	.	.	.	.	.	.	.	.	.
<i>Andropogon glomeratus</i>	bushy bluestem	.	.	.	.	.	.	.	.	.	.
<i>Andropogon virginicus</i>	broomsedge	.	.	.	.	.	.	.	.	.	.
<i>Arundinaria tecta</i>	switch cane	.	.	.	.	.	.	.	.	.	.
<i>Carex crinita</i>	long hair sedge	.	.	.	.	.	.	.	.	.	.
<i>Carex lurida</i>	sallow sedge	.	.	.	.	.	.	.	.	.	.
<i>Carex pensylvanica</i>	Pennsylvania sedge	.	.	.	.	.	.	.	.	.	.
<i>Carex stricta</i>	tussock sedge	.	.	.	.	.	.	.	.	.	.
<i>Chasmanthium latifolium</i>	river oats, spanglegrass	.	.	.	.	.	.	.	.	.	.
<i>Danthonia sericea</i>	silky oatgrass	.	.	.	.	.	.	.	.	.	.
<i>Danthonia spicata</i>	poverty oatgrass	.	.	.	.	.	.	.	.	.	.
<i>Dichanthelium clandestinum</i>	deer-tongue	.	.	.	.	.	.	.	.	.	.
<i>Dichanthelium commutatum</i>	variable panicgrass	.	.	.	.	.	.	.	.	.	.
<i>Dulichium arundinaceum</i>	dwarf bamboo	.	.	.	.	.	.	.	.	.	.
<i>Elymus hystrix</i>	bottlebrush grass	.	.	.	.	.	.	.	.	.	.
<i>Elymus virginicus</i>	Virginia wild rye	.	.	.	.	.	.	.	.	.	.
<i>Juncus canadensis</i>	Canada rush	.	.	.	.	.	.	.	.	.	.
<i>Juncus effusus</i>	soft rush	.	.	.	.	.	.	.	.	.	.
<i>Leersia oryzoides</i>	rice cutgrass	.	.	.	.	.	.	.	.	.	.
<i>Panicum amarum</i>	coastal panic grass	.	.	.	.	.	.	.	.	.	.
<i>Panicum virgatum</i>	switch grass	.	.	.	.	.	.	.	.	.	.
<i>Saccharum giganteum</i>	giant plumegrass	.	.	.	.	.	.	.	.	.	.
<i>Schizachyrium scoparium</i>	little bluestem	.	.	.	.	.	.	.	.	.	.
<i>Scirpus cyperinus</i>	woolgrass bulrush	.	.	.	.	.	.	.	.	.	.
<i>Sorghastrum nutans</i>	Indian grass	.	.	.	.	.	.	.	.	.	.
<i>Sparganium americanum</i>	American bur-reed	.	.	.	.	.	.	.	.	.	.
<i>Tridens flavus</i>	redtop	.	.	.	.	.	.	.	.	.	.
<i>Tripsacum dactyloides</i>	gama grass	.	.	.	.	.	.	.	.	.	.
<i>Typha latifolia</i>	broad-leaved cattail	.	.	.	.	.	.	.	.	.	.
<i>Zizania aquatica</i>	wild rice	.	.	.	.	.	.	.	.	.	.

Scientific Name	Common Name	Uses			Light			Moisture			
		W	H	C	D	S	P	F	L	M	H
Vines											
<i>Bignonia capreolata</i>	crossvine	.</									

Enclosure 5. NAS Oceana Instruction 5090.2E (Procedures for Cutting Firewood and Use of Tree Products)

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DEPARTMENT OF THE NAVY

1750 TOMCAT BOULEVARD
NAVAL AIR STATION OCEANA
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO:

NASOCEANAINST 5090.2E

18

25 OCT 1999

NAS OCEANA INSTRUCTION 5090.2E

Subj: PROCEDURES FOR CUTTING FIREWOOD AND USE OF TREE PRODUCTS

Ref: (a) OPNAVINST 5090.1B
(b) NAVFAC P-73

Encl: (1) Chainsaw Safety

1. Purpose. To establish procedures governing cutting of trees for firewood and obtaining other forest products on board Naval Air Station (NAS) Oceana, Fleet Combat Training Center (FCTC) Dam Neck and Naval Auxiliary Landing Field (NALF) Fentress.

2. Cancellation. NASOCEANAINST 5090.2D. Because of numerous revisions, paragraph markings have been omitted.

3. Definition. Forest products, for the purpose of this instruction include: Pine straw, live and felled trees and scrap lumber or pallets.

4. Policy. It is the continuing policy of the Secretary of the Navy that all Navy facilities and installations having land areas with a potential for timber production have an active program for the conservation and management of forest resources as outlined in reference (a).

5. Responsibilities

a. Natural Resources Manager, Regional Environmental Group Oceana shall administer and oversee the Firewood Program by designating areas for cutting, issuing permits, collecting fees and monitoring cutting. Methods of dispersal, sales and handling of funds shall be per references (a) and (b). Reference (a) notes that forest products will not be given away, abandoned, carelessly destroyed, used to offset costs of contracts or traded for products, supplies or services.

b. Base Security, with support from the designated Game Wardens, shall be responsible for enforcing this instruction and any conditions of firewood permits. At NALF Fentress woodcutters shall sign out in the visitor's logbook at the Crash Captain's Desk, Building 100.

c. Cutters and Gatherers shall comply with this instruction, applicable state and federal regulations and enclosure (1).

25 OCT 1999

6. General

a. Authorized Personnel. The following persons are authorized to cut firewood and obtain other forest products on NAS Oceana, FCTC Dam Neck and NALF Fentress:

- (1) Active duty military personnel
- (2) Retired military personnel
- (3) Federal civilian employees of NAS Oceana or FCTC Dam Neck
- (4) Reservists

b. Utilization. All purchased wood is for the sole benefit of the purchaser's personal home use and is not to be resold.

7. Procedures

a. Permits. All persons cutting or collecting firewood or other wood products on NAS Oceana, FCTC Dam Neck or NALF Fentress shall have a firewood permit.

(1) Firewood permits are obtainable only from the Regional Environmental Group Oceana, Building 830 or Natural Resources Center, Building 78. A permit will be issued for a specific day and area and displayed on the vehicle dashboard. Cutting outside of designated days or areas may constitute a charge of trespassing.

(2) At the time of permit issuance, individuals shall be required to complete and sign a general release statement which relieves the federal government of all liability in case of accident or injury.

(3) There is a nominal charge for tree products. Prices may vary due to changes in marketability of a product. Loads larger or smaller than the standard fees listed below shall be priced by the Natural Resources Manager according to seasonal demand and availability.

- Firewood - \$20.00/small pickup truck load (cut-your-own)
- Firewood - \$30.00/small pickup truck load (cut and split, when available)
- Firewood - \$25.00/standard 8 foot bed pickup truck load (cut-your-own)
- Firewood - \$40.00/standard 8 foot bed pickup truck load (cut and split, when available)

25 OCT 1999

Scrap lumber, crates, and pallets - \$ 10.00/pickup truck load

Pine straw - \$ 5.00/pickup truck load

Live trees - \$ 10.00 - \$25.00/tree. Varies with species and availability. Requires prior approval from the Natural Resources Manager.

(4) Permits shall specify the date of harvest and/or collection and can be used only for the specified number of loads.

(5) Individuals may not remove more than three cords of wood per calendar year.

b. Harvesting

(1) Individuals shall provide their own cutting and hauling equipment.

(2) Wood shall be cut only in locations on NAS Oceana, FCTC Dam Neck and NALF Fentress designated by the Natural Resources Manager.

(3) Firewood shall be cut during daylight hours only.

(4) Unless otherwise specified on the permit, only trees within the designated area that have been previously felled may be taken.

(5) No minors (under the age of 18) shall be allowed to operate a chainsaw or any other sharp tools, such as a saw, hatchet or axe.

(6) Limbs and/or brush shall be removed at least twenty feet away from any road or firebreak and removed from any stream or standing body of water.

(7) Young trees shall be protected and there shall be no ground disturbances that could cause erosion.

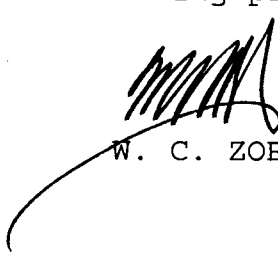
(8) Littering is prohibited at all times. Individuals found littering shall have their woodcutting privileges suspended.

(9) Operating a chainsaw while under the influence of alcohol is prohibited. Individuals found guilty of consuming alcoholic beverages while on the worksite shall have their privileges revoked.

NASOCEANAINST 5090.2E

25 OCT 1999

8. Violations. Individuals found violating the provisions of this instruction may have wood cutting privileges suspended or revoked.



W. C. ZOBEL

Distribution:
NASOCEANAINST 5216.1U
List I (Case A), III and IV

25 OCT 1999

CHAINSAW SAFETY

1. Wear snug fitting clothes, gloves, and heavy boots.
2. Wear ear and eye protection.
3. Avoid kick-back. Never cut with the nose of the guidebar.
4. Avoid over reaching and cutting above shoulder height.
5. Have non-alcoholic beverages on hand to prevent dehydration in hot and cold weather.
6. Use a sharp chain, set at the proper tension.
7. Stay clear of the cutting path of the chainsaw.



Appendix E

Wetland and Watershed Maps/Information

Enclosure 1 Preliminary Wetland Jurisdictional Determination

Enclosure 2 50ft Wetland/Riparian Buffer Map

Enclosure 3 Watershed/Hydrologic Unit Maps

Enclosure 1 Preliminary Wetland Jurisdictional Determination



DEPARTMENT OF THE ARMY
NORFOLK DISTRICT CORPS OF ENGINEERS
FORT NORFOLK 803 FRONT STREET
NORFOLK VIRGINIA 23510-1096

MARCH 10, 2011

PRELIMINARY JURISDICTIONAL DETERMINATION

Southern Virginia Regulatory Section
NAO-2010-2830 (Redwing Lake/Atlantic Ocean)

Mr. David Noble
Environmental Planning and Conservation
Navy Region, Mid-Atlantic
1510 Gilbert Street
Norfolk, Virginia 23511-2737

Dear Mr. Noble:

This letter is in regard to your request for a preliminary jurisdictional determination for waters of the U.S. (including wetlands) on property known as NASO Dam Neck DEVGRU Compound, located on a 208-acre parcel at Naval Air Station Oceana Dam Neck (NASO Dam Neck), in Virginia Beach, Virginia (GPIN #24253926610000 and 24257432440000).

The maps titled "Figure 4 Sheet Key. Aquatic Resources Map for DevGru Compound on NASO Dam Neck, Virginia Beach, Virginia; Figure 4a. Aquatic Resources Map for DevGru Compound on NASO Dam Neck, Virginia Beach, Virginia; and Figure 4b. Aquatic Resources Map for DevGru Compound on NASO Dam Neck, Virginia Beach, Virginia", prepared by Tetra Tech, dated March 2011 and Corps date stamped as received March 4, 2011 (copies enclosed) provides the locations of waters and/or wetlands on the property listed above. The basis for this delineation includes application of the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region and the positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation and/or the presence of an ordinary high water mark.

Discharges of dredged or fill material, including those associated with mechanized landclearing, into waters and/or wetlands on this site may require a Department of the Army permit and authorization by state and local authorities including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC) and/or a permit from the City of Virginia Beach Wetlands Board. This letter is a confirmation of the Corps preliminary jurisdiction for the waters and/or wetlands on the subject property and does not authorize any work in these areas. Please obtain all required permits before starting work in the delineated waters/wetland areas.

This is a preliminary jurisdictional determination and is therefore not a legally binding determination regarding whether Corps jurisdiction applies to the waters or wetlands in question. Accordingly, you may either consent to jurisdiction as set out in this preliminary jurisdictional determination and the attachments hereto if you agree with the determination, or you may request and obtain an approved jurisdictional determination. This preliminary jurisdictional

determination and associated wetland delineation map may be submitted with a permit application.

This delineation of waters and/or wetlands is valid for a period of five years from the date of this letter unless new information warrants revision prior to the expiration date.

Enclosed is a copy of the "Preliminary Jurisdictional Determination Form". Please review the document, sign, and return one copy to Ms. Katy Damico, of my staff, either via email (katy.r.damico@usace.army.mil) or via standard mail to US Army Corps of Engineers, Regulatory Office, and ATTN: Katy Damico, 803 Front Street Norfolk, Virginia 23510 within 30 days of receipt and keep one for your records.

If you have any questions, please contact Katy Damico, of my staff, either via telephone at (757) 201-7121 or via email at katy.r.damico@usace.army.mil .

Sincerely,



FOR Lynette R. Rhodes
Chief, Southern Virginia Regulatory Section

Enclosures: Preliminary Jurisdictional Determination Form
Wetland/Waters Delineation Maps
Supplemental Preapplication Information

Cc: Mr. Thad McDonald, Natural Resources, NAVFAC MIDLANT
Ms. Lindsay Eiser, Tetra Tech, Agent
Mr. Jeff Hannah, Kerr Environmental Services Corp, Agent
Ms. Sheri Kattan, Virginia Department of Environmental Quality

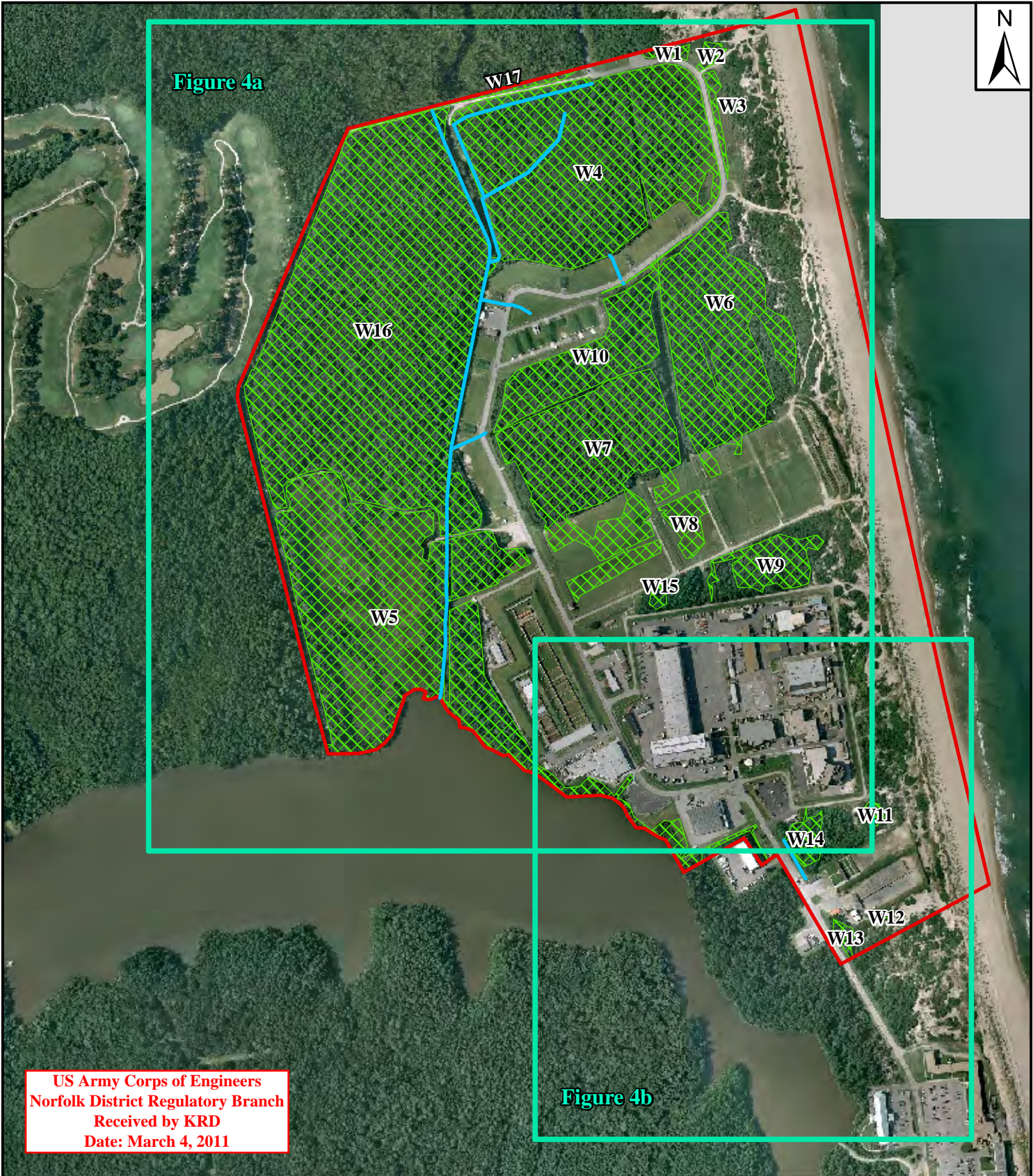


Figure 4a

Figure 4b

US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KRD
 Date: March 4, 2011

Legend

- Project Boundary
- Sheet Boundary
- Jurisdictional Wetlands*
- Jurisdictional Waters*

*USACE jurisdiction based on preliminary JD.


0 350 700
 Feet

0 84 168
 Meters

Source: Received from Navy October 2010. Aquatic resources, Tetra Tech November 2010.

Figure 4 Sheet Key. Aquatic Resources Map for DevGru Compound on NASO Dam Neck, Virginia Beach, Virginia.

Prepared For: 
 Naval Facilities Engineering Command

Prepared By:  TETRA TECH

Date: 3/2011

US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KR D
 Date: March 4, 2011



Legend

- Project Boundary
- Jurisdictional Wetlands*
- Jurisdictional Waters*
- Wetland Plots
- Upland Plots

0 225 450
 Feet

0 54 108
 Meters

Source: Received from Navy October 2010. Aquatic resources, Tetra Tech November 2010.

Figure 4a. Aquatic Resources Map for DevGru Compound on NASO Dam Neck, Virginia Beach, Virginia.

Prepared For:



Prepared By:



Date:
 3/2011

*USACE jurisdiction based on preliminary JD.

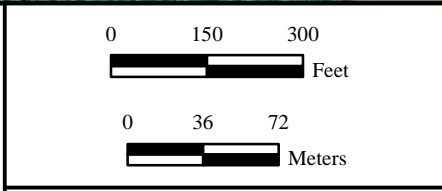


US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KR D
 Date: March 4, 2011

Legend

- Project Boundary
- Jurisdictional Wetlands*
- Jurisdictional Waters*
- ⊕ Wetland Plots
- ⊕ Upland Plots

*USACE jurisdiction based on preliminary JD.



Source: Received from Navy October 2010. Aquatic resources, Tetra Tech November 2010.

Figure 4b. Aquatic Resources Map for DevGru Compound on NASO Dam Neck, Virginia Beach, Virginia.

Prepared For: 

Prepared By: 

Date: 3/2011

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

BACKGROUND INFORMATION:

A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD): Thursday, March 10, 2011

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:

Mr. David Noble
Environmental Planning and Conservation
Navy Region, Mid-Atlantic
1510 Gilbert Street
Norfolk, Virginia 23511-2737

C. DISTRICT OFFICE: Norfolk District (CENAO-REG)

FILE NAME: NASO Dam Neck DEVGRU Compound JD

FILE NUMBER: NAO-2010-2830

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)

State: **VIRGINIA** County/parish/borough: Virginia Beach City: Virginia Beach

Center coordinates of site (lat/long in degree decimal format):

Latitude: 36.79830508680 ° N Longitude: -75.9665745751 ° W

Universal Transverse Mercator: n/a

Name of nearest waterbody: Redwing Lake (to the south, Lovetts Marsh (to the north)
and the Atlantic Ocean (to the east)

Identify (estimate) amount of waters in the review area:

Non-wetland waters: linear feet; width (ft); and/or acres.

Cowardin Class: manmade swales and drainage ditches

Stream Flow: n/a

Wetlands: 134.10 +/- acres

Cowardin Class: PFO / PSS/ PEM

Name of any water bodies on the site that have been identified as Section 10 waters:

Tidal: Atlantic Ocean

Non-Tidal: Redwing Lake

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

Office (Desk) Determination. Date: March 10, 2011

Field Determination. Date(s): February 23, 2011

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring “pre-construction notification” (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant’s acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

3. This preliminary JD finds that there “*may be*” waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA:

Data reviewed for preliminary JD (check all that apply) - checked items should be included in case file and, where checked and requested, appropriately reference sources below.

- Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
 TetraTech c/o NAVFAC-MIDLANT
 451 Presumpscot Street
 Portland, Maine 04103

- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
 - Office concurs with data sheets/delineation report. dated 11/23.10; revised 3/2011
 - Office does not concur with data sheets/delineation report.
- Data sheets prepared by the Corps:
- Corps navigable waters' study:
- U.S. Geological Survey Hydrologic Atlas:
 - USGS NHD data.
 - USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name: 7.5 minute quad; Virginia Beach Quad
- USDA Natural Resources Conservation Service Soil Survey.

Citation:

- National wetlands inventory map(s). Cite name:
- State/Local wetland inventory map(s):
- FEMA/FIRM maps:
- 100-year Floodplain Elevation: (National Geodetic Vertical Datum of 1929)
- Photographs: Aerial (Name & Date):
or Other (Name & Date):
- Previous determination(s): DEVGRU Wetland Delineation (October 1, 2008)
File no. and date of response letter: NAO-2008-3381
- Other information (please specify):

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.



Signature
Regulatory Project Manager
(REQUIRED)

2011-03-10

Date

Signature of person requesting
Preliminary JD
(REQUIRED, unless obtaining the signature is impracticable)

Date

Table 1. Wetland Feature Summary for DEVGRU Compound, NASO Dam Neck.

Wetland Label	Field Wetland Classification¹	On Base Area (acre)	Comment
Wetland W1	PSS/PEM	0.26	Depressional, small wetland that continues of northern boundary adjacent to back-dune community.
Wetland W2	PSS/PEM	0.28	Depressional, isolated wetland located adjacent to back-dune community.
Wetland W3	PEM/PSS	0.41	Depressional, isolated near northern shoreline within back-dune community
Wetland W4	PFO/PSS	24.01	Forested wetland bound by Regulus Road.
Wetland W5	PFO/PEM/PSS	28.50	Forested wetland surrounding deep, emergent wetland; abuts Redwing Lake.
Wetland W6	PFO	12.20	Adjacent to Known Distance (KD) Range.
Wetland W7	PFO/PEM	13.72	Forested wetland adjacent to KD Range.
Wetland W8	PEM	1.13	Depressional, isolated emergent wetland within maintained field of KD Range.
Wetland W9	PFO	2.41	Depressional, forested wetland that abuts coast dune community and is adjacent to KD Range.
Wetland W10	PFO	5.75	Forested wetland that is connected to W6 via W18.
Wetland W11	PFO	0.19	Depressional, small forested wetland within back-dune community.
Wetland W12	PFO	0.03	Depressional, small forested wetland within back-dune community.
Wetland W13	PFO	0.27	Depressional, forested wetland near security gate and east of Regulus Road
Wetland W14	PFO	0.87	Depressional, forested wetland east of Regulus Road and north of W13.
Wetland W15	PFO	0.21	Depressional, small forested wetland adjacent to KD Range.
Wetland W16	PFO	43.28	Extensive forested wetland in northeast portion of Project area.
Wetland W17	PSS/PEM	0.52	Southern edge of extensive forested wetland located to north of Project area.
Wetland W18	PEM	0.06	Depressional, small emergent wetland that connects W6 and W10.
	TOTAL	134.10	

US Army Corps of Engineers
Norfolk District Regulatory Branch
Received by KR D
Date: March 4, 2011

Table 2. Linear Water Feature Summary for DEVGRU Compound, NASO Dam Neck.

Stream Label	Name	Flow Regime	Direction of Flow	Comment
Jurisdictional Water 1	Unnamed	Ephemeral	North	Manmade swale that flows into W4.
Jurisdictional Water 2	Unnamed	Ephemeral	South	Manmade swale that flows through culvert under Regulus Rd.
Jurisdictional Water 3	Unnamed	Perennial	South	Modified drainage that enters Project area at north end and flows south into Redwing Lake; has been deepened and straightened.
Jurisdictional Water 4	Unnamed	Ephemeral	West	Manmade swale that drains magazine area on east side of Regulus Rd.; flows into PS3.
Jurisdictional Water 5	Unnamed	Ephemeral	West	Manmade swale that drains wetlands to east of Regulus Rd.; flows into PS3.
Jurisdictional Water 6	Unnamed	Intermittent	West	Modified drainage that has been deepened and diverted; flows into JW7
Jurisdictional Water 7	Unnamed	Perennial	West-South	Modified drainage that has been; flows into JW3

US Army Corps of Engineers
Norfolk District Regulatory Branch
Received by KRD
Date: March 4, 2011



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NORFOLK DISTRICT CORPS OF ENGINEERS
FORT NORFOLK 803 FRONT STREET
NORFOLK VIRGINIA 23510-109

MARCH 10, 2011

Supplemental Preapplication Information

Project Number: NAO-2010-2830
Applicant: Mr. David Noble, NAVFAC MIDLANT
Project Location: NASO Dam Neck DEVGRU Compound

1. A search of the Virginia Department of Historic Resources data revealed the following:

- No known historic properties are located on the property.
- The following known architectural resources are located on the property:
- The following known archaeological resources are located on the property:
 - 44VB0082: - eligibility unknown
 - 44VB0085: - eligibility unknown
 - 44VB0308: - eligible (7/19/2004)
 - 44VB0091: - eligibility unknown
- The following known historic resources are located in the vicinity of the property (potential for effects to these resources from future development):

NOTE:

- 1) *The information above is for planning purposes only. In most cases, the property has not been surveyed for historic resources. Undiscovered historic resources may be located on the subject property or adjacent properties and this supplemental information is not intended to satisfy the Corps' requirements under Section 106 of the National Historic Preservation Act (NHPA).*
- 2) *Prospective permittees should be aware that Section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant.*

2. A search of the data supplied by the Virginia Department of Conservation and Recreation and the Virginia Department of Game and Inland Fisheries revealed the following:

- No known populations of federally listed threatened or endangered species are located on the property or within a one-half (0.50) mile radius.
- The following federally-listed species are known to be within a one to two mile radius of the property:
- The following state-listed (or other) species are known to be within a one to two mile radius of the property:

Please note this information is being provided to you based on the preliminary data you submitted to the Corps relative to project boundaries and project plans. Consequently, these findings and recommendations are subject to change if the project scope changes or new information becomes available and the accuracy of the data.



**DEPARTMENT OF THE ARMY
NORFOLK DISTRICT CORPS OF ENGINEERS
FORT NORFOLK 803 FRONT STREET
NORFOLK VIRGINIA 23510-1096**

January 30, 2012

PRELIMINARY JURISDICTIONAL DETERMINATION

Southern Virginia Regulatory Section
NAO-2008-3381 (NASO Dam Neck Annex)

Mr. David Noble
Environmental Planning and Conservation
Navy Region, Mid-Atlantic
1510 Gilbert Street
Norfolk, Virginia 23511-2737

Dear Mr. Noble:

This letter is in regard to your request for a preliminary jurisdictional determination for waters of the U.S. (including wetlands) on property known as Naval Air Station Oceana Dam Neck (NASO Dam Neck), located at the end of Dam Neck Road in Virginia Beach, Virginia.

The maps entitled "Figure 4-4l. Aquatic Resources Map for NASO Dam Neck Annex Wetland Delineation Virginia Beach, Virginia", prepared for the Naval Facilities Engineering Command, by Tetra Tech, dated December 2011, and Corps date stamped as received December 15, 2011 (copy enclosed) provides the locations of waters and/or wetlands on the property listed above. The basis for this delineation includes application of the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region and the positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation and the presence of an ordinary high water mark.

Discharges of dredged or fill material, including those associated with mechanized landclearing, into waters and/or wetlands on this site may require a Department of the Army permit and authorization by state and local authorities including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC) and/or a permit from your local wetlands board. This letter is a confirmation of the Corps preliminary jurisdiction for the waters and/or wetlands on the subject property and does not authorize any work in these areas. Please obtain all required permits before starting work in the delineated waters/wetland areas.

This is a preliminary jurisdictional determination and is therefore not a legally binding determination regarding whether Corps jurisdiction applies to the waters or wetlands in question. Accordingly, you may either consent to jurisdiction as set out in this preliminary jurisdictional determination and the attachments hereto if you agree with the determination, or you may request and obtain an approved jurisdictional determination. This preliminary jurisdictional determination and associated wetland delineation map may be submitted with a permit application.

Enclosed is a copy of the "Preliminary Jurisdictional Determination Form". Please review the document, sign, and return one copy to Ms. Katy Damico, of my staff, either via email (katy.r.damico@usace.army.mil) or via standard mail to US Army Corps of Engineers, Regulatory Office, and ATTN: Katy Damico, 803 Front Street Norfolk, Virginia 23510 within 30 days of receipt and keep one for your records. This delineation of waters and/or wetlands is valid for a period of five years from the date of this letter unless new information warrants revision prior to the expiration date.

If you have any questions, please contact Katy Damico, of my staff, either via telephone at (757) 201-7121 or via email at katy.r.damico@usace.army.mil.

Sincerely,



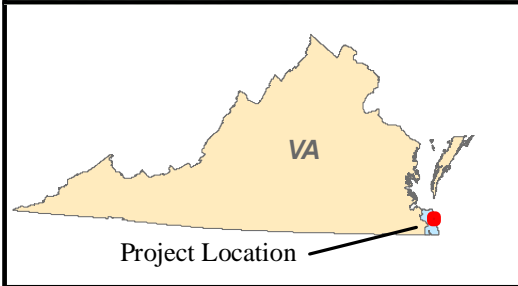
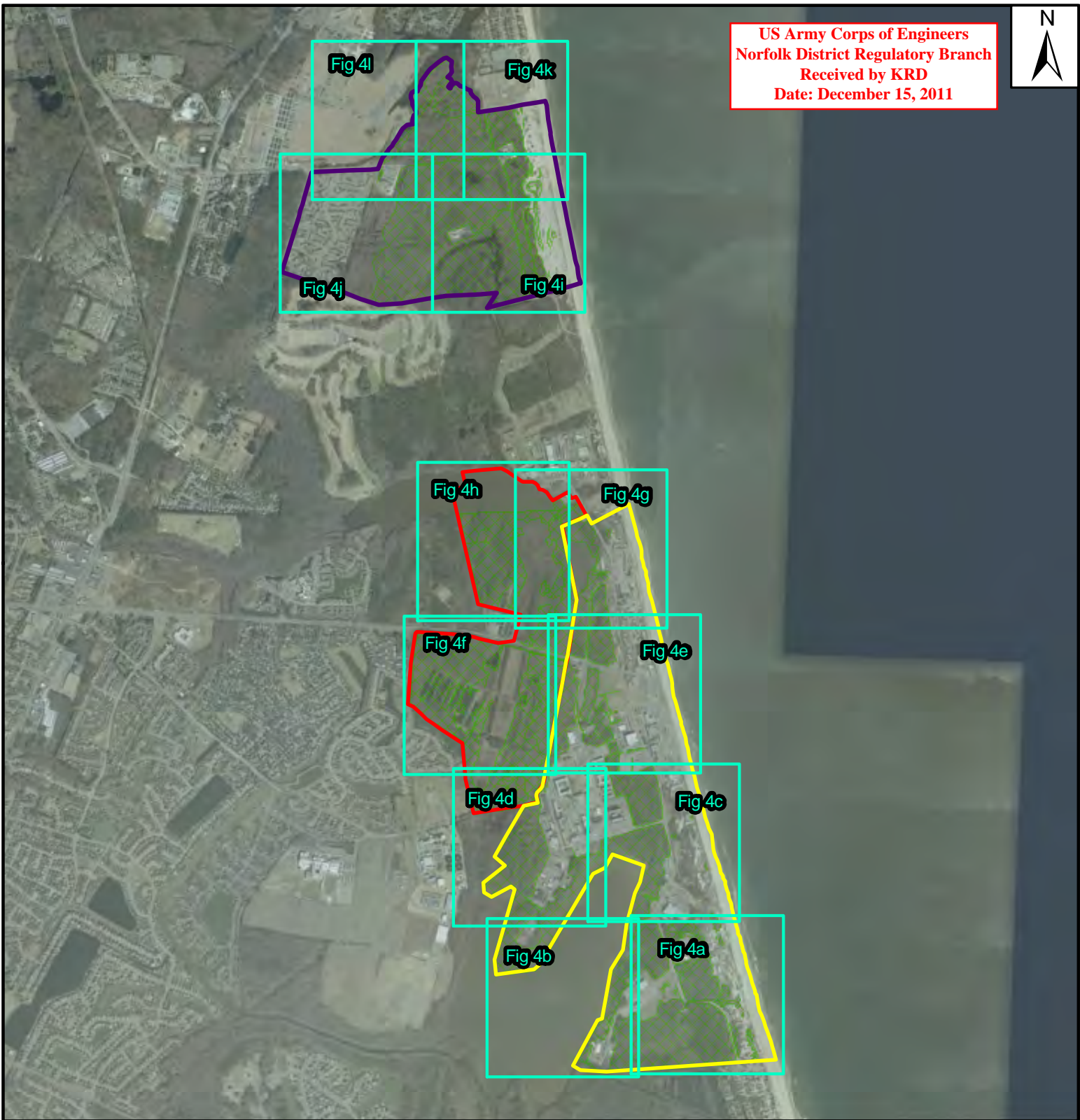
FOR Lynette R. Rhodes
Chief, Southern Virginia Regulatory Section

Enclosures: Preliminary Jurisdictional Determination Form
Wetland/Waters Delineation Map
Supplemental Preapplication Information

Copies Furnished:

Mr. Curtis Davey, Virginia Department of Environmental Quality
Mr. Thad McDonald, Naval Facilities Engineering Command
Ms. Lindsay Eiser, Tetra Tech, Agent
Mr. Jeff Hannah, Kerr Environmental, Agent

US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KRD
 Date: December 15, 2011



Legend

- Sheet Key
- Study Area 3
- Study Area 1
- Study Area 2
- Wetlands

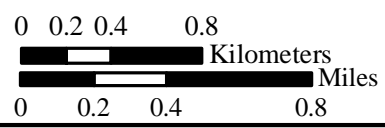


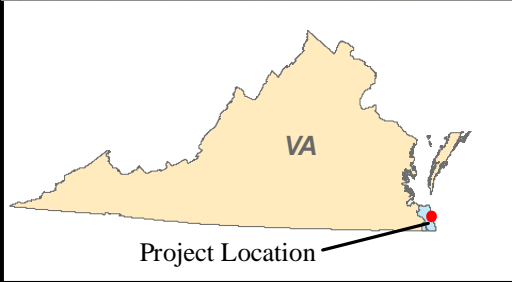
Figure 4. Sheet Key. Aquatic Resources Map For NASO Dam Neck Annex Wetland Delineation, Virginia Beach, Virginia

Prepared for:

Prepared by: Date: 12/2011






Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech 2011.

US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KR
 Date: December 15, 2011



Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech, 2011.


Legend


	Study Area 1		Wetland Plots
	Wetlands		Upland Plots
	Not Surveyed		

0 70 140 280
 Meters

0 230 460 920
 Feet

Figure 4a. Aquatic Resources Map For NASO Dam Neck Annex Wetland Delineation, Virginia Beach, Virginia

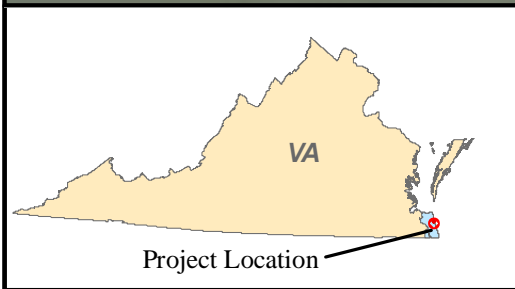
Prepared for: 

Prepared by: 

Date: 12/2011








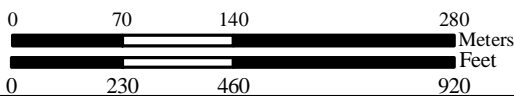
**US Army Corps of Engineers
Norfolk District Regulatory Branch
Received by KR D
Date: December 15, 2011**



Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech, 2011.

Legend

-  Study Area 1
-  Wetlands
-  Not Surveyed
-  Wetland Plots
-  Upland Plots



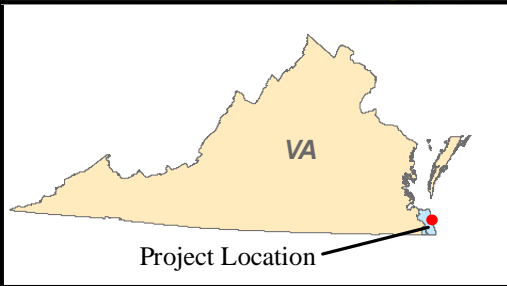
**Figure 4b. Aquatic Resources
Map For NASO Dam
Neck Annex Wetland Delineation,
Virginia Beach, Virginia**

Prepared for:  **NAVFAC**
Naval Facilities Engineering Command

Prepared by:  **TETRA TECH** Date: 12/2011



US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KR D
 Date: December 15, 2011



Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech, 2011.

Legend

	Study Area 1		Wetland Plots
	Study Area 3		Upland Plots
	Wetlands		
	Facility Area		

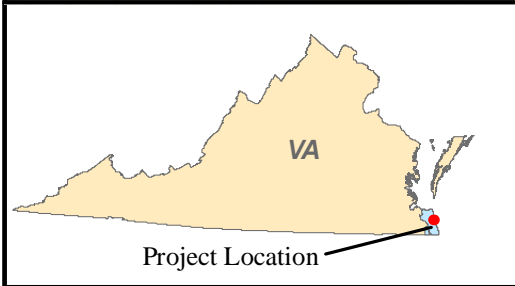
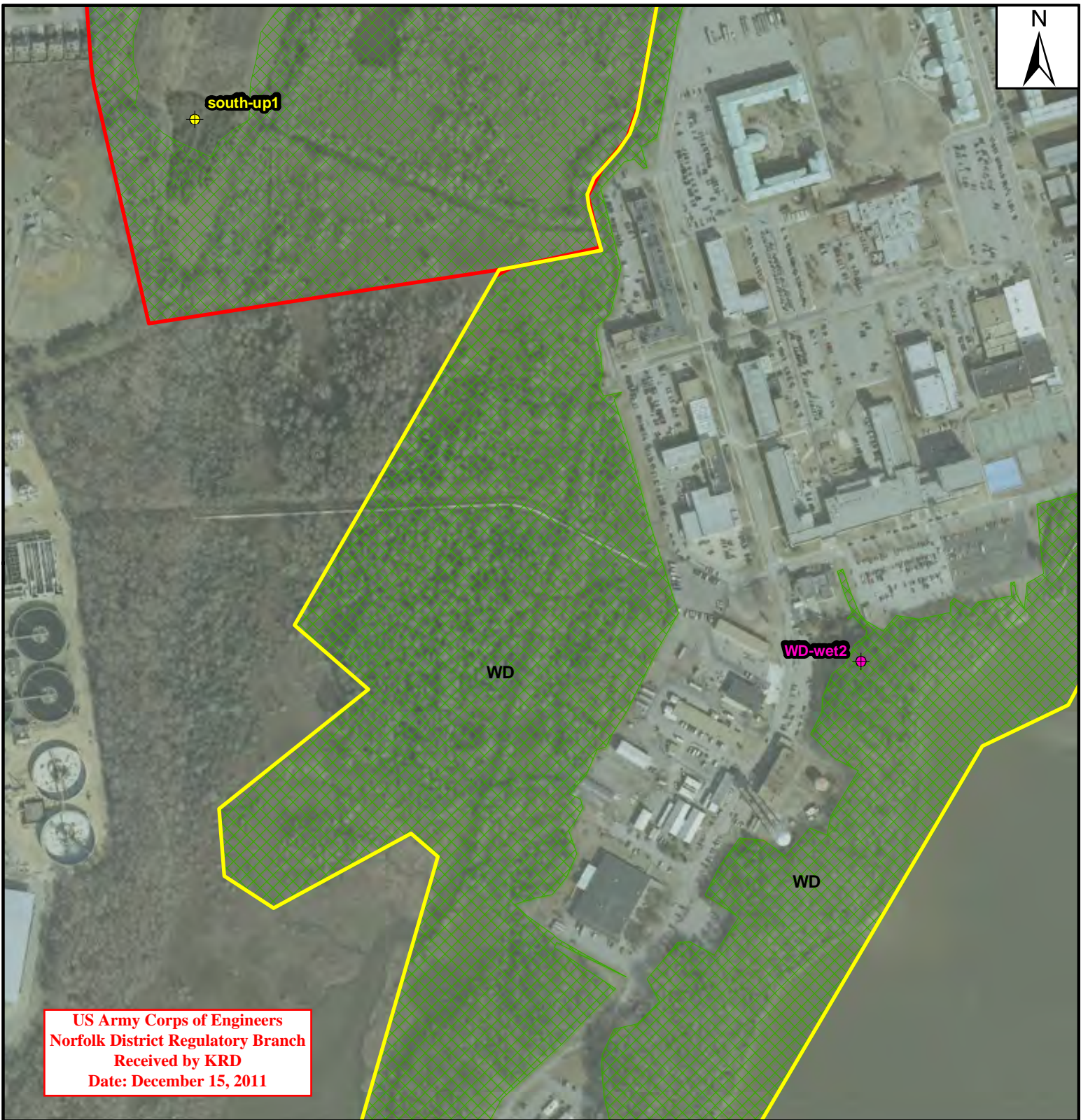
0 70 140 280 Meters
 0 230 460 920 Feet

Figure 4c. Aquatic Resources Map For NASO Dam Neck Annex Wetland Delineation, Virginia Beach, Virginia

Prepared for: Naval Facilities Engineering Command






Prepared by: TETRA TECH

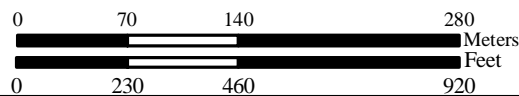
Date: 12/2011



Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech, 2011.

Legend

-  Study Area 1
-  Study Area 3
-  Wetlands
-  Wetland Plots
-  Upland Plots

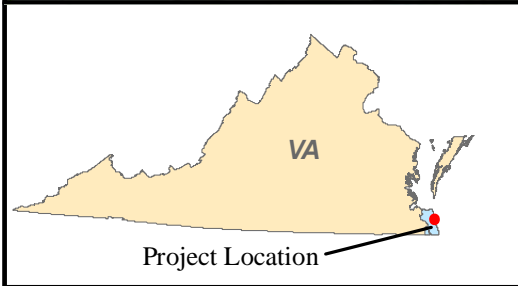


**Figure 4d. Aquatic Resources
Map For NASO Dam
Neck Annex Wetland Delineation,
Virginia Beach, Virginia**

Prepared for:  **NAVFAC**
Naval Facilities Engineering Command





Prepared by:  **TETRA TECH** Date: 12/2011

US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KRD
 Date: December 15, 2011



Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech, 2011.

Legend

-  Study Area 1
-  Wetlands
-  Wetland Plots
-  Upland Plots

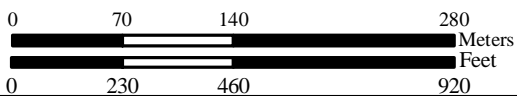


Figure 4e. Aquatic Resources Map For NASO Dam Neck Annex Wetland Delineation, Virginia Beach, Virginia

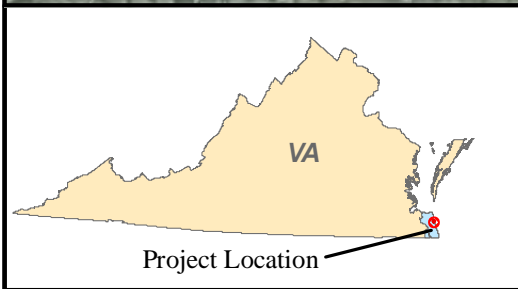
Prepared for:  **NAVFAC**
 Naval Facilities Engineering Command

Prepared by:  **TETRA TECH**

Date: 12/2011

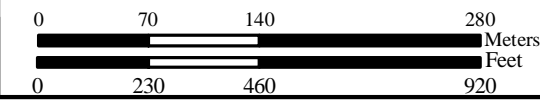


US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KR D
 Date: December 15, 2011



Legend

- Study Area 1
- Study Area 3
- Wetlands
- Facility Area
- ◆ Wetland Plots
- ◆ Upland Plots



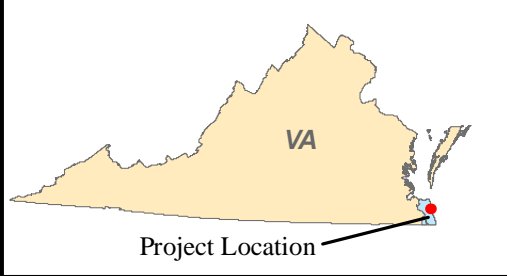
**Figure 4f. Aquatic Resources
 Map For NASO Dam
 Neck Annex Wetland Delineation,
 Virginia Beach, Virginia**

Prepared for:

Prepared by: Date: 12/2011







Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech, 2011.

US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KRD
 Date: December 15, 2011



Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech, 2011.

Legend

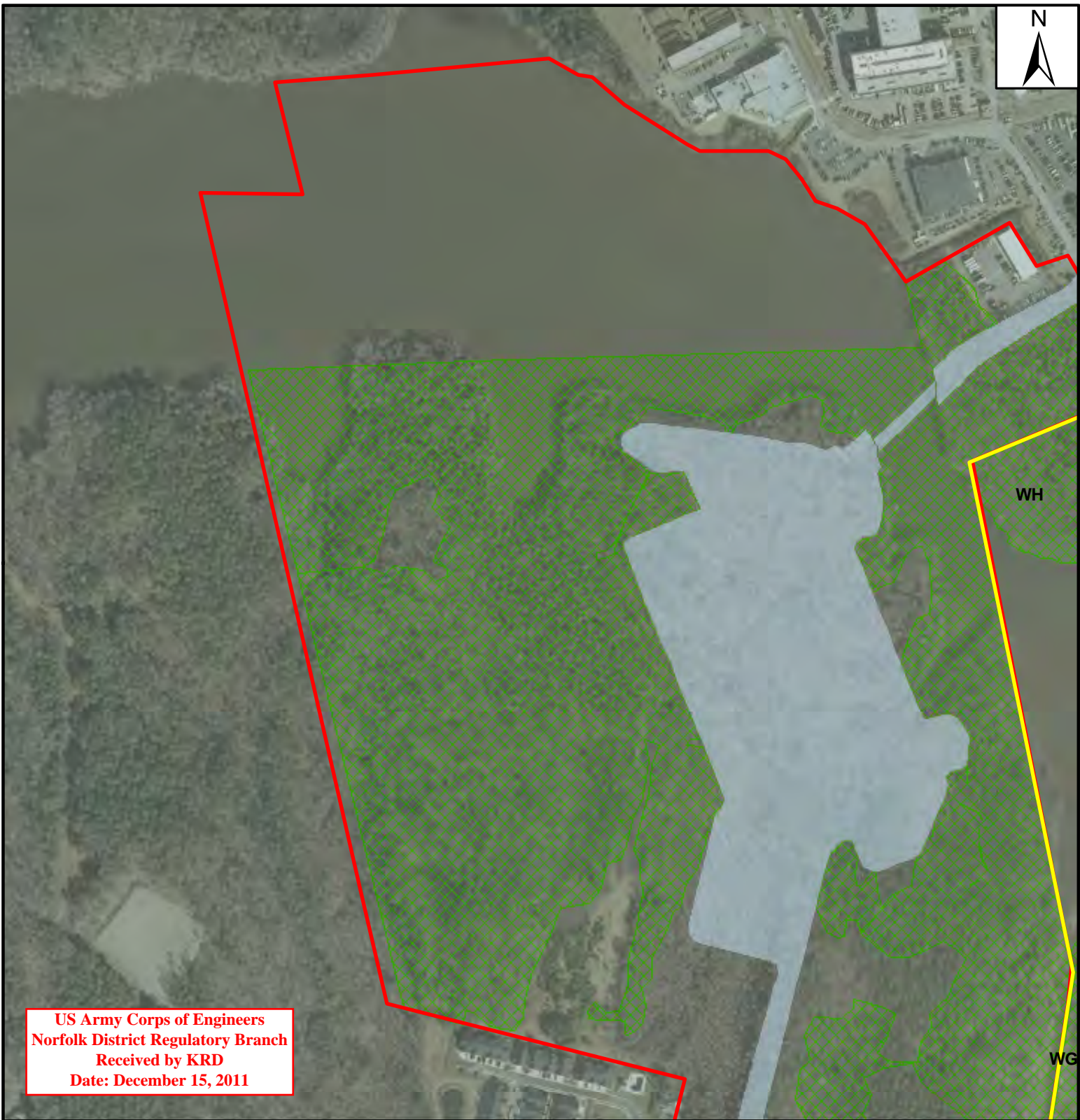
	Study Area 1		Wetland Plots
	Study Area 3		Upland Plots
	Wetlands		
	Facility Area		

0 70 140 280 Meters
 0 230 460 920 Feet

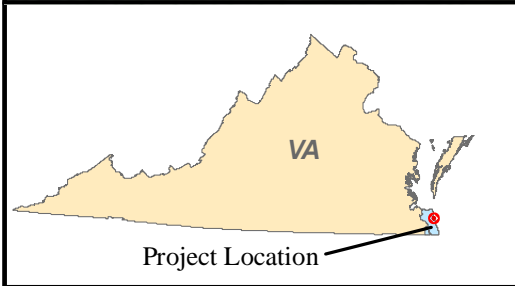
Figure 4g. Aquatic Resources Map For NASO Dam Neck Annex Wetland Delineation, Virginia Beach, Virginia

Prepared for: 







Prepared by:  Date: 12/2011



US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KRD
 Date: December 15, 2011



Legend

	Study Area 1		Wetland Plots
	Study Area 3		Upland Plots
	Wetlands		
	Facility Area		

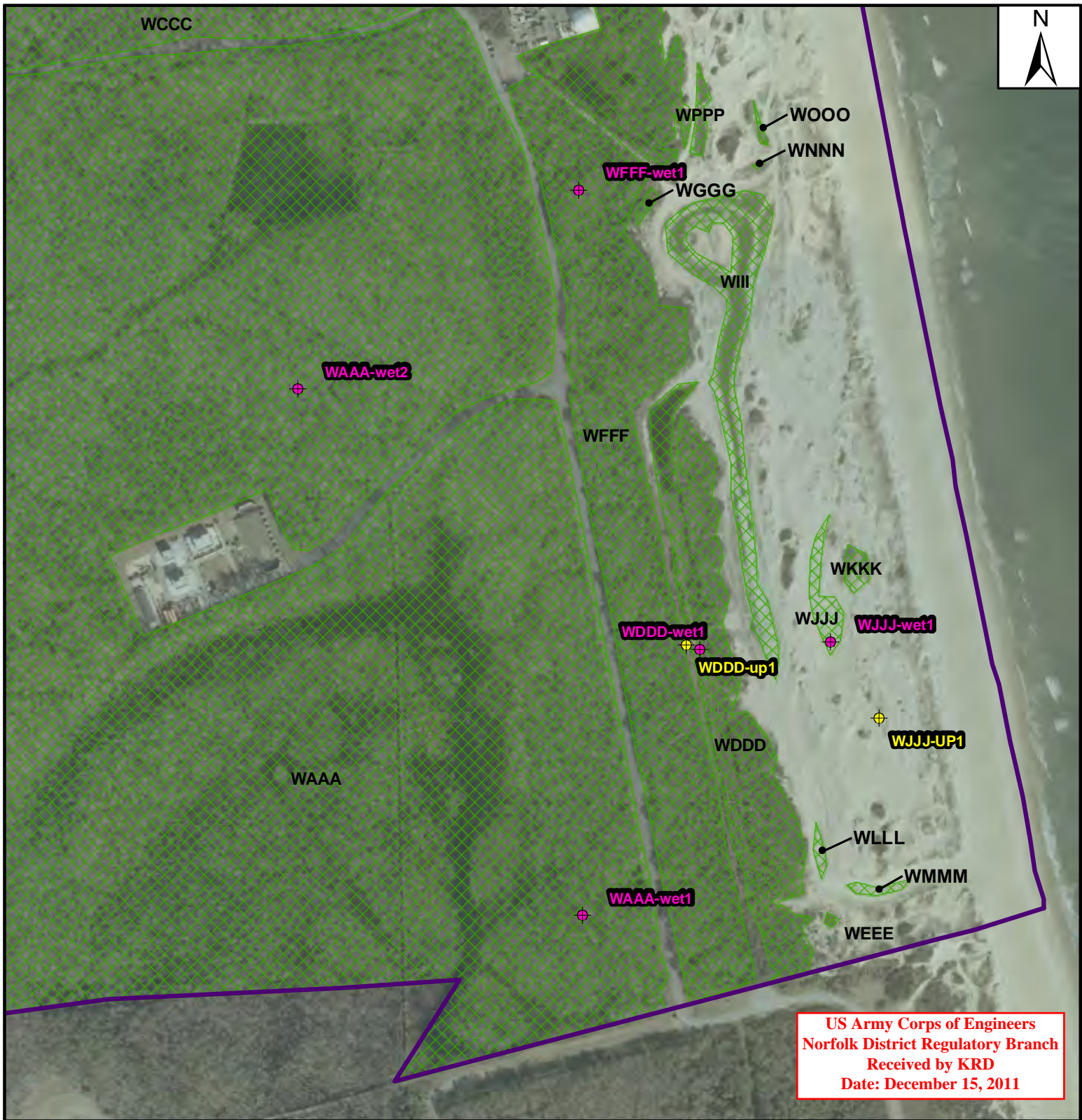
0 70 140 280
 Meters
 0 230 460 920
 Feet

**Figure 4h. Aquatic Resources
 Map For NASO Dam
 Neck Annex Wetland Delineation,
 Virginia Beach, Virginia**

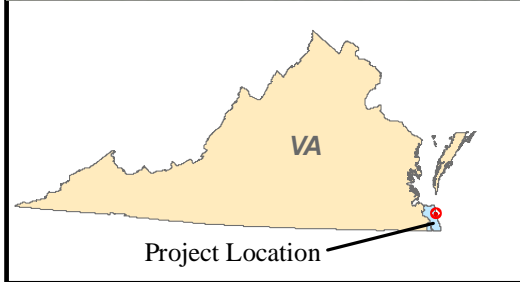
Prepared for:  **NAVFAC**
 Naval Facilities Engineering Command

Prepared by:  **TETRA TECH** Date: 12/2011

Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech, 2011.



US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KRD
 Date: December 15, 2011



- Legend**
- Study Area 2
 - Wetlands
 - + Wetland Plots
 - + Upland Plots

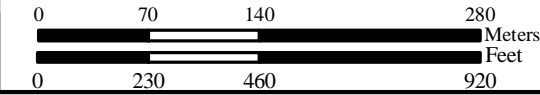
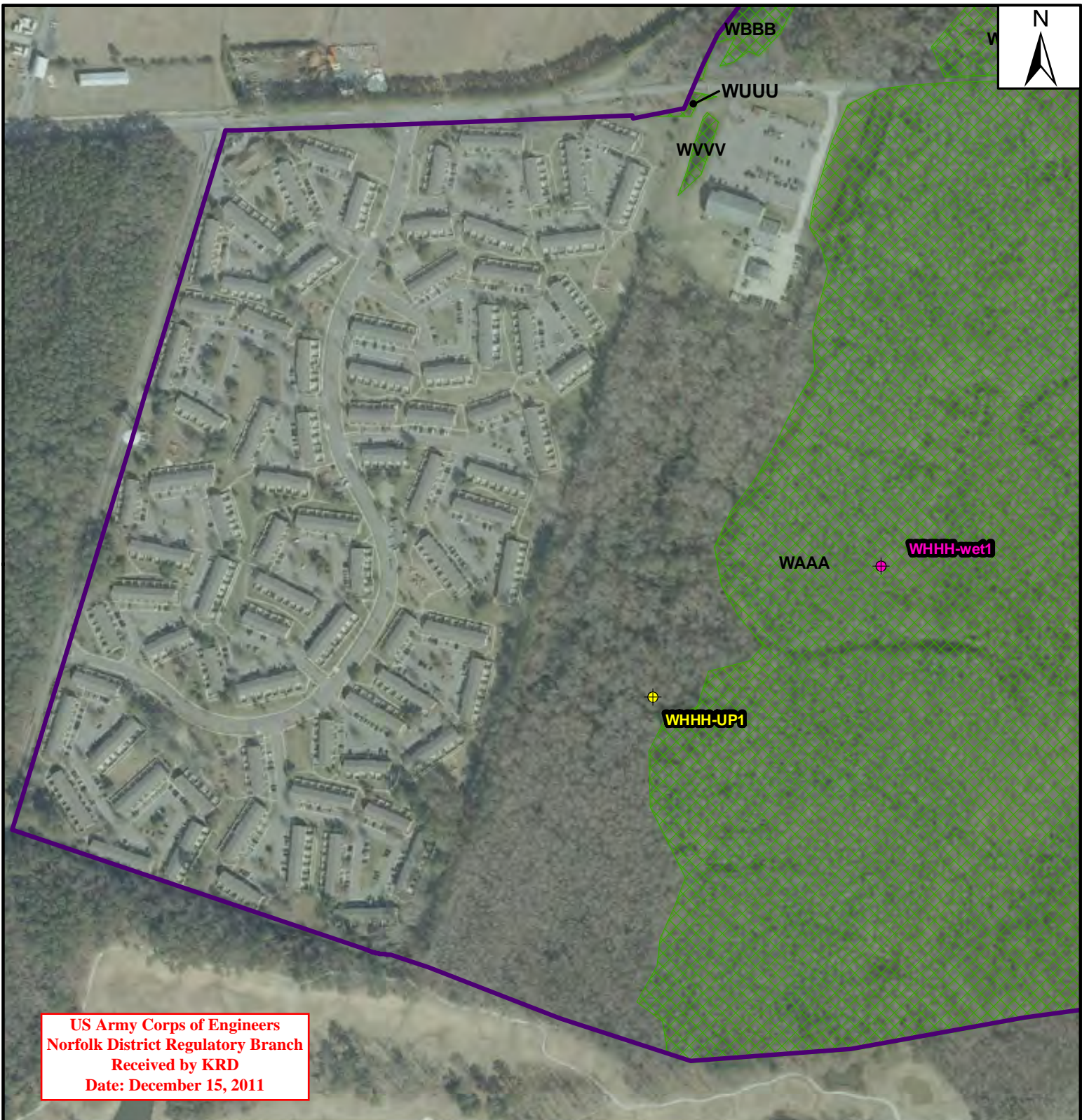


Figure 4i. Aquatic Resources Map For NASO Dam Neck Annex Wetland Delineation, Virginia Beach, Virginia

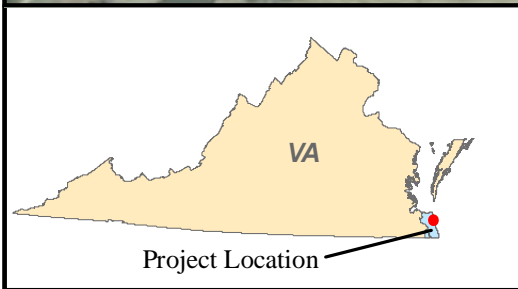
Prepared for: **NAVFAC**
 Naval Facilities Engineering Command

Prepared by: **TETRA TECH** Date: 12/2011

Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech, 2011.



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 Norfolk District Regulatory Branch
 Received by KR D
 Date: December 15, 2011



Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech, 2011.

- Legend**
- Study Area 2
 - Wetlands
 - Wetland Plots
 - Upland Plots

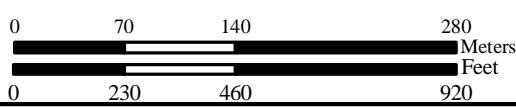
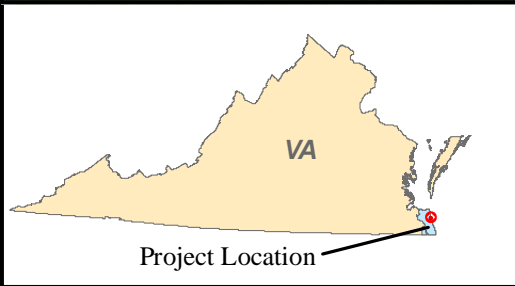


Figure 4j. Aquatic Resources Map For NASO Dam Neck Annex Wetland Delineation, Virginia Beach, Virginia

Prepared for:

Prepared by: Date: 12/2011

US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KR
 Date: December 15, 2011



Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech, 2011.

- Legend**
- Study Area 2
 - Wetlands
 - Wetland Plots
 - Upland Plots

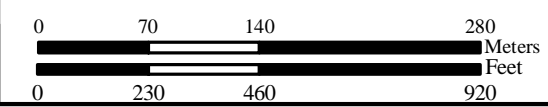
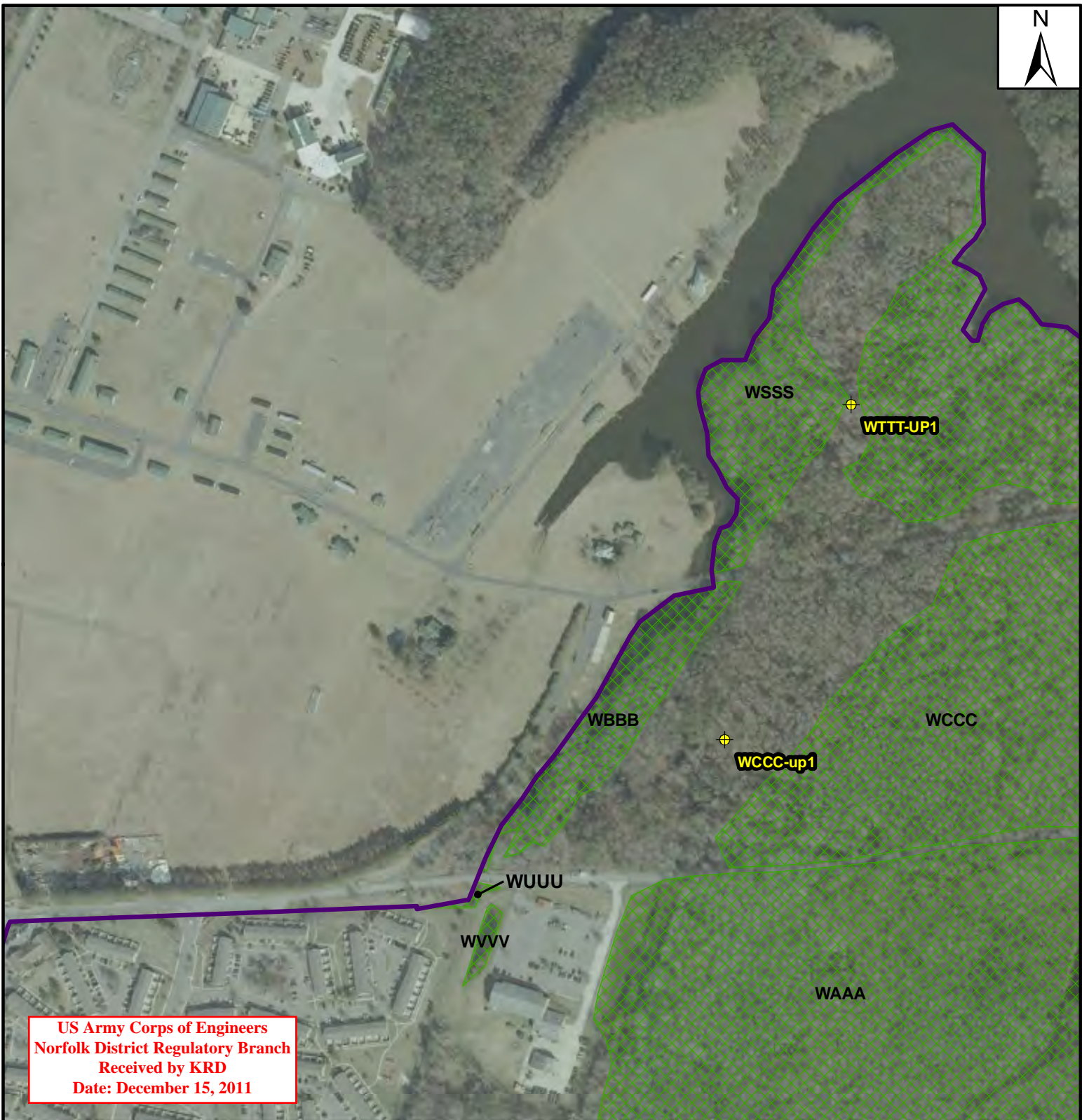


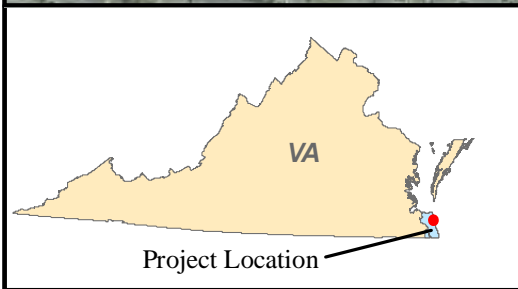
Figure k. Aquatic Resources Map For NASO Dam Neck Annex Wetland Delineation, Virginia Beach, Virginia

Prepared for:

Prepared by: **TETRA TECH** Date: 12/2011







US Army Corps of Engineers
 Norfolk District Regulatory Branch
 Received by KR D
 Date: December 15, 2011



Source: ESRI Imagery, 2010. Navy, 2011. Tetra Tech, 2011.

Legend

-  Study Area 2
-  Wetlands
-  Wetland Plots
-  Upland Plots

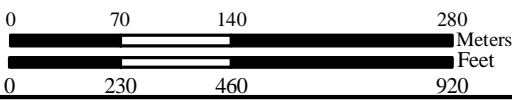


Figure 4I. Aquatic Resources Map For NASO Dam Neck Annex Wetland Delineation, Virginia Beach, Virginia

Prepared for: 

Prepared by:  Date: 12/2011

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

BACKGROUND INFORMATION:

A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD): Monday, January 30, 2012

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:
David Noble
Environmental Planning and Conservation
Navy Region, Mid-Atlantic
1510 Gilbert Street
Norfolk, Virginia 23511-2737

C. DISTRICT OFFICE: Norfolk District (CENAO-REG)

FILE NAME: NASO Dam Neck Preliminary Jurisdictional Determination / Delineation Confirmation

FILE NUMBER: NAO-2008-3381

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)

State: **VIRGINIA** County/parish/borough: Virginia Beach City: Virginia Beach

Center coordinates of site (lat/long in degree decimal format):

Latitude: 36.78265 ° N Longitude: -75.95857 ° W

Universal Transverse Mercator: N/A

Name of nearest waterbody: Atlantic Ocean / Redwing Lake / Lake Tecumseh / Lake Christine

Identify (estimate) amount of waters in the review area:

Non-wetland waters: N/A linear feet; N/A width (ft); and/or N/A acres.

Cowardin Class: N/A

Stream Flow: N/A

Wetlands: 787.90+/- acres

Cowardin Class: PFO, PSS, PEM

Name of any water bodies on the site that have been identified as Section 10 waters:

Tidal: Atlantic Ocean

Non-Tidal: Lake Christine / Lake Tecumseh / Redwing Lake

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

Office (Desk) Determination. Date: January 30, 2012

Field Determination. Date(s): January 18, 2012

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring “pre-construction notification” (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant’s acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

3. This preliminary JD finds that there “*may be*” waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA:

Data reviewed for preliminary JD (check all that apply) - checked items should be included in case file and, where checked and requested, appropriately reference sources below.

- Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
 Tetra Tech
 Ms. Lindsay Eiser
 451 Presumpscot Street
 Portland, Maine 04103

- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
 - Office concurs with data sheets/delineation report. dated 12/13/11(rec'd 12/15/11)
 - Office does not concur with data sheets/delineation report.
- Data sheets prepared by the Corps:
- Corps navigable waters' study:
- U.S. Geological Survey Hydrologic Atlas:
 - USGS NHD data.
 - USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name: 7.5 minute quad / Virginia Beach
- USDA Natural Resources Conservation Service Soil Survey.

Citation:

- National wetlands inventory map(s). Cite name:
- State/Local wetland inventory map(s):
- FEMA/FIRM maps:
- 100-year Floodplain Elevation: (National Geodetic Vertical Datum of 1929)
- Photographs: Aerial (Name & Date):
or Other (Name & Date):
- Previous determination(s):
File no. and date of response letter:
- Other information (please specify):

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.



Signature
Regulatory Project Manager
(REQUIRED)

2012-01-30

Date

Signature of person requesting
Preliminary JD
(REQUIRED, unless obtaining the signature is impracticable)

Date

Table 1. Wetland Feature Summary for the Dam Neck Annex, NAS Oceana.

Wetland Label	Field Wetland Classification ¹	On Base Area (acres)	Comment
Study Area 1			
WA	PFO	65.30	Extensive wetland bounded by the South Road. Continues off Project area at southwest corner of Study Area 1.
WB	PEM	0.44	Small depressional wetland within maintained field at the intersection of S Bullpup Road and Regulus Ave.
WC	PEM	0.10	Small depressional wetland within maintained field at intersection of S Bullpup Road and Regulus Ave.
WD	PFO	155.77	Extensive forested wetland that fringes Lake Tecumseh in the southern portion of Study Area 1 and a canal that connects to Redwing Lake in the northern portion of Study Area 1.
WE	PEM	0.17	Northern edge of extensive wetland that occurs at south end of Dam Neck Annex where it extends into Project area. Appears to be connected to Wetland F south of Project area.
WF	PEM	0.14	Northern edge of extensive wetland that exists to south of Dam Neck Annex where it extends into Project area. Appears to be connected to Wetland E south of Project area.
WG	PFO/PSS	12.02	Extensive forested wetland that fringes the southeast end of Redwing Lake and the canal that connects to Lake Tecumseh. Wetland is bounded to the south by Dam Neck Ave. and is connected to Wetland D by a canal under Dam Neck Ave.
WH	PFO	7.02	Forested wetland fringing Lake Tecumseh and a continuation of Wetland G. Wetland continues off the survey area to the north.
W13	PFO	0.01	Delineated in 2010; portion of depressional wetland near security gate and east of Regulus Rd. Majority of wetland to north of study area.
WI	PFO	0.26	Isolated depressional wetland between Regulus Ave. and dune complex at northern end of Study Area 1.
WJ	PFO	14.50	Medium sized wetland bounded to the west by Terrier Ave., to the east by development along Regulus Ave. and to the south by Vanguard St.
WK	PFO/PEM/PSS	11.52	Wetland complex in the middle of Study Area 1 that includes a section fringing PSS wetland around Sadler Pond and an

Wetland Label	Field Wetland Classification ¹	On Base Area (acres)	Comment
			extensive forested wetland with emergent vegetation on edges that are within maintained fields.
WL	PFO/PEM	1.09	An extension of Wetland K that is separated by a paved walking path. Emergent vegetation dominates edges that are within maintained fields.
WM	PEM/ PFO	0.90	Linear wetland located between Regulus Ave. and dune complex at the south end of Study Area 1.
WN	PSS/PEM	0.01	Small, manmade feature separated from Wetland O by a berm.
WO	PFO/PEM	1.97	Primarily forested wetland bounded by Regulus Ave. to west and dune complex to the east in the southern portion of Study Area 1.
WP	PSS	0.04	Small, inter dune swale in the southern portion of Study Area 1.
WQ	PFO	0.85	Forested wetland bounded to the north by Talos St., to the south by a paved walkway, and to the west and east by parking areas.
WR	PFO/PSS	21.78	Extensive wetland with scrub-shrub area dominated by buttonbush in the southwest corner. Connected to Wetland D via culver at end of manmade canal along southern edge.
WS	PSS	0.15	Small wetland located in drainage basin. Connected to WT and WR via grassy spillway.
WT	PSS	0.11	Small wetland located in drainage basin. Connected to WS via grassy spillway.
WU	PEM	0.03	Narrow – approximately 3 feet wide – manmade drainage located in parking area and dominated by herbaceous emergent vegetation.
WV	PSS/ PFO	12.24	Extensive wetland bounded by Regulus Ave. or access roads on all sides.
WW	PFO/PEM	6.98	Extensive wetland bounded by dunes to the east and development and roads to the north, west, and south. Wetland W is connected to Wetland JJ via culverts under and overgrown roadbed
WX	PSS	0.04	Small, inter dune swale in the southern portion of Study Area 1.
WY	PEM/PSS	0.17	Small, inter dune swale in the southern portion of Study Area 1.
WZ	PEM	0.09	Small, inter dune swale in the southern portion of Study Area 1.

Wetland Label	Field Wetland Classification ¹	On Base Area (acres)	Comment
WAA	PEM/PSS	0.01	Small, inter dune swale in the southern portion of Study Area 1.
WBB	PSS	0.04	Small, inter dune swale in the southern portion of Study Area 1.
WCC	PSS	0.01	Small, inter dune swale in the southern portion of Study Area 1.
WDD	PSS/PEM	0.14	Small, inter dune swale in the southern portion of Study Area 1.
WEE	PSS	0.04	Small, inter dune swale in the southern portion of Study Area 1.
WFF	PSS/PEM	0.01	Small, inter dune swale in the southern portion of Study Area 1.
WGG	PSS/PEM	0.04	Small, inter dune swale in the southern portion of Study Area 1.
WHH	PFO	0.04	Small forested wetland in southern portion of Study Area 1.
WII	PEM	0.04	Narrow – approximately 3 feet wide – manmade drainage connecting Wetlands W and JJ and dominated by herbaceous emergent vegetation.
WJJ	PFO	1.80	Forested wetland connected to Wetland W via culvert under old, overgrown road and to Wetland D via culvert under Regulus Ave.
WKK	PSS/PEM	0.20	Medium-sized inter dune wetland in southern portion of Study Area 1.
WLL	PSS	0.02	Small inter dune wetland in southern portion of Study Area 1.
WMM	PEM/PSS	0.85	Relatively large inter dune wetland in southern portion of Study Area 1.
WNN	PEM	0.01	Small, manmade borrow pit wetland dominated by wetland graminoids.
WOO	PSS	0.04	Small inter dune wetland in central portion of Study Area 1.
WPP	PSS	0.04	Small inter dune wetland in central portion of Study Area 1.
WQQ	PSS	0.03	Small inter dune wetland in central portion of Study Area 1.
WRR	PFO	0.13	Small forested wetland located between the base of dune complex and Regulus Ave.
Study Area 1 Total		317.2	
Study Area 2			
WAAA	PFO/PSS	171.77	Extensive wetland at south end of Study Area 2 that is connected to wetland at north end of DEVGRU facility via several culverts under access road.
WBBB	PFO/PEM	3.41	Fringing wetland along finger of Lake Christine that continues off the survey area to the west.
WCCC	PFO	24.48	Extensive forested wetland bounded by South Birdneck Rd. to

Wetland Label	Field Wetland Classification ¹	On Base Area (acres)	Comment
			the south, Regulus Ave. to the east, Rifle Range Rd. to the north and upland forest to the west.
WDDD	PFO	5.83	Linear wetland located at the base of dune complex along the east side of Study Area 2.
WEEE	PSS/PEM	0.02	Small forested area located within the dunes on the far east corner of Study Area 2
WFFF	PFO	28.42	Linear forested wetland located at the base of dune complex east of Regulus Rd.
WGGG	PSS/PEM	0.07	Small forested area located within the center of the dune complex of Study Area 2
WIII	PEM	2.73	Small, inter dune swale in the eastern portion of Study Area 2.
WJJJ	PSS/PEM	0.40	Small, inter dune swale in the eastern portion of Study Area 2.
WKKK	PSS/PEM	0.18	Small, inter dune swale in the eastern portion of Study Area 2.
WLLL	PEM	0.077	Small, inter dune swale in the eastern portion of Study Area 2.
WMMM	PEM	0.10	Small, inter dune swale in the eastern portion of Study Area 2.
WNNN	PSS/PEM	0.01	Small, inter dune swale in the eastern portion of Study Area 2.
WOOO	PSS/PEM	0.03	Small, inter dune swale in the eastern portion of Study Area 2.
WPPP	PSS/PEM	0.19	Small, inter dune swale in the eastern portion of Study Area 2.
WQQQ	PSS/PEM	0.04	Small, inter dune swale in the eastern portion of Study Area 2.
WRRR	PSS/PEM	0.08	Small, inter dune swale in the eastern portion of Study Area 2.
WSSS	PFO	16.36	Fringing forested wetland bounded by Rifle Range Rd. to the south, Regulus Ave. and Lake Christine to the east, and Lake Christine to the west and north.
WUUU	PSS/PEM	0.09	Small wetland located in drainage basin within Study Area 2.
WVVV	PSS/PEM	0.23	Small wetland located in drainage basin within Study Area 2.
Study Area 2 Total		254.5	

Study Area 3			
North Parcel ²	PFO	77.89	Wetland area to the north of Dam Neck Road. This parcel was delineated and verified by the USACE in 2007 (Corps Project # NAO-2003-01785). Impacts to the original wetland resources occurred as a result of the P-899 Operations Facility that was constructed in 2009-2011. The acreage listed here reflects the current, post-construction wetland area.
South Parcel ³	PFO/PEM	138.29	The portion of Study Area 3 that is south of Dam Neck Road. This parcel was delineated and verified by the USACE in 2008 (Corps Project #s NAO-2008-3381 and NAO-2008-00523). During the 2011 field activities, Tetra Tech wetland biologists conducted a field verification of the previously delineated wetland boundaries. No changes to the property have occurred since the JDs were obtained.
Study Area 3 Total		216.2	

¹From *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979): PFO = Palustrine Forested, PSS=Palustrine Scrub Shrub, and PEM=Palustrine Emergent

²This wetland was delineated in 2007.

³The majority of this wetland was delineated in 2008.



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NORFOLK DISTRICT CORPS OF ENGINEERS
FORT NORFOLK 803 FRONT STREET
NORFOLK VIRGINIA 23510-109

JANUARY 30, 2012

Supplemental Preapplication Information

Project Number: NAO-2008-3381

Applicant: United States Navy - Naval Facilities Engineering Command Mid-Atlantic (NAVFAC-MIDLANT)

Project Location: Naval Air Station Oceana - Dam Neck Annex (NASO Dam Neck) in Virginia Beach, VA

1. A search of the Virginia Department of Historic Resources (VDHR) data revealed the following:
 - No known historic properties are located on the property.
 - The following known architectural resources are located on the property: *See attached Regulatory Report.*
 - The following known archaeological resources are located on the property: *See attached Regulatory Report.*
 - The following known historic resources are located in the vicinity of the property (potential for effects to these resources from future development): *See attached Regulatory Report.*

NOTE:

- 1) *The information above is for planning purposes only. In most cases, the property has not been surveyed for historic resources. Undiscovered historic resources may be located on the subject property or adjacent properties and this supplemental information is not intended to satisfy the Corps' requirements under Section 106 of the National Historic Preservation Act (NHPA).*
 - 2) *Prospective permittees should be aware that Section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant.*
2. A search of the data supplied by the Virginia Department of Conservation and Recreation and the Virginia Department of Game and Inland Fisheries revealed the following:
 - No known populations of threatened or endangered species are located on the property or within a one to two mile radius.
 - The following federally-listed species are known to be within a one to two mile radius of the property: *See attached Regulatory Report.*
 - The following state-listed (or other) species are known to be within a one to two mile radius of the property: *See attached Regulatory Report.*

Please note this information is being provided to you based on the preliminary data you submitted to the Corps relative to project boundaries and project plans. Consequently, these findings and recommendations are subject to change if the project scope changes or new information becomes available and the accuracy of the data.

Endangered Species and Historic Locations

Generated: 1/30/2012

Center: (-75.9637, 36.7871)

Buffer Radius: 0 mi.



Endangered Species (VA DCR)

- **NHR ID (Legal Status, Type): Site Name - Site Description**
- E_370 (NL, General Location): no name - Vascular Plant
- E_3074 (NL, General Location): no name - Vascular Plant
- E_3512 (NL, General Location): no name - Vascular Plant
- E_436 (NL, General Location): no name - Vascular Plant
- E_4131 (NL, General Location): no name - Vascular Plant
- E_5195 (NL, General Location): no name - Vascular Plant
- E_1304 (NL, General Location): no name - Vascular Plant
- E_6399 (NL, General Location): no name - Vascular Plant
- E_6790 (NL, General Location): no name - Invertebrate Animal
- E_6251 (NL, General Location): no name - Invertebrate Animal
- E_341 (NL, General Location): no name - Vascular Plant
- S_556 (NL, Conservation Site): **CAMP PENDLETON DUNE AND SWALE** - Rare communities here, the pond, interdunal swales, and dune system support a variety of uncommon plants. Although small, the unusual habitats are worthy of protection and further study. 9/02
- S_318 (FL, Conservation Site): **DAM NECK MIDDLE BEACH DUNES** - This site supports 1 rare invertebrate and an increasingly uncommon habitat (Atlantic beach dune system). Protection of the dunes and natural processes which maintain the system are critical to long-term viability of this site. 9/02
- S_711 (NL, Conservation Site): **DAM NECK HELICOPTER PAD WETLANDS** - This small wetland supports one rare plant species. Despite the proximity of roads and buildings, the wetland is worthy of protection. 9/02

- S_914 (FL, Conservation Site): DAM NECK INTERDUNAL SWALE - This site supports rare plant and animal species. The interdunal swale and associated vegetation is uncommon along the mid-Atlantic, and worthy of protection. 9/02
- S_487 (NL, Conservation Site): LOVETTS MARSH - Lovetts Marsh is a freshwater emergent marsh, supporting associated natural vegetation as well as rare plants. It's location and persistence make it uncommon, and along w/rare species, worthy of protection. 9/02
- S_30 (NL, Conservation Site): DAM NECK NORTHERN DUNE AND SWALE - This site supports 4 rare plant species and significant maritime forest vegetation. Protection of the dunes, associated swale, natural processes, and vegetation is critical. 9/02

Architectural Resources

- **DHR ID: Resource Name - Eligibility (Eligibility Date) - Optional Comment**
- 134-0413: Camp Pendleton State Military Reservation Historic District - eligibility unknown
- 134-5046: Dam Neck Annex, Naval Air Station Oceana - eligibility unknown

Archaeological Resources

- **DHR ID: Resource Name - Eligibility (Eligibility Date) - Optional Comment**
- 44VB0309: - eligibility unknown
- 44VB0308: - eligible (7/19/2004)
- 44VB0087: - eligibility unknown
- 44VB0086: - eligibility unknown
- 44VB0088: - eligibility unknown
- 44VB0082: - eligibility unknown
- 44VB0085: - eligibility unknown
- 44VB0083: - eligibility unknown
- 44VB0084: - eligibility unknown
- 44VB0091: - eligibility unknown
- 44VB0344: no name - not eligible (12/11/2009)
- 44VB0345: no name - not eligible (12/16/2009) - comment: Potentially Eligible 12/11/09
- 44VB0346: no name - not eligible (12/16/2009) - comment: Potentially Eligible 12/11/09

Cold Water Trout Streams

- none

TE Stream Reaches

- none

Anadromous Fish Use Areas

- none

Colonial Water Birds

- none

Federal_State Listed Species

- **Common Name - Genus species subspecies - Federal Status - State Status**
- Eagle, bald - *Haliaeetus leucocephalus* - Federal Species of Concern - State Threatened
- Turtle, loggerhead sea - *Caretta caretta* - Federal Threatened - State Threatened
- Turtle, Kemp's (= Atlantic) Ridley sea - *Lepidochelys kempii* - Federal Endangered - State Endangered

Bald Eagle Nest - (Center for Conservation Biology, 2009)

- **Nest Code (Nest Year) Location**
- VB0401 (2009) at (XLon = -75.97005, YLat = 36.79508)

Bald Eagle Nest Buffer - 660'

- **Nest Code (Nest Year) Location**
- VB0401 (2009) at (XLon = -75.97005, YLat = 36.79508)

Bald Eagle Concentration Area

- none

Critical Habitat

- none

NMFS Essential Fish Habitat (2004)

- **Record Number: Species**
- 101: red hake (*Urophycis chuss*), witch flounder (*Glyptocephalus cynoglossus*), windowpane flounder (*Scophthalmus aquosus*), Atlantic sea herring (*Clupea harengus*), bluefish (*Pomatomus saltatrix*), summer flounder (*Paralichthys dentatus*), scup (*Stenotomus chrysops*), black sea bass (*Centropristus striata*), spiny dogfish (*Squalus acanthias*), king mackerel (*Scomberomorus cavalla*), Spanish mackerel (*Scomberomorus maculatus*), cobia (*Rachycentron canadum*), red drum (*Sciaenops ocellatus*), dusky shark (*Charcharinus obscurus*), sandbar shark (*Charcharinus plumbeus*), sand tiger shark (*Odontaspis taurus*), tiger shark (*Galeocerdo cuvieri*), Atlantic sharpnose shark (*Rhizopriondon terraenovae*), scalloped hammerhead (*Sphyrna lewini*)

Submerged Aquatic Vegetation Beds

- none

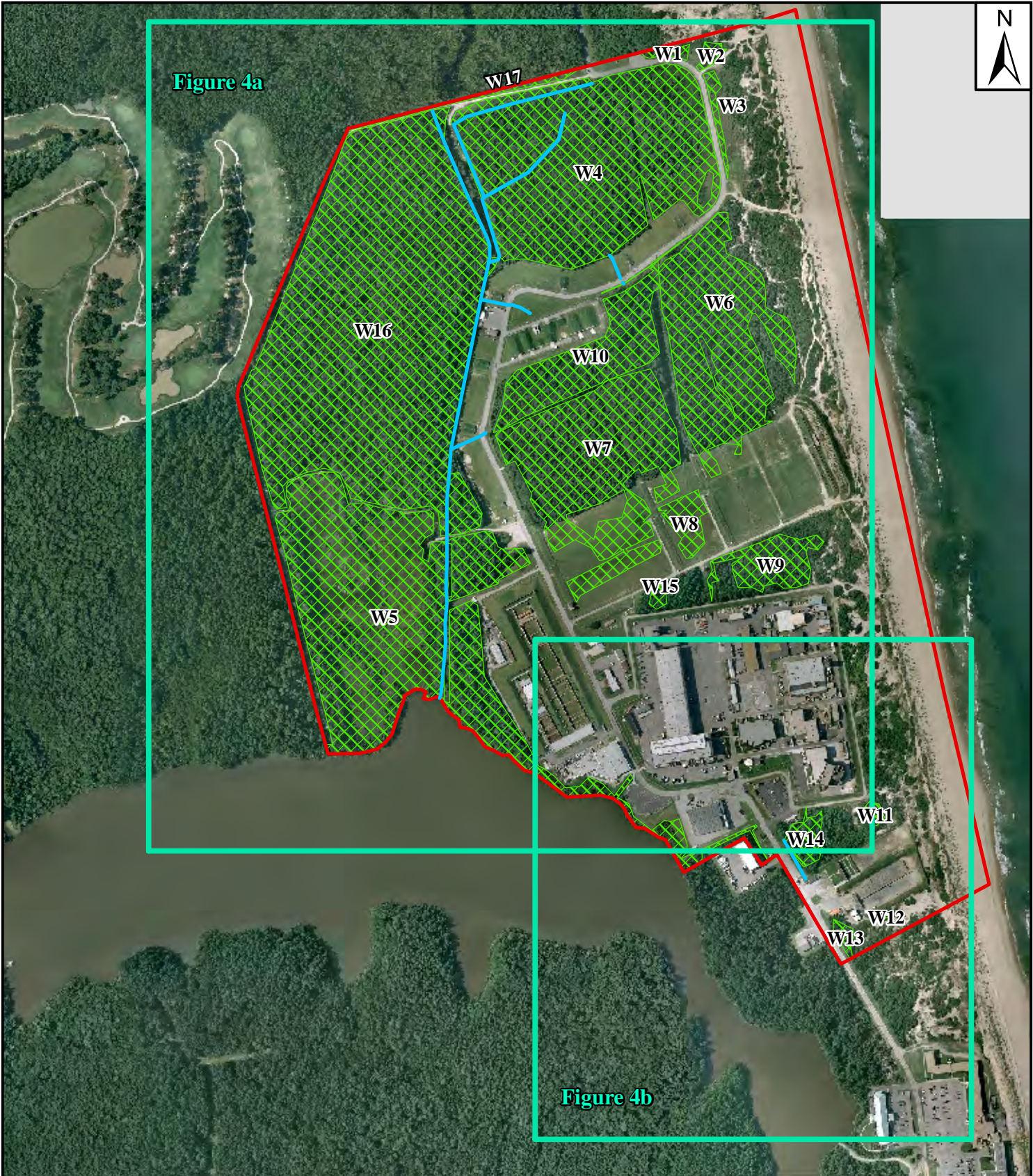







Figure 4a

Figure 4b

Legend

-  Project Boundary
-  Sheet Boundary
-  Jurisdictional Wetlands*
-  Jurisdictional Waters*

0 350 700
 Feet

0 84 168
 Meters

Source: Received from Navy October 2010. Aquatic resources, Tetra Tech November 2010.

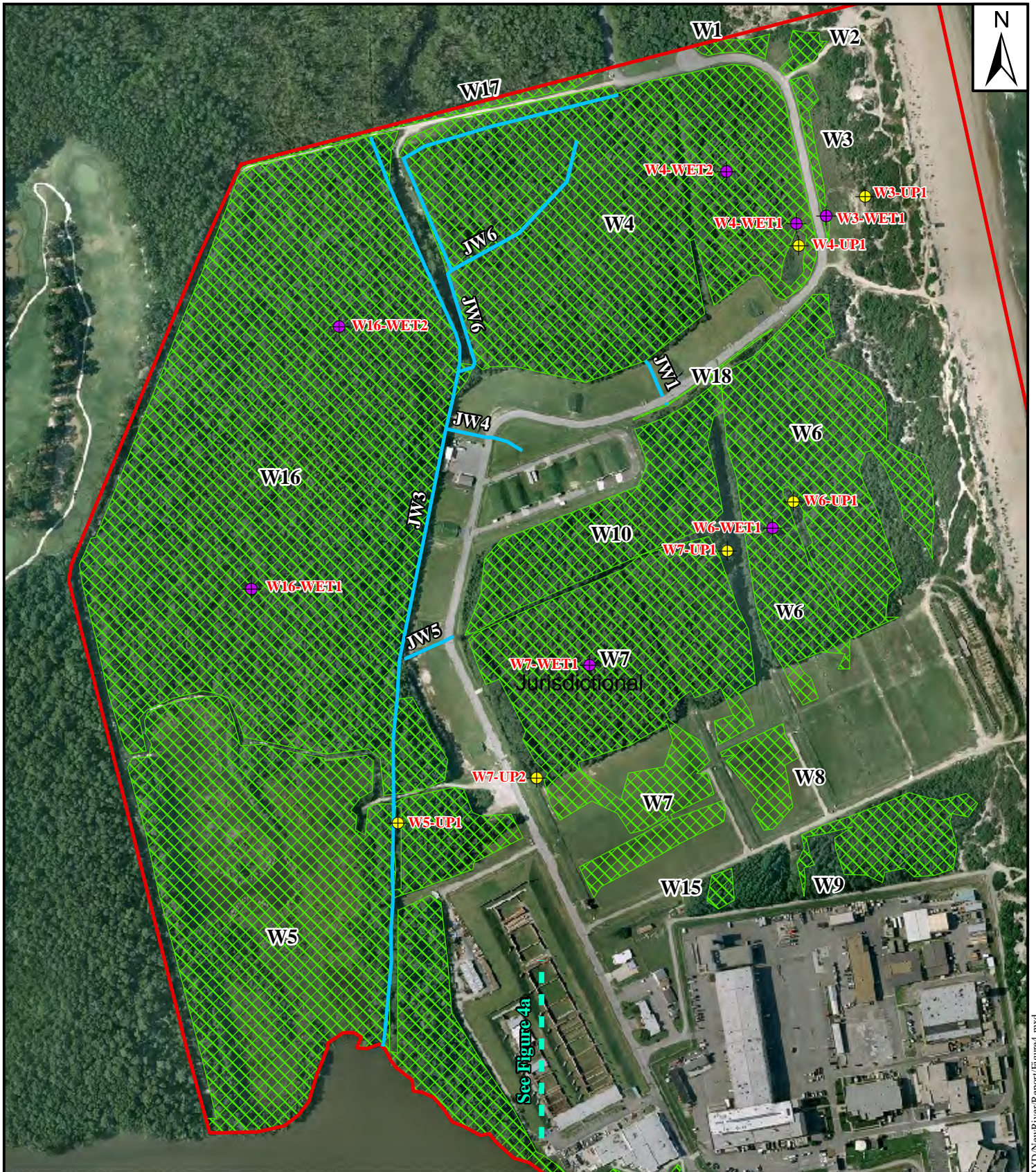
Figure 4 Sheet Key. Aquatic Resources Map for DevGru Compound on NASO Dam Neck, Virginia Beach, Virginia.

Prepared For: 
 Naval Facilities Engineering Command

Prepared By: 

Date: 3/2011

*USACE jurisdiction based on preliminary JD.



Legend

- Project Boundary
- Jurisdictional Wetlands*
- Jurisdictional Waters*
- + Wetland Plots
- + Upland Plots

0 225 450
 Feet

0 54 108
 Meters

Source: Received from Navy October 2010. Aquatic resources, Tetra Tech November 2010.

Figure 4a. Aquatic Resources Map for DevGru Compound on NASO Dam Neck, Virginia Beach, Virginia.

Prepared For:



Prepared By:



Date:
3/2011

*USACE jurisdiction based on preliminary JD.



Legend

- Project Boundary
- Jurisdictional Wetlands*
- Jurisdictional Waters*
- ⊕ Wetland Plots
- ⊕ Upland Plots

0 150 300
 Feet

0 36 72
 Meters

Source: Received from Navy October 2010. Aquatic resources, Tetra Tech November 2010.

Figure 4b. Aquatic Resources Map for DevGru Compound on NASO Dam Neck, Virginia Beach, Virginia.

Prepared For:



Prepared By:



Date:
 3/2011

*USACE jurisdiction based on preliminary JD.

Enclosure 2 50ft Wetland/Riparian Buffer Map

Naval Air Station Oceana, Dam Neck (N60191-DN)

Wetland/Waterway Protection Area Reference Map

Legend

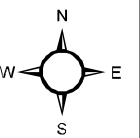
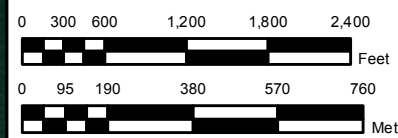
-  Wetland
-  Wetland Buffer (50 feet)
-  Installation Boundary

This map is generated from data contained in the CNRMA GeoReadiness Center (GRC). The information contained in CNRMA GRC is not to be construed or used as a "legal description" nor is it survey grade. Plans and maps from this database are believed to be accurate but accuracy is not guaranteed and the burden for determining accuracy, completeness, and appropriateness for use rests solely on the user accessing this information. The user acknowledges and accepts all inherent limitations of this maps and data, including the fact that they are dynamic and in a constant state of maintenance, correction, and revision. Data owners should be consulted if field verification or additional information is needed.

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Map created by K. Dean Wright,
NAVFAC MIDLANT EV
GIS Coordinator, on 04 JUN 2015

Coordinate System: WGS 1984 UTM Zone 18N
Projection: Transverse Mercator
Datum: WGS 1984



Enclosure 3 Watershed/Hydrologic Unit Maps

NAS OCEANA VA - DAM NECK



N60191-DN

Installation Watershed Map



ENVIRONMENTAL BUSINESS LINE, MID-ATLANTIC REGION

Legend

-  Watershed Boundary
-  Installation Boundary

This map is generated from data contained in the CNRMA GeoReadiness Center (GRC). The information contained in CNRMA GRC is not to be construed or used as a "legal description" nor is it survey grade. Plans and maps from this database are believed to be accurate but accuracy is not guaranteed and the burden for determining accuracy, completeness, and appropriateness for use rests solely on the user accessing this information. The user acknowledges and accepts all inherent limitations of this maps and data, including the fact that they are dynamic and in a constant state of maintenance, correction, and revision. Data owners should be consulted if field verification or additional information is needed. This material is For Official Use Only.

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Map created by K. Dean Wright,
NAVFAC MIDLANT EV
GIS Coordinator, on 6/8/2015

Coordinate System: WGS 1984 UTM Zone 18N
Projection: Transverse Mercator
Datum: WGS 1984



INTID: 963
HUC 8: 02040304
HUC 10: 0204030405
HUC 12: 020403040501
VAHU5: AO-G
VAHU6: AO23
HU_12_NAME: Atlantic Ocean-Rudee Inlet, (tidal)

INTID: 1
HUC 8: 03010205
HUC 10: 0301020513
HUC 12: 030102051301
VAHU5: AS-D
VAHU6: AS18
HU_12_NAME: Ashville Bridge Creek, (tidal)

INTID: 1053
HUC 8: 03010205
HUC 10: 0301020513
HUC 12: 030102051301
VAHU5: AS-D
VAHU6: AS18
HU_12_NAME: Ashville Bridge Creek, (tidal)

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Appendix F

Marine Mammal, Sea Turtle, and Essential Fish Habitat Management

- Enclosure 1 Standard Operating Procedures for Sea Turtles**
- Enclosure 2 Marine Resources Stranding Database & Reporting Process**
- Enclosure 3 Virginia Aquarium Stranding Response**
- Enclosure 4 Section 7 Consultation on Repairs to the Shoreline Protection System at Naval Station Oceana, Dam Neck Annex, Virginia Beach (2012); Biological Opinion on the Back Bay National Wildlife Refuge Sea Turtle Management Program, Virginia Beach, Virginia (2011)**
- Enclosure 5 Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species**
- Enclosure 6 INRMP Sea Turtle Program Biological Opinion and Biological & Lighting Assessments**

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Enclosure 1. Standard Operating Procedures for Sea Turtles

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STANDARD OPERATING PROCEDURES
FOR SEA TURTLES
Naval Air Station Oceana - Dam Neck Annex
VIRGINIA BEACH, VIRGINIA

Prepared by: Michael F. Wright Date: June 2008
Natural Resources Specialist

Revised by: Michael F. Wright Date: July 2012
Natural Resources Specialist

Revised by: Michael F. Wright Date: May 2013
Natural Resources Specialist

Revised by: Michael F. Wright Date: Jan 2015
Natural Resources Specialist

Revised by: Michael F. Wright Date: May 2015
Natural Resources Specialist

Revised by: Michael F. Wright Date: Aug 2015
Natural Resources Specialist

Revised by: Michael F. Wright Date: Sep 2015
Natural Resources Specialist

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Acronyms

ATV = All-Terrain-Vehicle

BBNWR = Back Bay National Wildlife Refuge

CLEO = Conservation Law-enforcement Officer (“Game Warden”)

DNA = Dam Neck Annex

ESA = Endangered Species Act

GPS = Global Positioning System

INRMP = Integrated Natural Resources Management Plan

NASO = Naval Air Station Oceana

NEST = Network for Endangered Sea Turtles

NMFS = National Marine Fisheries Service

NRM = Natural Resources Manager

PPE = Personal Protective Equipment

SOP = Standard Operating Procedures

USFWS = United States Fish & Wildlife Service

VA = Virginia

VAANG-CP = Virginia Army National Guard – Camp Pendleton

VAST = Virginia Aquarium Stranding Team

VDGIF = Virginia Department of Game and Inland Fisheries

VMSM = Virginia Marine Science Museum (now know as the Virginia Aquarium & Marine Science Center)

Introduction

This document provides the standard operating procedures (SOP) associated with managing Naval Air Station Oceana's (NASO) sea turtle program.

There are 5 species of sea turtles known off of the coast of NASO and NASO Dam Neck Annex (DNA), in southeastern Virginia: Green (*Chelonia mydas*); Hawksbill (*Eretmochelys imbricata*); Kemp's ridley (*Lepidochelys kempii*); Leatherback (*Dermochelys coriacea*); and Loggerhead (*Caretta caretta*). Of these 5 species 3 are known to have successfully nested along the coast of southeastern Virginia: Loggerhead, Kemp's ridley, and Green. Both the Loggerhead and the Kemp's ridley have been documented as nesting on NASO DNA. Leatherback sea turtles are known to have nested in North Carolina, but have yet to be documented nesting in Virginia. All 5 species of turtles have been documented as strandings in southeastern Virginia.

The NASO shoreline does not have typical suitable nesting habitat, but could have random stranding occurrences, particularly associated with tidal wash-up during storm events. The NASO DNA coastline (~4 miles) provides suitable nesting habitat and annually reports sea turtle strandings.

NASO and United States Fish & Wildlife Service (USFWS) Back Bay National Wildlife Refuge (BBNWR) work cooperatively to manage the sea turtle program at NASO DNA. The guiding documents associated with this cooperative working partnership are the Endangered Species Act (ESA), the NASO DNA Integrated Natural Resources Management Plan (INRMP) mandated by the Sikes Act (available upon request), the BBNWR Biological Opinion as amended on 25 May 2012 (Appendix A), and the 2008 NASO & BBNWR nest relocation agreement (Appendix B).

NASO staff and authorized associates perform daily sea turtle patrols to locate nests, crawls, and strandings at NASO DNA and Virginia Army National Guard-Camp Pendleton (VAARNG-CP) during the sea turtle nesting season. For nests located on NASO DNA, NASO and BBNWR biologists collaboratively determine if a nest should be left in place (in situ) or relocated. Relocated nests are buried on the closest adjacent land suitable site available to the originating nest location or to an established beach front nursery site on NASO DNA or BBNWR. The nests are protected by a predator enclosure that allows for unattended hatching and release of hatchlings. Nests are checked daily and are more closely monitored when the estimated hatching date approaches.

Nests located on VAARNG-CP property are collaboratively managed between BBNWR and VAARNG-CP biologists. NASO staff will notify both BBNWR and VAARNG-CP biologists if a crawl is located on their property.

All observed turtle strandings on NASO DNA and VAARNG-CP will be reported to the VA Aquarium Stranding Team (VAST).

Lighting assessments starting in 2015 are planned to be completed every 5 years (appendix J) to identify and address on installation lighting concerns associated with sea turtles.

Projects, training, and other activities on NASO DNA are reviewed to determine potential impacts to sea turtles and guidance is provided to minimize and or avoid identified concerns (appendix L)

Turtle Patrols

General Information

Morning patrols for nesting sea turtle crawls and nests, as well as for marine mammal and sea turtle strandings are conducted from 15 May through 31 Aug on NASO DNA and VAANG-CP. NASO Natural Resources staff and other authorized individuals conduct the patrols.

Patrollers attend a training session on turtle patrol procedures and crawl recognition (Appendix C). In addition to the patrol procedures training, ATV safety training presented by a Navy designated safety trainer is required for all volunteers, interns, and staff who will be operating an ATV or utility vehicle (refresher training required every 5 years). Patrols are done by ATV, or other four/all-wheel drive vehicle as approved by the installation Natural Resources Manager (NRM).

Appendix D provides a map of the NASO DNA patrol area. Due to Military Mission requirements the North end of NASO DNA is patrolled 1st (north of the building 127 beach access).

Patrollers arrive on site no-later-than 30 minutes prior to sunrise as identified by the Sunrise/Sunset table (Appendix E). If patrols start before daylight, headlights of vehicles will be covered with red filters before proceeding onto the beach. Patrollers first scout the beach along the water's edge looking for turtle crawls and strandings. Patrollers then return along the middle beach looking for crawls and high tide line strandings. Due to the narrow beaches and potential for nesting Piping plover, patrollers do not patrol above high tide line. If a stranded sea turtle or a crawl is sighted, procedures outlined in crawl and nest procedures section of this SOP are followed.

While on patrol, patrollers concurrently scout for and identify any unauthorized vehicles, temporary artificial lighting or other beach activities that may interfere with turtles. If such items are identified patrollers should notify base security, the conservation law-enforcement officer/"Game Warden" (CLEO), and the installation NRM. Security or the CLEO will escort any unauthorized vehicles, with headlights turned off, from the beach and will address any other concerns as appropriate referring to the appropriate Executive Order 11989, ESA, the Coastal Zone Management Act, or other regulatory document as appropriate.

At the completion of each patrol, the patroller records patrol information in the Sea Turtle Patrol Log (Appendix F). BBNWR employees respond as soon as possible to nest/crawl reports made by or relayed to BBNWR staff, volunteers, visitors, and partnering agencies.

Equipment and Supplies

- All-Terrain-Vehicle (ATV)
 - The patroller is responsible for wearing appropriate personal protective equipment (PPE). PPE includes but is not limited to: eye protection, safety vest, helmet, gloves, hearing protection, closed toed shoes, long shirt, long pants, and scarf under the helmet (for personal hygiene when sharing helmets). **A helmet must be worn ANY time an ATV is operated.**
 - Before patrol begins individuals should inspect the ATV and ensure:
 - ATV has adequate fuel, oil, and brake fluid levels. If not then those fluids should be filled appropriately.
 - ATV has adequate tire pressure for patrolling on the beach, if not adjust tire pressure accordingly.
 - ATV's nuts, bolts, toolbox, wiring, etc. are adequately secured.
 - ATV lights and gauges are working appropriately.
 - ATV lights if on beach before daylight are covered with red film/lens.
 - After patrol is completed individuals should inspect the ATV and ensure:
 - ATV is rinsed off daily after exiting the beach to minimize damage to the equipment from salt and sand.
 - ATV is refueled after each usage, if fuel gauge drops below ½ full.
 - ATV did not become damaged during patrol and all equipment/controls are in full working order.
 - ATV is stored and locked in the Natural Resources ATV storage shed behind Building 127.
 - ATV issues are documented on the patrol log and reported to the Natural Resources Manager.
- Turtle Patrol Log Book
 - Includes:
 - Data Sheets
 - Access & Notification Procedures (Contact List)
 - Copy of appropriate SOPs
 - Crawl and Turtle Identification Guide
 - Patrol Calendar
 - Brochures
- ATV Toolbox
 - Ensure before leaving on patrol that all required supplies/equipment are present and replace used items once patrol is completed)
 - Pens & Pencils
 - Latex gloves
 - Goggles
 - Hearing Protection
 - Helmet
 - Safety Vest
 - Tire gauge
 - Bright colored wire flag markers to flag off nest
 - Bags for trash and other various uses
 - First aid kit

- Paper towels
- Large hook to drag dead stranding to high beach
- “Do Not Cross” tape and pink tape to flag off turtle crawl/nest
- Digital camera
 - Check Battery Status after each patrol. If Low swap battery out with charged battery kept by Natural Resources Manager.
- GPS unit with extra batteries
- Binoculars
- Fluorescent orange spray paint (used for remarking previously spray painted turtles whose paint has degraded to a point where it is or will quickly become hard to identify that that turtle has already been reported and recorded)
- Storage Shed
 - ATV
 - Fuel (kept in appropriately marked Navy Authorized Storage Container)
 - Oil (kept in appropriately marked Navy Authorized Storage Container)
 - Restocking Supplies for ATV Toolbox
 - Response Equipment (Signs, Cages, Posts, Post-hole Pounder, Auger, Wire, Fencing, ATV Loading Ramp, Spot-light with Red-cap, live stranding Cooler, towels, live stranding shade tent/umbrella, Shovels, Rakes, Nuts & Bolts, foldable chairs, etc.).

Sea Turtle Strandings

All stranded turtles on NASO DNA and VAANG-CP are reported to the VA Aquarium Stranding Team (VAST), formerly the Virginia Marine Science Museum (VMSM), at 757-385-7575 (during business hours 0830-1630) or at 757-385-7576 (during afterhours for live stranding emergencies) .

Notifications regarding strandings found elsewhere in Virginia Beach, VA are referred to BBNWR and VAST.

Notifications regarding strandings found in North Carolina are referred to the North Carolina Aquarium’s Network for Endangered Sea Turtles (NEST) team at 252-441-8622.

See Appendix G for details regarding all marine animal stranding reporting procedures.

Dead Strandings

The procedures for dead strandings found on NASO, NASO DNA and VAARNG-CP are as follows:

- 1) If turtle is already spray painted, the turtle is not reported.
- 2) If spray paint is not seen on turtle, report turtle to the VAST at 757-385-7575 and the NRM at 757-433-3461. Ensure you relay day, time of finding, base name, location (preferably GPS point and physical location description), your name and contact information. If sea turtle is in the surf drag it up onto the beach so that it does not wash away before VAST arrives on the scene. Be sure to document on

the datasheets and notify VAST that the turtle was originally located in the surf and dragged up onto the beach.

- 3) Assist, as needed, the VAST with access to the stranding.
- 4) Assist, as needed/as able, the VAST with data collection and removal of the stranding.
- 5) Complete Turtle patrol log & appropriate other datasheets, include location description, GPS location, and note if pictures were taken (pictures should be taken and sent to the installation NRM). All other data will be obtained and recorded by the responding VAST personnel on a standard National Marine Fisheries Service (NMFS) sea turtle stranding form.

Live Strandings

The procedures for live strandings found on NASO, NASO DNA and VAARNG-CP are as follows:

- 1) If it is a hatchling, VAST and installation NRM is contacted. The turtle is kept in a moist dark environment until further instructions are given.
- 2) If the turtle is injured, VAST and installation NRM is contacted. The turtle's nose and eyes are kept moist and the body kept shaded, while the patroller awaits further instructions.
- 3) If the turtle is uninjured determine if it is a stranding or a nesting attempt. If it is a nesting attempt follow procedures in crawl and nest procedures section of this SOP. If it is a stranding, VAST and installation NRM should immediately be contacted. The patroller awaits further instructions.
- 4) If the turtle is in the water, no attempt is made to catch it. If the turtle appears to be in distress, VAST and installation NRM is contacted. As much information as possible is collected and recorded on the appropriate logs and is reported to VAST.
- 5) Assist, as needed, the VAST with access to the stranding.
- 6) Assist, as needed/as able, the VAST with data collection and removal of the stranding.
- 7) Complete Turtle patrol log & other appropriate datasheets, include location description, GPS location, and note if pictures were taken (pictures should be taken and sent to the installation NRM). All other data will be obtained and recorded by the responding VAST personnel on a standard NMFS sea turtle stranding form.

Note: If a live stranding is found while conducting nesting sea turtle patrol, immediately call in the stranding to VAST and the installation NRM with all appropriate information. After notifying VAST and installation NRM, continue and complete the nesting turtle patrol. After completing the turtle patrol collect live stranding supplies from the storage shed and proceed back to the turtle to provide the turtle appropriate protection until VAST can arrive on the scene. If the turtle is a hatchling, you should collect it on the spot and place it in the hatchling cooler with moist sand (no standing water) and continue on your patrol, be sure to let VAST know where to meet you to pickup the hatchling. [If

another natural resources staff member is available, they can be called in to assist with either completing the patrol or taking care of the live stranding situation.]

Crawl and Nest Procedures

General Information

A crawl is the entry and/or exit flipper and drag markings/impressions left in the sand from a sea turtle exiting and entering back into the Ocean, crawling up and off of the beach. The crawl area includes the entry, and exit crawl and any nesting area.

The nesting area is the disturbed area (“body cavity”) created by the turtle as she digs a hole, deposits and buries eggs, and turns away from the dunes towards the ocean for reentry. Usually there is mounded sand, as well as a flattened area. Sometimes sand disturbance from turning looks like a nesting area. In this case, hard sand usually with unbroken layers of dark sand can be found underneath the softer, disturbed sand. A crawl without any evidence of an attempt to dig a hole is termed a “false crawl.” A crawl that contains a nesting area that does not contain eggs is termed a “false nest.”

When a nesting or crawling turtle is encountered, usually spotted by a crawl observed in the ATV path, patrollers/responders immediately extinguish the headlights and park the ATV at a safe distance from the turtle. Patrollers should take extreme care to not startle turtle(s) and to stop anyone else from entering into the turtle nesting/crawling area. Patrollers should keep a good distance away from the turtle until the turtle has either engaged in egg laying or is returning to the surf. Patrollers cordon off the area from access, record the time the turtle was first spotted, GPS the nest location, determine whether the individual is carrying tags and record any tagging information or identifying characteristics, and take pictures from a distance (only if no flash is required or a picture can be taken utilizing an infrared lens, **NO WHITE LIGHT FLASHES**).

Patrollers report the nesting activity immediately to BBNWR and the installation NRM, and then continue all other required notifications. Other notifications may include but are not limited to range control, security, VA Department of Game and Inland Fisheries (VDGIF) sea turtle program manager, Command Duty Officer, Public Affairs Officer, Installation Environmental Program Director, Public Works Officer, etc.

When a sea turtle crawl is found, BBNWR employees will respond as quickly as possible following notification. All crawl and nest sightings are recorded on the Nest and Crawl Data Sheet (Appendix H).

Once appropriate notifications have been made, area marked, and immediate need data collected the patroller should complete the remainder of the patrol to determine if any other potential nesting activity occurred on base. If the turtle is in the process of digging a body cavity, she will most likely attempt to nest. Once active egg laying begins, to save time place a marker (survey flag) at least one foot behind the cavity to indicate the position of the nest, before continuing patrol. If additional nesting activity is identified, the same process should be followed as for the original nest. The patroller should request

additional support to aide in protecting crawls and nests until BBNWR staff can get on site to obtain appropriate biological data. **No one is allowed to enter into the nest/crawl area until authorization has been given by USFWS or the installation NRM.**

BBNWR, in support of an agreement with the Virginia Aquarium (formerly the Virginia Marine Science Museum), retains four hatchlings from the first successful loggerhead sea turtle nest they manage. These hatchlings are transferred to the Virginia Aquarium and used in an exhibit for about one year. After that time, they are transported by boat to the Gulf Stream and released.

BBNWR, in support of an agreement with Warnell School of Forestry and Natural Resources at the University of Georgia, collects a single egg from nests. These eggs are used as part of the “Genetic Mark-Recapture of the Northern Recovery Unit (GA, SC, NC [and VA]) and Mitochondrial Genomics for Characterizing Genetic Structure of Loggerhead Turtles” project/study. **The project duration is from 01 June 2010 to 31 May 2013.** Detailed information regarding this project is available upon request.



Crawl Procedures

BBNWR and Virginia Department of Game and Inland Fisheries (VDGIF) will be notified if a crawl is found on property.

BBNWR employees will respond immediately to reports of crawls and/or nests.

BBNWR Procedures are as follows:

- 1) Upon notification of a crawl, BBNWR staff will collect required equipment and supplies to respond to the site. Equipment will be utilized for biological data collection, protecting the nest and if required relocating the nest.
- 2) The perimeter of the entire nesting area (including incoming and outgoing tracks) is marked with wire flags. *(may be completed in advance by Navy staff)*
- 3) If necessary, the area is cordoned off with flagging to keep the public off of the tracks and possible nesting area. *(may be completed in advance by Navy staff)*
- 4) The data required in Section I, II, and III of data sheet is collected (Appendix H). This includes the date, weather conditions, names of observers, and crawl measurements. Track width measurements are taken from the lower, wetter portions of the beach where flipper impressions are more noticeable. Time of emergence from the ocean and return is estimated based on tide marking and tide tables.
- 5) A GPS location for the nest area is obtained.
- 6) The crawl is photographed. A small dry-erase board noting the date, crawl number, location, and so forth is included in every photo.
- 7) BBNWR biologist will make a determination if the site is a false crawl, false nest, or if a nest is present. BBNWR biologist will examine any nest body cavities by carefully digging out any body cavities to determine if eggs are present. (See Nest Procedures Section of this SOP for additional details.)
 - a. The BBNWR biologist will closely examine any circular, indented or mounded areas within the nesting area for front flipper impressions to

determine how the turtle was positioned when she laid the clutch of eggs before stepping near or inside it.

- b. If flipper impressions are found, the area directly opposite them will be targeted as the most probable nest location and will be excavated first.
- c. If impressions are not found, the flattened circular area at the end of the tracks will be targeted, followed by other flattened areas.
- d. The nest will be carefully excavated by hand to ensure eggs (if present) are not damaged. The observer will usually find a small, soft section of sand, unlike the surrounding harder sands. Eggs are usually a few inches below this soft, 2"-3" opening, so extreme care must be taken.

Nest Procedures

The BBNWR biologist and installation NRM will jointly make a determination regarding the status of the nest [nest relocation or left in place (In Situ)].

Appendix K depicts the Sea Turtle Nest Management Zones for NASO DNA.

VDGIF will be notified of any nest relocation or excavation efforts.

This determination is made by examining many factors associated with the nest location, such as: height on the beach (preferably close to the toe of the dunes), above average high tide line (regular inundation by water will result in embryonic mortality); width of the beach; amount of public use; located in a military training area; area susceptible to erosion; and sloughing escarpment (susceptible to being buried too deep). If the nest is at risk from several wash-overs during high tide, and/or the beach has a lot of public use the nest will be relocated. If the nest is located well above the high tide line, and in an area with a low amount of public use, then the nest will be left in situ, unless there are other extenuating circumstances. If, for any reason, the BBNWR Biologist or installation NRM determines that the nest will be in danger of destruction if left in place, the nest will be relocated to a safer location on the closest available suitable adjacent land.

In Situ Nests

Nests located in undisturbed, wide, high, beach areas adjacent to the toe of the dunes, will be left in situ. Each nest will be protected from predators by a wire predator enclosure.

The nest will be surrounded by informational signs, wire, flagging, and reflectors to educate the public, deter human disturbance and alert permittees driving on the beach.

The nest will be checked daily to ensure no unauthorized disturbance of the nest has been made, to determine if hatching has commenced, and to document any signs of predatory disturbance and plant or pest invasion. No later than ten days before the estimated hatch date, nest sitting/monitoring procedures will be implemented (Appendix I). Nest sitting is the process where individuals watch over the nest nightly until the nest has been confirmed via excavation that no further hatching will occur from that particular nest.

Individuals conducting nest sitting are called nest sitters. The nest sitters help protect emerging sea turtle hatchlings from predators as the turtles make their way to the ocean.

Two to three weeks after the hatchlings have emerged and no more signs of hatching are present, the nest will be excavated and data will be collected. In situ nests threatened by hurricanes or storms with expected beach erosion may be relocated to the next approved most suitable adjacent ocean front beach property.

BBNWR procedures are as follows:

- 1) Once eggs have been determined present and the nest identified to stay in place, the depth from beach surface is measured (using a board placed level with the sand surface, over the nest), to the top of eggs, with a tape measure.
- 2) The nest is then covered back up ensuring sand is placed back over the eggs in the same order as removed (moist sand first).
- 3) Eggs are left in place to naturally hatch out.
- 4) Once all data has been recorded, the tracks will be raked over.
- 5) The nest will be excavated two to three weeks after the majority of hatchlings have emerged. Hatchlings may continue to emerge for two weeks after initial emergence. Data on remaining unhatched eggs including developmental stage will be recorded. Dead hatchlings and infertile eggs will be frozen in the BBNWR biology freezer.

Relocated Nests

Excavating Nests

If it is determined necessary to move a nest, it will be relocated to either a suitable ocean front beach nursery site on NASO DNA or to the nearest approved suitable adjacent land to the originating nest location. If conditions change at NASO DNA and there are no suitable nest relocation sites available on the installation or on immediately adjacent land owner property nests will be relocated to a designated nursery site at BBNWR.

- 1) The BBNWR biologist will closely examine any circular, indented or mounded areas within the nesting area for front flipper impressions to determine how the turtle was positioned when she laid the clutch of eggs before stepping near or inside it.
- 2) If flipper impressions are found, the area directly opposite them will be targeted as the most probable nest location and will be excavated first.
- 3) If impressions are not found, the flattened circular area at the end of the tracks will be targeted, followed by other flattened areas.
- 4) The nest will be carefully excavated by hand to ensure eggs (if present) are not damaged. The observer will usually find a small, soft section of sand, unlike the surrounding harder sands. Eggs are usually a few inches below this soft, 2"-3" opening, so extreme care must be taken
- 5) Before the eggs are removed, the depth from beach surface is measured (using a board placed level with the sand surface, over the nest), to the top of eggs, with a tape measure.
- 6) Using excavated sand from the original nest, a 2" layer of sand will be placed in the bottom of a cooler.
- 7) Keeping exposed eggs shaded with an umbrella, the BBNWR biologist will remove them individually from the nest being careful not to rotate the eggs. They will be placed into the cooler with a 1" border of sand between the eggs and cooler. The eggs will be placed in the cooler in a methodical and consistent manner with note taken of the order. The number of eggs in each layer will be counted and recorded. Eggs will be packed in such a manner that they are not

- touching and with two inches of sand between each layer of eggs. With large nests, a second cooler will be needed.
- 8) After all eggs are removed, the "bottom nest depth," (the depth from board level with sand surface, to bottom of empty nest) is measured. The length and width of the nest cavity at the widest and longest points is also measured.
 - 9) Once all eggs are placed in the cooler, extra sand from the nest is placed over them, and also into a separate container. This sand will be used to surround the reburied eggs at the nursery site.
 - 10) Once all data has been recorded, the tracks will be raked over and the nest cavity refilled
 - 11) Eggs will be kept at a moderate temperature, out of direct sunlight, and jolting or shifting will be avoided during the trip to the nursery.

Items Needed for Nest Response/Relocation

BBNWR equipment for nest response/relocations (Navy equipment is identified under the Equipment and Supplies section of this SOP):

- Coolers (3)
- Aluminum wire (40 feet)
- In-situ predator exclosure
- Relocation predator exclosure
- Shovels (3)
- Umbrellas (2)
- Measuring tape (40 meter)
- Post hole diggers (2)
- Dry erase board and markers (2)
- Rake
- Digital camera and extra batteries
- Extra hand-held radio and cellular phone
- Pen and notepad
- Nest and Crawl data sheet
- Black indelible marker (to mark nest # on cage)
- Wire flags
- BBNWR Sea turtle nest box
- BBNWR Sea turtle patrol box

Nest Relocation

BBNWR procedures:

- 1) At the designated relocation site a hole is dug with a shovel that will allow the reconstruction of the original nest dimensions with sand from the originating nest.
- 2) The bottom and sides of reconstructed nest cavity will be filled with sand from original nest and compacted firmly. Dry sand will be prevented from entering the cage while the shape and size of the original nest is recreated as closely as possible. The remainder of the relocated nest cavity is filled with the extra sand brought from the original nest.
- 3) The same person who removed the eggs from the original nest will transfer the eggs from the cooler(s) to the nest-cage. **THE EGGS WILL NOT BE ROTATED**

- or packed tightly. Eggs will be placed into the nest-cage in the reverse order in which they were removed from the original nest. For example, the first egg put in the cooler will be the last one to go into the cage.
- 4) For any eggs that are broken how the break occurred is recorded, and a copy of the nest data sheet is included in the freezer with the specimens.
 - 5) Once the nest is in place and fully buried a trench will be dug around the nest cavity in which to place and secure the predator enclosure cage. This is the same cage utilized for in situ nests. The cage allows hatchlings to hatch and be released without human assistance. The nest number will be affixed to the top of the cage.
 - 6) Once predator enclosure is in place, for nests not located in a nursery site a large post with sea turtle information and protection notices will be placed on all 4 sides of the nest, approximately 1-2 feet away from the cage. If a nursery site is established the nursery site will be posted and cordoned off, as such each individual nest will not receive posts and signs.
 - 7) The Nest and Crawl Data Sheet is completed and placed in the turtle nest binder in the office with photos of the nest and crawl.
 - 8) Once data collection is completed, all foot prints/tracks leading from the beach into the dunes are smoothed out with grass rakes and/or boards to reduce the chance of curious members of the public following the tracks from the beach to the nest.

Nest Monitoring

After an appropriate length of incubation (40 days for Kemps Ridley and 50 days for Loggerhead and Green sea turtle nests), **nests will be monitored** via 2 daytime nest checks and overnight “nest sitting,” in approved zones (figure 1). Day time checks will be made once in the morning and once in the afternoon. Nest sitting will occur from 8PM to 5AM. Day and night checks are looking to initially identify a cone shaped depressions in the center of the nest and for evidence of prior/undocumented emergence. The time a depression is first seen is recorded on the Hatching Data Sheet, as well as on the original Nest Data Sheet.

The majority of nests hatch out at night. Nest sitters prepare the path to the surf, count the hatchlings and protect the hatchlings from predators such as gulls, raccoons, ghost crabs and foxes.

See Appendix I for detailed Standard Operating Procedures for Nest Monitoring.

Release of Hatchlings and Nest Excavation

When hatchlings begin emerging, Navy and BBNWR personnel will be contacted immediately. Hatchlings from in situ nests will be counted and observed.

The emergence time will be recorded on the Hatching Data Sheet.

The hatchlings will be allowed to crawl to the ocean on their own. It is very important that the hatchlings make this journey without assistance. Observers will frighten off any potential predators, if necessary.

The nest will be excavated two to three weeks after the majority of hatchlings have emerged. Hatchlings may continue to emerge for two weeks. The final judgment lies with Refuge Biologist. Data on remaining unhatched eggs including developmental stage will be recorded. Dead hatchlings and infertile eggs will be frozen in the biology freezer located in the brick building.

See Appendix I for detailed SOP for nest monitoring and hatchling release procedures.

Appendix A
Biological Opinion



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
6669 Short Lane
Gloucester, Virginia 23061



MAY 25 2012

Mr. W. David Noble
Director, Environmental Planning and Conservation
Department of the Navy
Navy Region Mid-Atlantic
1510 Gilbert Street
Norfolk, Virginia 23511-2737

Attn: Ben McGinnis, Environmental Planning and Conservation

Re: Section 7 Consultation on Repairs to
the Shoreline Protection System at
Naval Station Oceana, Dam Neck
Annex, Virginia Beach

Dear Mr. Noble:

On November 3, 2012, the U.S. Fish and Wildlife Service (Service) delivered our response to the Biological Assessment (BA) prepared by the Navy for the referenced project and its effects on the federally listed endangered roseate tern (*Sterna dougallii dougallii*) and the federally listed threatened Atlantic piping plover (*Charadrius melodus*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and seabeach amaranth (*Amaranthus punilus*) in accordance with section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA). In our November 3, 2012 response, the Service concurred with the Navy's determination of may affect, but is not likely to adversely affect for the roseate tern and seabeach amaranth. The Service requested that the Navy address concerns regarding proposed management for loggerhead sea turtles, green sea turtles, and piping plovers.

In a letter dated April 20, 2012, the Navy requested the Service's concurrence with the determination of may affect, but is not likely to adversely affect for the loggerhead sea turtle, green sea turtle, and piping plover based on modifications made by the Navy to their Integrated Natural Resource Management Plan (INRMP). Additionally, the Navy requested the Service's concurrence with a no effect determination for nesting federally listed endangered leatherback sea turtle (*Dermochelys coriacea*), hawksbill sea turtle (*Eretmochelys imbricate*), and Kemp's ridley sea turtle (*Lepidochelys kempii*). The Service concurs with the Navy's no effect determination for these three species of sea turtle because no records of nesting attempts by these species have been documented in Virginia.

Regarding loggerhead and green sea turtles, the Navy's INRMP includes a Sea Turtle Monitoring Protocol section, which sets criteria for daily monitoring of nesting sea turtles and nests, nest protection, and nest relocations. The Navy has agreed to leave nests in situ rather than

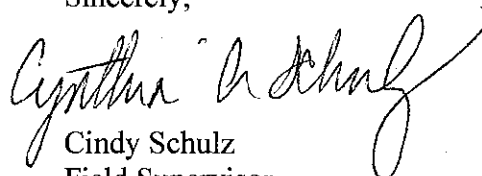
relocating nests, only moving nests when operational uses of the beach would result in the take of a nest. In such cases, the Navy will coordinate with the Service's Back Bay National Wildlife Refuge (NWR). All nest relocations by the Navy will be conducted in accordance with the methods outlined in the July 13, 2011, biological opinion issued to Back Bay NWR (copy enclosed) that provides ESA compliance for such activities at False Cape State Park, Back Bay NWR, Sandbridge Beach, Virginia Beach Resort Area, and Fort Story.

The Service does not concur with the Navy's determination of may affect, but is not likely to adversely affect for nesting loggerhead and green sea turtles, because take of turtles may occur. However, this letter amends the Loggerhead Sea Turtle Nest Monitoring and Management on Back Bay NWR biological opinion issued by the Service on July 13, 2011, to add Naval Station Oceana, Dam Neck Annex. This letter will be appended to that biological opinion and maintained as part of the decision document and administrative record. The biological opinion, this amendment, and the criteria in the INRMP together provide ESA compliance for the Navy related to monitoring of nesting sea turtles and nests, nest protection, and nest relocations for both loggerhead and green sea turtles that may occur at Naval Station Oceana, Dam Neck Annex.

The Navy has included in their INRMP guidelines for migratory bird monitoring and management. The INRMP includes protocols to ensure surveys and daily observations during sea turtle nesting periods will include monitoring for both piping plover and the federal candidate red knot (*Calidris canutus rufa*). There are no records of piping plovers nesting on beaches south of the Chesapeake Bay, where the species is considered to be an uncommon transient. Because it is unlikely that the piping plover will utilize this area and the monitoring protocols will be implemented, the Service concurs with the Navy's determination of may affect, but is not likely to adversely affect for piping plovers.

If you have any questions, please contact Mike Drummond of this office at (804) 693-6694, extension 122, or via email at mike_drummond@fws.gov.

Sincerely,



Cindy Schulz
Field Supervisor
Virginia Ecological Services

Enclosure

cc: Back Bay NWR, Virginia Beach, VA (Attn: Kathy Owen)
VDGIF, Richmond, VA (Attn: Amy Ewing)

Mr. Noble

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VDGIF, Wachapreague, VA (Attn: Ruth Boettcher)
VDCR, DNH, Richmond, VA (Attn: René Hypes)



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Ecological Services
6669 Short Lane
Gloucester, Virginia 23061

JUL 13 2011

Memorandum

To: Project Leader, Back Bay National Wildlife Refuge
(Attn: Geralyn Mireles, Wildlife Biologist)

From: Supervisor, Virginia Ecological Services *Cynthia A. Schuyz*

Subject: Biological Opinion on the Back Bay National Wildlife Refuge Sea Turtle Management Program, Virginia Beach, Virginia

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the subject project and its effects on the federally listed threatened loggerhead sea turtle (*Caretta caretta*) and green sea turtle (*Chelonia mydas*). The Service's Back Bay National Wildlife Refuge (BBNWR) proposes to conduct sea turtle nest management activities on BBNWR and adjacent properties along the Atlantic coast beaches extending from the Virginia/North Carolina border to the mouth of the Chesapeake Bay. This biological opinion is submitted in accordance with section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA). Formal consultation was initiated on January 27, 2011.

This biological opinion is based on the BBNWR Comprehensive Conservation Plan (CCP) (Service 2010), emails, telephone conversations, a sea turtle management meeting, and other information provided by the Service, Virginia Department of Game and Inland Fisheries, and others. A complete administrative record of this consultation is on file in this office.

CONSULTATION HISTORY

- 08-03-10 BBNWR requested section 7 consultation on their revised CCP.
- 08-03-10 to 9-13-10 The Virginia Field Office (VAFO) and BBNWR coordinated on a management plan to review and revise sea turtle and beach management on BBNWR.
- 09-13-10 VAFO and BBNWR completed review of BBNWR CCP and completed informal consultation. BBNWR and VAFO committed to conducting a meeting and evaluation of sea turtle management prior to the 2011 sea turtle nesting season to review and revise sea turtle management and complete formal section 7 consultation, if necessary.

- 01-19-11 VAFO held a sea turtle management meeting which included BBNWR and other agencies conducting sea turtle nest management and beach management in Virginia.
- 02-02-11 VAFO received draft intra-Service section 7 consultation form on BBNWR sea turtle management.
- 02-02-11 VAFO and BBNWR reviewed and revised sea turtle nest management protocol to 06-15-11 and intra-Service consultation form.
- 06-15-11 VAFO received final revisions of the nest management protocol and intra-Service consultation from BBNWR.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed activity is to continue monitoring and managing loggerhead sea turtle nests within all sea turtle nesting areas including the beaches of BBNWR, the Virginia Beach resort area, Fort Story, the City of Sandbridge, and False Cape State Park (FCSP). These management practices will continue until the loggerhead sea turtle is no longer listed. If nests of other sea turtle species are found, including the green sea turtle, the same protocol will be followed. Activities within sea turtle nesting habitat include crawl and nest searches as well as nest relocations.

A limited number of permit holders drive vehicles on the beach at BBNWR. Permits are issued to continue traditional ingress and egress along the BBNWR beach between the permittee's residence and their full-time employment in the Norfolk-Virginia Beach area. These permits are not transferrable and will be terminated when the current permit holder is no longer able to drive, or when alternate access becomes available during the permit period. Permittee access on BBNWR beach is prohibited between 12:00 am and 5:00 am from May 1 – September 30, to reduce negative impacts on sea turtles.

Monitoring Methods -

Turtle crawl and nest searches - Morning patrols for turtle crawls and nests are conducted from about June 1 through August 31. FCSP employees patrol BBNWR and FCSP, while BBNWR staff and volunteers are responsible for the north mile of BBNWR and Sandbridge Beach. A BBNWR volunteer patrols the Fort Story and Virginia Beach resort area beaches. Personnel use ATVs for the surveys, but vehicles may be used on the beaches where permitted beach driving is allowed.

When a turtle crawl is found, BBNWR staff determine whether the crawl resulted in a nest. The presence of a "body pit" in a sea turtle crawl usually indicates the turtle attempted to lay eggs. BBNWR biologists closely examine the body pit for indented impressions and/or mounded areas that indicate the location of the female's front flippers. This dictates her position when the eggs

were deposited. If flipper impressions are found, the area directly to the rear is targeted as the most probable nest location and is carefully excavated by hand first. The fingertips are used to probe the sand for a small, soft spot, unlike the surrounding more densely packed sand. This indicates the nest location. If flipper impressions are not found, the flattened circular area at either end of the tracks is targeted. Eggs are usually a few inches below this soft, 2-3 inch opening, so extreme care is taken. The biologist gently digs by hand into the body pit to locate the egg chamber and determine if eggs are present (Service 2007). The location and date of the crawl will be recorded, whether a nest is found or not.

Nest relocation - The construction of dunes on FCSP and BBNWR beaches in the 1930s resulted in blockage of overwash and dune blowout areas which otherwise would have allowed nesting sea turtles access to higher beach elevations. Current turtle nesting is limited to lower elevation sections of the beach which are susceptible to extensive saltwater inundation, beach erosion and complete nest loss during monthly high tides, "northeaster" storms, and hurricane activity in the mid-Atlantic. Other potential threats including vehicular beach traffic and public use activity also exist on these beaches.

The following risk analysis is performed by BBNWR biologists to determine if a nest needs to be relocated. If the answer to either of the two questions below is affirmative, the nest is relocated:

- Is the nest/body pit located below the estimated mean high tide lines -- as evidenced by the wrack lines and reference to tidal conditions when personnel survey the beach?
- Is the nest in an area where there is a likelihood that vehicles will run over the nest with signage and markers installed, or that there is a likelihood that intense artificial lighting will result in hatchling disorientation?

Once nests are determined to be present, biologists wear nitrile gloves prior to handling any eggs. This minimizes potential harm to the handlers (i.e., salmonella) and to the eggs (human carried bacteria, temperature change, etc.).

Before eggs are removed, the depth from beach surface to the top of eggs is measured. Using excavated sand from the original nest, a 2 inch layer of moist sand is placed in the bottom of a cooler (Sill et al. 2000). Keeping exposed eggs shaded with an umbrella, BBNWR staff remove eggs individually from the nest, being careful not to rotate them in the process. Eggs are placed into the cooler with a 1 inch border of sand between the eggs and the sides of the cooler. The eggs are placed in the cooler in a consistent and methodical manner with note taken of the order. The number of eggs in each layer are counted and recorded. Eggs are packed in such a manner that they are not touching and with 2 inches of sand between each layer of eggs. Usually two coolers are used. After all eggs are removed, the distance from the beach surface to the bottom of the nest depth is measured (Boulon 1999, Service 2007). The length and width of the nest cavity at the widest and longest points is also measured. Once all eggs are placed in the cooler, extra sand from the nest is placed over them and into a separate container. This sand is used to surround the reburied eggs at the nursery site located on BBNWR behind the primary dune. Once all the data has been recorded, the nest cavity is refilled and the crawl brushed out with

rakes and shovels. Eggs are kept out of direct sunlight; jolting or shifting is avoided during the trip to the nursery (Mortimer 1999).

At the designated nursery site a vertical shaft large enough for the predator-proof cage is dug with a spade/shovel. The predator-proof cage is placed in the hole with the middle rib of cage at least an inch above the sand as long as bottom and top nest depths are near the original nest's depths (Service 2007). The same person who removed the eggs from the original nest transfers the eggs from the coolers to the nest cage. The eggs are not rotated or packed tightly (Jones and Musick 1988, Mortimer 1999). Eggs are placed into the nest cage in the reverse order in which they were removed from the original nest (i.e., the first egg put in the cooler will be the last one to go into the cage). The bottom and sides of the cage are filled with sand from the original nest. Dry sand is not allowed to enter the cage through the mesh while the shape and size of the original nest is recreated as closely as possible. The remainder of the relocated nest cavity is filled with the extra sand brought from the original nest. The top of the predator-proof cage is secured with three 6-inch pieces of aluminum wire, and the nest number is written on the top. For any eggs that are broken, the cause of break is recorded on a copy of the nest data sheet. The sheet is then bagged with the specimen and placed in the biology freezer at BBNWR. The Nest and Crawl Data Sheet is completed and filed at BBNWR. Digital photos of the nest and crawl are downloaded and catalogued. This information and more is included in the 2007 "Back Bay NWR Sea Turtle Nest Standard Operating Procedures."

In situ nest management - Nests that are identified and left in situ are marked with reflectors, signs identifying the site as a sea turtle nest, and flagging tape placed in the immediate vicinity of the nest (within 9.8 feet [ft]) to help prevent nests from being run over by vehicles or inadvertently disturbed. A predator guard, constructed of galvanized fence wire with a rectangular mesh size of approximately 2 inches by 4 inches is used. A trench is excavated around the nest, and the fence material is placed over the nest with flaps placed in the trenches and re-buried to prevent excavation by predators. In situ nests are monitored daily near the hatch window to determine if they are successful, and after all hatching is anticipated to be completed, the nests are excavated and the number and condition of hatched eggs, unhatched eggs, and young turtles are counted.

Action Area - The "action area" is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The Service has determined that the action area for this project consists of the beaches of BBNWR, FCSP, the Virginia Beach resort area, Fort Story, and Sandbridge.

STATUS OF THE SPECIES AND CRITICAL HABITAT RANGEWIDE

The loggerhead sea turtle was listed as threatened in the U.S. in 1978 (NMFS and Service 1991a) and the green sea turtle was listed as endangered in 1978 (NMFS and Service 1991b). In March 2010, the Service and NMFS published a proposed rule in the Federal Register to recognize nine distinct populations of loggerhead sea turtles worldwide. Under this proposed rule, the loggerhead sea turtle population that would be affected by the proposed actions is the north

Atlantic population and it is proposed to be listed as endangered (72 FR 12598). There is designated critical habitat outside of Virginia for the green sea turtles, but none has been designated for the loggerhead sea turtle.

Species/Critical Habitat Description and Life History – This account emphasizes loggerhead and green sea turtle nesting and breeding biology, which is the subject of this biological opinion. Additional information about the life history of these sea turtle species and their habitat use, behavior, and survival at sea can be found in other documents, including the loggerhead and green sea turtle recovery plans (National Marine Fisheries Service [NMFS] and Service 1991a, b, respectively), loggerhead and green sea turtle five-year status reviews (NMFS and Service 2007a, b, respectively), and other sources (National Research Council 1990).

The loggerhead is smaller, with a mean carapace length of 3 ft and a mean mass of 293 pounds (NMFS and Service 2008), compared to 3.35 ft and 300 pounds for the green sea turtle (National Research Council 1990). Green sea turtles nest primarily in the tropics and are rarer nesters at higher latitudes, while loggerheads have significant nesting populations outside the tropics (National Research Council 1990).

Life History and Population Dynamics - Loggerhead females are believed to reach sexual maturity at a minimum age of 30 years (Snover 2002). At the start of the breeding season, they migrate from foraging areas on the continental shelf to mating areas in the waters near their nesting beaches (Schroeder et al. 2003). Reproductive females exhibit the desire to return to their birthplace to lay their eggs (Miller et al. 2003). Females may be inseminated by multiple males (Bollmer et al. 1999). After mating, males return to their foraging areas while females remain in the waters near their natal beaches to emerge onto their nesting beaches to lay eggs. The following account of nesting biology is a synopsis of Miller et al. (2003).

Loggerhead females tend to nest on high wave energy, sandy ocean beaches. Gravid females emerge from the wash zone and crawl toward the dune line until they encounter a suitable nest site, typically on open sand at the seaward base of a dune, but sometimes in vegetation. The female clears away surface debris with the front flippers, creating a "body pit," then excavates a flask shaped nest cavity with her hind flippers. Loggerheads lay an average of 112 eggs per nest. After laying, the female covers the nest with sand using all four flippers. Once the nest covering phase is complete, she crawls back into the sea. Individual females may nest 1 to 6 times per nesting season, at intervals of 12-16 days, during the late spring to late summer. Intervals between nesting shorter than 10 days indicate that the previous nest attempt was likely aborted due to disturbance. Mature loggerheads nest every two to three years, on average (Schroeder et al. 2003). Nest incubation period (from laying to hatching) depends on temperature and ranges from 48 to 90 days at the extremes. Emergence of hatchlings from the nest cavity usually occurs within four days of hatch, but may take up to two weeks longer. Hatchling emergence from nests usually occurs at night when temperatures are lower and diurnal predators are inactive. Hatching success typically approaches 80 percent; after hatchlings leave the beaches, they typically fall prey to a variety of predators, including birds, fish, and sharks (National Research Council 1990).

Within the Northwest Atlantic, the majority of loggerhead sea turtle nesting activity occurs from April through September, with a peak in June and July (Williams-Walls et al. 1983, Dodd 1988, Weishampel et al. 2006). Nesting occurs within the Northwest Atlantic along the coasts of North America, Central America, northern South America, the Antilles, Bahamas, and Bermuda, but is concentrated in the southeastern U.S. and on the Yucatán Peninsula in Mexico on open beaches or along narrow bays having suitable sand (Sternberg 1981, Ehrhart 1989, Ehrhart et al. 2003, NMFS and Service 2008).

Sex ratio of hatchlings depends on temperature during incubation. Below 84° Fahrenheit (29° Celsius), more males are produced than females and above that temperature more females are produced (Carthy et al. 2003). Furthermore, fluctuating incubation temperatures often produce more females than stable temperatures, and temperature, hydration, and gas exchange during incubation can determine hatchling size, early swimming behavior, growth rate, and hatchling robustness (Carthy et al. 2003). Newly emerged hatchlings immediately head for the sea, most likely orienting toward the water by moving toward the brightest horizon and away from dark silhouettes (Lohmann and Lohmann 2003). Sea turtles are most negatively sensitive to blue and green light and loggerheads in particular are averse to yellow light (Witherington and Martin 1996). Once in the sea, hatchling loggerheads swim into the waves and eventually enter the open ocean, where they will spend the first 6.5 to 11.5 years of their lives primarily at the top of the water column, until finally moving to foraging areas on the continental shelf (Bolten 2003).

Green sea turtles nest in two, three, or four year intervals, and may lay as many as nine clutches within a nesting season (NMFS and Service 1991b). Clutch size varies from 75-200 eggs, and incubation ranges from about 45-75 days (NMFS and Service 1991b).

Nesting habitat - Less is known about factors that cue nest site selection than about anthropogenic disturbances that discourage nesting (Miller et al. 2003). Typical nesting areas are sandy, wide, open beaches backed by low dunes, with a flat, sandy approach from the sea (Miller et al. 2003). Nesting is nonrandom along the shoreline, but studies of the physical characteristics associated with nests versus random or non-nesting sites on the beach have produced varying results. Some factors found to determine nest selection are beach slope (3 of 3 studies), temperature (2 of 3 studies), distance to ocean (1 of 3 studies), sand type (2 of 2 studies), and moisture (1 of 3 studies), although the results were occasionally contradictory (Miller et al. 2003). Other factors examined but not found to be significant were sand compaction, erosion, pH, and salinity. Although the process of nest site selection is not well understood, a successful nest must be laid in a low salinity, high humidity, and well-ventilated substrate that is not prone to flooding or burying due to tides and storms and where temperature is optimal for development (Miller et al. 2003).

Status and Distribution – Approximately 58,000 loggerhead nests were estimated in the U.S. Atlantic in 1983 (NMFS and Service 1991a) and between 53,000 and 92,000 nests from 1989 to 1998 (Turtle Expert Working Group 2000). Within the northern subpopulation (north Florida to Virginia), studies in South Carolina and Georgia have documented a decline in number of nests

(Ehrhart et al. 2003). Based on genetic evidence, male loggerheads disperse freely among sites within the U.S. Atlantic population, while females are faithful to their natal sites (Bowen et al. 2005). Because sex ratio is determined by temperature during incubation (Miller et al. 2003), the northern part of the U.S. Atlantic population, apparently provides a disproportionate number of males to the larger population (Mrosovsky et al. 1984a, Hanson et al. 1998, Hawkes et al. 2007).

“Analyses of historic and recent abundance information by the Marine Turtle Specialist Group (MTSG) indicate that extensive population declines for the green sea turtle have occurred in all major ocean basins. The MTSG analyzed population trends at 32 index nesting sites around the world and found a 48-65 percent decline in the number of mature females nesting annually over the past 100-150 years. The two largest nesting populations of green turtles are found at Tortuguero, on the Caribbean coast of Costa Rica, and Raine Island, on the Great Barrier Reef in Australia, where an annual average of 22,500 and 18,000 females nest per season, respectively. In the U.S., green turtles nest primarily along the central and southeast coast of Florida; present estimates range from 200 - 1,100 females nesting annually” (NMFS 2008). In the southeast U.S., the majority of green turtle nesting occurs in Florida. The green turtle nesting population of Florida appears to be increasing based on 19 years (1989-2007) of index nesting data from throughout the state (http://research.myfwc.com/features/view_article.asp?id=27537).

Factors Affecting the Species – Numerous factors affect sea turtle growth, survival, and behavior while at sea from when they leave natal beaches as hatchlings until they mature and return to beaches to breed. These factors are discussed in detail in the 5-year status reviews for the two turtle species (NMFS and Service 2007a, b). The discussion herein is limited to factors affecting turtle nesting. Threats to loggerhead sea turtles on the nesting grounds are similar to those faced by green sea turtles. The following threats affect both species, though there may be some differences in susceptibility between the species.

Weather and tides - Storm events may erode beaches and destroy nests or cause nest failure due to flooding or piling of eroded sand on the nest site. Beach erosion due to wave action may also decrease the availability of suitable nesting habitat (Steinetz et al. 1998), leading to a decline in nesting rate on a particular beach. Sea level rise, often in combination with human development along beaches, is contributing to erosion, changes in beach characteristics, and more intensive management of many beaches.

Predation - Predation of eggs and young by mammals, birds, and ghost crabs may eliminate up to 100 percent of the nests and any hatchlings that emerge on beaches where predation is not managed (National Research Council 1990). This is a natural phenomenon that has always affected sea turtle populations, but due to reduced turtle population sizes, reduced turtle habitat availability, and unnatural population increases of nest predators in some areas, predation is a significant threat to remaining breeding populations and is actively controlled through predator exclusion and predator control on most beaches where turtles nest.

Human activities - Crowding of nesting beaches by pedestrians can disturb nesting females and prevent laying (NMFS and Service 2008). Furthermore, the use of flashlights and campfires may

interfere with sea-finding behavior by hatchlings. Beach driving, including pedestrian traffic and vehicle use, and beach cleaning pose a risk of injury to females and live stranded turtles, can leave ruts that trap hatchlings attempting to reach the ocean (Hosier et al. 1981, Cox et al. 1994), can disturb adult females and cause them to abort nesting attempts, and can interfere with sea-finding behavior if headlights are used at night (NMFS and Service 2008). Driving directly over incubating egg clutches can cause sand compaction, which may decrease hatching and emergence success and directly kill pre-emergent hatchlings (NMFS and Service 2007a). Artificial lighting on structures may affect turtle behavior in a similar manner (Witherington and Martin 1996). Beach cleaning can directly destroy nests. Poaching is a problem in some countries and occurs at a low level in the U.S. (NMFS and Service 2007a). An increased human presence may also lead to an increase in the presence of domestic pets that can depredate nests and an increase in litter that may attract wild predators (National Research Council 1990).

The rate of habitat loss due to erosion and escarpment formation may be increased during shoreline stabilization efforts, either through renourishment (Dolan et al. 1973) or placement of hard structures such as sea walls or pilings (Bouchard et al. 1998). Vehicle traffic may alter the beach profile leading to steeper foredunes (Anders and Leatherman 1987), which may be unsuitable for nesting. Improperly placed erosion control structures such as drift fencing can act as a barrier to nesting females. Non-native and/or invasive vegetation may be introduced in conjunction with beach development, which can overrun nesting habitat, make the substrate unsuitable for digging nest cavities, invade nests and desiccate nests, or trap hatchlings.

Reduced nesting success on constructed/augmented beaches could result due to sand compaction, escarpment formation, and changes in the beach profile. Sand compaction has been shown to negatively impact sea turtles, particularly concerning beach nourishment projects. Placement of very fine sand and/or the use of heavy machinery can cause sand compaction on nourished beaches (Nelson et al. 1987, Nelson and Dickerson 1988). Significant reductions in nesting success (i.e., false crawls occurred more frequently) have been documented on severely compacted nourished beaches (Nelson and Dickerson 1987, Nelson et al. 1987), and increased false crawls may result in increased physiological stress to nesting females. Sand compaction may also increase the length of time required to excavate nests and result in increased physiological stress (Nelson and Dickerson 1988).

ENVIRONMENTAL BASELINE

Status of the Species/Habitat Within the Action Area – Sea turtle nesting has regularly occurred within the action area since the 1970s. Since 1970, 93 nests have been recorded, ranging from 0-7 nests per year. The majority of nests have occurred on BBNWR and FCSP (49 and 28, respectively, BBNWR 2011). Up to 8 false crawls have also been recorded among all the sites within a year (2002; BBNWR 2011), and a total of 45 false crawls have been recorded.

Since monitoring began, 9 nests have been left in situ, and most of these occurred from 2003 to 2005, when BBNWR staff tested and evaluated in situ hatch success of nests. The majority of nests left in situ failed to hatch, presumably as a result of tropical storms causing prolonged

inundation and beach erosion, but at least one nest left in situ hatched successfully at a rate comparable to nests placed in the hatchery. Most nests have been relocated to a sea turtle hatchery on BBNWR, located behind the primary dune. Hatch success of the hatchery-produced young is high, generally ranging from 80 to 95 percent.

In 2010, preliminary genetic analysis of 9 sea turtle nests in Virginia was conducted in conjunction with a larger study of the population genetics of the northern recovery unit of loggerhead sea turtles. The 9 nests were laid by 4 different females, 2 of which also nested in North and South Carolina within the same year, as well as individuals that had not been recorded nesting outside of Virginia (Nairn and Shamblin 2011).

At BBNWR there is an artificial dune system that creates a narrow beach with a high primary dune. This combination creates poor quality nesting habitat due to the high probability of erosive washovers, egg exposure to saltwater and air, or entombment. Beaches in Sandbridge, Virginia Beach oceanfront, and other sites are generally larger, but are also subject to high levels of human activity, extensive illumination, and human traffic. Beaches at several sites are periodically renourished to maintain them in a condition to support public recreation.

Factors Affecting Species Environment Within the Action Area – The artificial dunes on BBNWR and FCSP result in narrow beaches that lack the upper beach zones and at high tides water is generally at or near the base of the dunes. The upper beach berm to dune transitional habitat, and all associated plants and animals, are generally lacking.

Beach driving results in ruts, compaction of sand, and disturbance of beach flora and fauna, and further contributes to the degraded condition of upper beach habitat. Vehicle operation on the beach may also reduce beach stability and result in increased levels of sand transport both on and off of the beaches of BBNWR and FCSP.

Human recreational use of the beaches, including grooming of the most heavily used recreational beaches in the City of Virginia Beach, result in highly disturbed beaches that lack natural beach contours, and may be more compacted than natural beaches. These areas also generally lack vegetation, and the beaches lie immediately in front of heavily developed hotel/resort areas. These areas are generally illuminated, and lack most characteristics of suitable sea turtle nesting beaches, with the exception of a broad beach profile that is maintained through periodic beach renourishing. Direct disturbance of sea turtles is also likely to occur on beaches that have high levels of human use or vehicle operation.

Beach renourishment may result in unsuitable beach conditions, including unnatural profiles, beach sand composition that is different from natural beaches in color, density, compaction, drainage, and other characteristics. These beaches may be suitable for sea turtle nesting, but may result in differences in nest success, hatchling gender, and hatchling fitness.

EFFECTS OF THE ACTION

Adverse Effects – The effects to sea turtles from nest relocation are not well studied, and vary depending on the specific practices involved in relocation. Because it is not practical to monitor the long-term survival or success of hatchling turtles, the specific effects of nest management action on BBNWR on hatchling turtles are not known.

Many studies indicate reduced hatch success of relocated sea turtle nests. Handling alone can result in damage to embryos by disrupting membrane attachment and result in reduced hatch success (Limpus et al. 1979, Parmenter 1980). Differences in the moisture regime, temperature regime, and gas exchange between nest sites selected by turtles and sites where nests are relocated also have the potential to affect hatch success (Ackerman 1980, McGehee 1990).

Movement of sea turtle nests to a hatchery site alters sex ratios of sea turtles compared to those that would occur in natural nests as a result of different incubation temperatures (Harvey and Slatkin 1982; Limpus et al. 1982; Mrosovsky et al. 1984a, b; Dalrymple et al. 1985; Dutton et al. 1985; Standora and Spotila 1985). The use of a hatchery site that is more far-removed from the beach likely generally results in warmer incubation temperatures than those which would occur at natural nest sites, and this would tend to increase the proportion of female hatchlings (Mrosovsky et al. 1984a, b). However, because the sex ratios that would naturally occur are expected to vary among years and sites depending on weather conditions, date that the nest is laid, nest depth, soil conditions, and other factors, it is not possible to determine how the sex ratio at the hatchery site would differ from what would occur naturally. Additionally, it is not possible to determine what biological, demographic, or genetic effects to the population may result from altered sex ratios, except that differences should be expected, and we presume that the naturally occurring sex ratios and the variation in those ratios over time, are appropriate to maintain the sea turtle populations.

As a result of the refinement of methods and implementation of a detailed protocol to excavate, transport, and re-bury turtle nests that are relocated by BBNWR personnel, hatch success rates are generally comparable to those that may occur naturally. Similarly, the identification and routine use of a carefully selected hatchery site at BBNWR has apparently reduced the adverse effects to turtle embryos and hatching success.

Emerging research on the homing abilities of sea turtles continues to indicate a strong tendency for sea turtles to return to their natal beaches to nest. However, to date, the cues that sea turtle hatchlings use to allow them to return to natal beaches are unknown. Irwin et al. (2004) have measured distorted magnetic fields within sea turtle egg enclosures similar to those used by BBNWR. Based on evidence that sea turtles navigate at sea using magnetic fields Lohmann et al. (1999) and Irwin et al. (2004) speculate that magnetic fields may be an important mechanism for imprinting on natal beaches, and distortion in magnetic fields may affect homing behavior and the ability to return to natal beaches.

Condition of hatchling turtles may be more important than hatch success in terms of the likelihood of survival and recruitment of young turtles. Hatchling size in some turtle species is related to the water balance of eggs while in the nest, with larger young generally resulting from eggs that occurred in wetter conditions (Janzen et al. 1995). While the relationship of hatchling size to nest environment during development has not been well studied in sea turtles, larger young may be more likely to survive (Janzen et al. 1995).

Manual release of hatchlings from the enclosed egg chamber used at the BBNWR hatchery may result in higher than normal susceptibility to predation. Release of hatchlings during daytime hours can result in higher predation, and release of hatchlings en masse may also increase predation vulnerability by attracting predators to the group of young being released. Under natural conditions, night-time emergence and emergence of relatively small numbers of individuals over time (particularly at more northerly latitudes) may result in reduced risk of loss of all young.

Additionally, holding hatchlings after emergence may result in expenditure of energy attempting to escape, interference with normal behaviors, and elevated levels of stress that may detrimentally affect the physiological condition of hatchlings. After release into the ocean, this may result in reduced likelihood of survival and reduced probability of reaching nursery areas.

While the risk of catastrophic loss of clutches cannot be estimated, relocating turtle nests to a common hatchery area increases the likelihood of catastrophic loss resulting from accidents, adverse environmental conditions, and disease and predation.

It is uncertain whether the effects of intensive nest management discussed above occur, and to what degree they affect hatchling survival. The types of effects may vary depending on the environmental conditions within the specific nesting season, and the specific conditions that each nest is subjected to during management activities and relocation. The combination of these factors results in highly uncertain effects to the sea turtle population. While hatch success has often been used as a proxy to assess reproductive success, the factors discussed above may reduce recruitment, affect population demography, and affect future use of turtle nesting beaches in the action area. For the purposes of this analysis and in the absence of specific information that would allow us to consider the expected magnitude and severity of effects that may result, we make the conservative assumption that all of these factors affect hatchling sea turtles to a degree that cumulatively results in significantly reduced survival and recruitment probability.

Beneficial Effects – Monitoring and in situ nest protection provides good information on the sea turtle nesting effort within the action area. Nest marking and predator protection reduce the potential for anthropogenic impacts including disruption of nests and predation that may result from artificially abundant predators. The educational component of the monitoring aids in improving beach visitor consideration of sea turtle nesting in the vicinity of recreational areas. While unknown, the controlled conditions of the turtle hatchery likely result in higher nest success rates than would occur if turtle nests were left in the wild, but it remains unclear whether the greater productivity results in improved recruitment of juvenile sea turtles.

Interrelated and Interdependent Actions - An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. The Service is not aware of any such actions associated with this project.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Cumulative effects likely to adversely impact nesting sea turtles include management of beaches by private individuals and municipalities, and use of beaches for recreational purposes. Management and use of beaches degrades the habitat quality for nesting sea turtles and minimizes the likelihood of successful nesting and hatching of young. Shoreline development adjacent to beaches, primarily along the developed Virginia Beach oceanfront and Sandbridge, results in disturbance of adult female sea turtles attempting to nest, minimizing the likelihood of successful nesting.

CONCLUSION

After reviewing the status of the loggerhead and green sea turtle, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed BBNWR sea turtle nest management program is not likely to jeopardize the continued existence of the loggerhead and green sea turtles. No critical habitat has been designated for this species within the action area; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by BBNWR so that they become binding conditions of any grant or permit issued to any applicant, as appropriate, for the exemption in action 7(o)(2) to apply. BBNWR has a continuing duty to regulate the activity covered by this incidental take statement. If BBNWR (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, BBNWR must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service anticipates incidental take of all sea turtle nests that are relocated within the action area. While there is potential for some individual hatchlings to survive and recruit into the breeding population, the degree of uncertainty in the expected effects that relocation has on sea turtles requires expectation of loss of all relocated nests. Because the decision to relocate nests is dependent on the specific location, setting of the nest, and determination of BBNWR personnel, all nests that occur in any year may be relocated.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or adverse modification or destruction of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of nesting sea turtles.

- Conduct sea turtle monitoring and management to minimize anthropogenic intervention and maximize protection of nests.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the ESA, BBNWR must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

The proposed action includes appropriate measures to avoid and minimize adverse effects to sea turtles, and no additional terms and conditions are needed to implement the reasonable and prudent measures.

The following relates to reporting requirements:

- Care must be taken in handling any dead specimens of proposed or listed species that are found to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the ESA. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective. Upon locating a dead specimen, notify the Service's Virginia Law Enforcement Office at 804-771-2883, 5721 South Laburnum Avenue, Richmond, Virginia 23231, and the Service's Virginia Field Office at 804-693-6694 at the address provided above.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to further minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

BBNWR should work with other beach owners and managers in the region to implement beach management programs for sea turtles that include efforts to minimize threats to sea turtle nesting such as artificial lighting, beach grooming, and vehicle operation on beaches.

BBNWR should develop a beach management plan that allows for overwash and natural beach processes in at least limited areas of BBNWR that will allow for sea turtle nesting. If sea turtle nest relocation continues, identify an alternate hatchery location on the beach that will allow for natural and unassisted emergence.

For the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the

amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions, please contact Tylan Dean of this office at (804) 693-6694, extension 166, or via email at tylan_dean@fws.gov.

cc: VDGIF, Wachapreague, VA (Attn: Ruth Boettcher)
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Appendix B

NASO & BBNWR Nest Relocation Agreement



DEPARTMENT OF THE NAVY

NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO:
5090
Ser 00/202
May 29, 2008

Mr. Jared Brandwein
Refuge Manager
U.S. Fish and Wildlife Service
Back Bay National Wildlife Refuge
4005 Sandpiper Road
Virginia Beach, VA 23456-4325

SUBJECT: RELOCATION OF SEA TURTLE NESTS FROM NAVAL AIR STATION
(NAS) OCEANA, DAM NECK ANNEX TO BACK BAY NATIONAL
WILDLIFE REFUGE

Dear Mr. Brandwein:

The Navy requests the assistance of the U.S. Fish and Wildlife Service (USFWS) Back Bay National Wildlife Refuge (BBNWR) staff, as an authorized agency for the relocation of endangered species nests, in the relocation of sea-turtle nests found on NAS Oceana, Dam Neck Annex.

Per the NAS Oceana, Dam Neck Annex Integrated Natural Resources Management Plan (INRMP) signed by the U.S. Navy, USFWS, Virginia Department of Game and Inland Fisheries, Navy Natural Resources personnel or trained authorized volunteers will conduct patrols of NAS Oceana, Dam Neck Annex beaches in an attempt to locate endangered loggerhead sea turtle (*Caretta caretta*) nests. The patrol covers approximately four miles and is located north of Sandbridge, and south of Camp Pendleton State Military Reservation. Patrols are to begin May 15, 2008, and end August 31, 2008, of each year.

Loggerhead sea turtles have nested on site. The frequency of nesting is sporadic and infrequent. It has been almost eight years since the last recorded nest was identified on NAS Oceana, Dam Neck Annex.

The high tide line on the majority of the beaches laps at the toe of the dune line. Beaches are also utilized for recreation and military training. These three factors combined lead the Navy Natural Resources Specialist to determine that the beaches are unsuitable for successful nest hatching on-site.

Pending concurrence with the USFWS BBNWR staff, the Navy Natural Resources Specialist recommends that in the event of a sea-turtle crawl on NAS Oceana, Dam Neck Annex, the Navy patroller immediately notify USFWS BBNWR staff of the crawl. The Navy patroller or other Navy representative would then coordinate access for the USFWS BBNWR staff onto NAS Oceana, Dam Neck Annex. USFWS BBNWR staff would then determine if a nest is present and facilitate the relocation. Navy Natural Resources staff will remain onsite to assist as needed.

5090
Ser 00/

Please inform us if you require further information.
Concurrence letters or questions concerning this request should
be directed to my point of contact, Mrs. Michael F. Wright, at
(757) 433-2883 or E-Mail michael.c.farrell@navy.mil.

Sincerely,

A handwritten signature in black ink, appearing to read "M. R. HUNTER", with a long horizontal flourish extending to the right.

M. R. HUNTER
Captain, U.S. Navy
Commanding Officer

From: John_Gallegos@fws.gov
To: [Farrell, Michael C CIV NAVFAC MidLant, Environmental](#)
Cc: Jared_Brandwein@fws.gov; Kathryn_Owens@fws.gov; Leticia_Melendez@fws.gov; elocher11@gmail.com; Walter_Tegge@fws.gov
Subject: Sea Turtle Nest Relocation from Oceana/Dam Neck Base
Date: Friday, June 06, 2008 11:44:14

Hi Mike,
Got the (your) official request from CO Captain Hunter of Oceana Naval Air Station to have us move sea turtle nests from the Dam Neck Naval Base beach to the nursery at Back Bay NWR. Do you need a response from us on this? Or not? Please let me know.
Thanks!

John G.

John B. Gallegos, Wildlife Biologist
U.S. Fish & Wildlife Service
Back Bay N.W.R.
4005 Sandpiper Road,
Virginia Beach, VA 23456-4347

E-Mail: John_Gallegos@fws.gov
Phone: (757) 721-2412/3896
Fax: (757) 721-6141
<http://backbay.fws.gov>

Wright, Michael F CIV NAVFAC MIDLANT, PWD Oceana

From: John_Gallegos@fws.gov
Sent: Thursday, May 22, 2008 8:14 AM
To: Farrell, Michael C CIV NAVFAC MidLant, Environmental
Cc: jared_brandwein@fws.gov; McGrogan, Lawrence CIV CNRMA ENV, N45; Munley, Michael T CIV NAVFAC MidLant, Environmental; Chamberlain, Terry N CIV; Kathryn_Owens@fws.gov
Subject: Re: Sea-turtle Nest Relocation

Hi Mike,
Likewise, it was nice talking sea-turtle stuff again.
Sure. Our (FWS) policy is that we be contacted about all sea turtle nests in the Virginia Beach area (even the Virginia Aquarium doesn't have authority to relocate sea turtle nests). So, please do contact me or Erica Locher if a nest turns up on Dam Neck Naval Base. Thanks for asking, and looking forward to continuing work with you.

John G.

John B. Gallegos, Wildlife Biologist
U.S. Fish & Wildlife Service
Back Bay N.W.R.
4005 Sandpiper Road,
Virginia Beach, VA 23456-4347

E-Mail: John_Gallegos@fws.gov
Phone: (757) 721-2412/3896
Fax: (757) 721-6141
<http://backbay.fws.gov>

"Farrell, Michael
C CIV NAVFAC
MidLant,
Environmental"
<michael.c.farrel
l@navy.mil>
05/20/2008 02:17
PM

<john_gallegos@fws.gov>
cc
"Chamberlain, Terry N CIV"
<terry.n.chamberlain@navy.mil>,
"McGrogan, Lawrence CIV CNRMA ENV,
N45" <lawrence.mcgrogan@navy.mil>,
"Munley, Michael T CIV NAVFAC
MidLant, Environmental"
<michael.munley@navy.mil>,
<jared_brandwein@fws.gov>
Subject
Sea-turtle Nest Relocation

Hi John:

As always it was a pleasure chatting with you today regarding sea-turtle patrols and nesting.

We are drafting a formal letter per your request; however, this may take a week or so before it is ready for official submission.

In the interim and in the event that we do have a crawl, would it still be okay for us to contact your staff regarding potential nest relocations?

R,

Mike

Michael F. Wright (formerly, Michael C. Farrell) Natural Resources Specialist Environmental Program Division Oceana Public Works Department

Office: 757-433-2883
New Cell: 757-373-8531
Alt. Fax: 757-433-3460

Address:
953 Hornet Dr.
Suite 206
Virginia Beach, VA 23460-2190

Appendix C

Training Materials



Natural Resources: Personnel Training (*Sea-Turtle Nesting & Marine Species Strandings*)

Michael Wright
Natural Resource Specialist
PWD NAS Oceana

Natural Resources Mission



- **Implement and maintain a balanced and integrated program for the management of natural resources on Navy-owned lands in support of the installation mission.**
- **Ensure military readiness and sustainability while complying with natural resources protection laws.**
- **Conserve and manage natural resources entrusted to Navy care.**

Today's Topics



- **Endangered Species, Sea Turtle Nest Surveys**
- **Marine Species Stranding Patrols & Reporting**

Sea Turtle Patrols/Nesting Activity Surveys

- **Dates: 15 May – 31 August**
- **Start Time: 30min prior to sunrise, NLT 0600**
- **Location: NASO DNA & VAANG-CP Beaches**
- **Procedures:**
 - **Turtle Patrol Log Manual**
 - **ATV**
 - Preventative Maintenance
 - Safety (Operation & PPE)
 - **Beach Patrol**
 - **Contacts**

- **Perform a figure 8**

- **Patrol Begins at the Middle of DNA. Continuing North 1st to cover firing range beaches 1st.**

- If Firing Ranges are active do not go past the firing range warning signs, see attached photo(s).

- **Patrol Shoreline First**

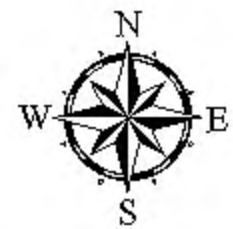
- **Patrol Middle Beach Second**

NASO DNA Sea Turtle Patrol Reference Map (Rev May 2013)

If firing range red flags or lights are flying stop at the 1st tower with these flags or lights and wait for the guard to say or give you the thumbs up to proceed up/down the firing range beach. Active ranges should cease fire to allow you thru and there should not be an extended wait time (5 minutes max). If you have difficulties give Michael Wright a call on her cell phone.

Note: You should be clearing these beaches 1st, you should be completed with the Firing Range, MACS24, and VAANG beaches NLT 0700, unless you locate a crawl.

Ideally, unless something major happens you should be done with your entire patrol by 0730.









0.5

Miles

810

Meters

-  Storage Shed
-  Vehicle Beach Access
-  ATV Beach Access
-  Walkover Beach Access
-  Range Restricted Beach Access
-  Alternate Route

No Alt. Route
as of May 2014

South End of Patrol Area (Sandbridge/Dam Neck Annex border)



North End of Patrol Area (VAANG-CP/Croatan Beach border)



Firing Range Warning Signage



- **Read Sea Turtle Standard Operating Procedures (SOP) Manual and all associated Appendices.**
 - **Sign Signature Page Acknowledging Receipt and Review of the Sea-turtle SOP. Signature page to remain on file at the installation Natural Resource Office, Building 820.**
 - **Note: Face to Face/Classroom training, goes over the SOP and Appendices, but one should read the SOP to ensure they understand the full details.**
 - **If there are any questions, contact the installation Natural Resources Manager.**

• **Identification of Crawls & Sea Turtles:**

- **Attached Photos were provided by the installation Natural Resources Program or from Michael Wright's personal photos.**
- **Photocopies of the sea turtle sections of the following book/guide are utilized in this training presentation to help explain how to identify sea turtles species: "Guide to Marine Mammals and Turtles of the U.S. Atlantic and Gulf of Mexico," published in 1999, authored by Kate Wynne and Malia Schwartz. Copies of the book have been purchased and are available for use.**

Examples of Loggerhead Sea Turtle Crawls

Crawl with Nesting Pit (normal tracks)



False Crawl (Crawl w/no Nest)



Crawl with Nesting Pit (X-cross tracks)



Example of Uncovered Loggerhead Sea-Turtle Nest

Note: Eggs look like white ping-pong balls. Nest typically contains anywhere from 60 to 120+ eggs. A turtle can nest multiple times in a season.



Example of Hatched Loggerhead Sea Turtles ("Hatchlings")

Note: These photos are of hatchlings from a nest just south of NASO Dam Neck Annex (NASO DNA) on the north end of Back Bay National Wildlife Refuge near the community of Sandbridge adjacent and directly south of NASO DNA.

Hatchlings fit in the palm of an average sized human hand. They typically hatch after dark and just before sun-rise and are guided by the light of the moon towards the water. City lights typically interfere with this process and misguide the hatchlings exhausting them and leaving them vulnerable to predation.

During early morning patrols keep an eye out for hatchlings starting in July, in the possible but unlikely event that a nest/crawl was missed during daily patrols.



15 June 2012 Kemps Ridley Sea Turtle Nesting NASO Dam Neck Annex

Unlike the Green or Loggerhead Turtles, which rarely lay nests during the afternoon daylight hours, it is not uncommon for Kemps Ridley's to lay nests during the day. This turtle was on the beach from ~1430-1530.

Adult Female Turtle Laying Nest:







Adult Turtle Crawl:

Notice the difference in the width of the tracks and the body cavity between the Loggerhead and the Kemps Ridley crawls. Kemps Ridleys (up to ~100 lbs.) are the smallest and Loggerheads (up to ~300 lbs) are the largest sea turtles currently nesting on our beaches.







Adult Turtle Flipper Prints & Closer view of Crawl Prints:



Nest Left In-Situ with Predator Guard/Cage and Signage:

Nests left on site (in-situ), not relocated, are protect with a predator guard to keep out predators such as foxes and racoons during egg incubation. The predator guard is designed to allow the turtles to hatch and work their way to the ocean without being held captive in the cage. Nests relocated to dunal nursery sites have enclosed cages.

In-situ nest are clearly marked and posted to provided general information, to clearly indicate that disturbance of the nest is prohibited and is a violation of Federal Law, and minimize the potential for vehicles to drive over and crush the nest.



Unlike all the other animals in this book, sea turtles are reptiles—taxonomically distant and distinct from marine mammals. They have dry, scaly skin, which is relatively impermeable to water; are ectothermic; and like many reptiles, lay eggs. The most distinguishing characteristic of sea turtles is their shell, a defining trait they share with all turtles. From terrestrial ancestors, marine turtles evolved secondarily to a marine existence. This resulted in a strongly tapered, streamlined shell and powerful, rigid, paddlelike forelimbs that “fly” through the water with amazing speed, without compromising the ability to move on land—an incapable confine for animals that must come ashore to lay their eggs.

Strong swimmers, sea turtles are capable of making deep, repetitive dives to search for food and can remain submerged for long periods of time, such as when resting on the ocean bottom. In fact, sea turtles spend little time at the water surface—often just long enough to take a breath of air—though some sea turtles, such as the leatherback and loggerhead, can be found basking at the water

surface. Basking in the sun may aid in maintaining a body temperature higher than that of the surrounding water, allowing for survival in colder Atlantic waters.

Life History

Sea turtles migrate, sometimes long distances, from foraging grounds to shallow-water nesting grounds to mate, nest, and lay their eggs. The female emerges from the water and digs a flask-shaped nest in the sand with her hind flippers, then lays 50 to 170 (depending on the species) ping-pong ball-shaped eggs. After covering the nest with sand, she returns to the water. She will nest several times in one season. After the nesting season, she migrates back to the foraging grounds. In most species of sea turtles, mature females do not nest every year, remaining instead at the foraging grounds in off years.

Following an 8-to-10-week incubation, the eggs hatch, and the hatchlings dig their way out of the nest, usually emerging at night. They make their way to the water, orienting them-

selves to the brightest horizon (hatchlings disoriented by brightly lit beaches become more vulnerable to hazards such as predation and dessication). Once in the water, they swim rapidly—“swimming frenzy”—until they reach the open ocean, where many species spend the “lost years” living and feeding in floating sargassum. They “reappear” as juveniles in feeding grounds shared with adults or, in some cases, migrate to developmental feeding grounds. But some species, such as the leatherback, spend their entire lives in a pelagic existence, coming inshore only to mate and nest.



Courtesy of CEE



Conservation

Probably the single greatest threat to sea turtle survival in U.S. Atlantic waters is entanglement in active and discarded fishing gear. Sea turtles that become entangled and cannot reach the surface to breathe become increasingly anoxic (oxygen depleted) and comatose. Not all turtles in this condition are dead. Although they are inactive and their heart rate is negligible, recent research shows that they may be able to recover.

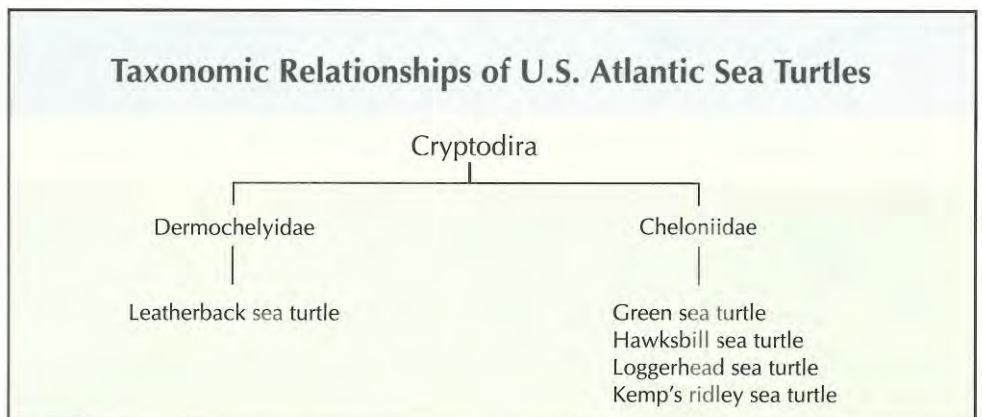
You can help sea turtles found in this condition: Place the turtle in the shade, carapace-up, and keep it moist with seawater until flipper activity resumes. Recovery may take more than 2 hours. Remember: Regulations require that you return the turtle to the water.

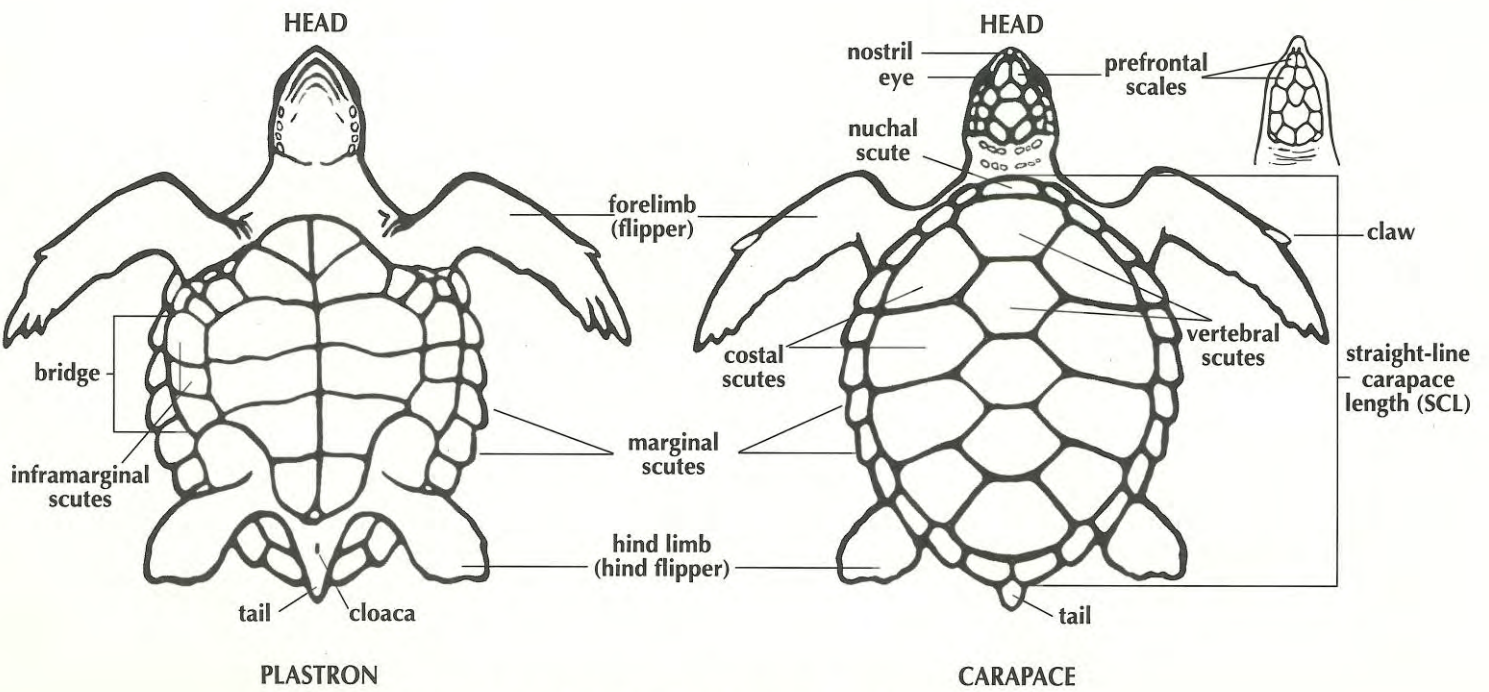
Dermochelyidae

Carapace and plastron lack horny shell scutes, being covered instead by leathery skin. Underlying bones of the shell are almost completely lost, their place taken by a mosaic of thousands of tiny bones imbedded below the leathery skin. Forelimbs are smooth, broad, and paddlelike and lack claws. This family is represented by a single living species, *Dermochelys coriacea*, the leatherback sea turtle.

Cheloniidae

Family composed of the “hard-shelled” sea turtles. Shell is covered with horny scutes, variable in number, but usually including 5 vertebral scutes, 4 or 5 pairs of costal scutes, and 3 or 4 pairs of inframarginal scutes. Carapace is oval to heart-shaped. Forelimbs are covered with scales, are paddlelike, with elongated digits and 1 to 2 claws on each forelimb.





Note: Sex of sea turtles is difficult to determine through external morphology.



HAWKSBILL SEA TURTLE



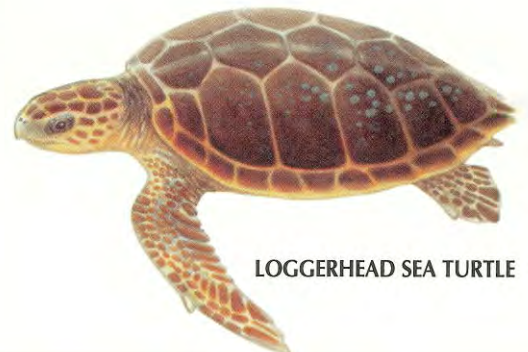
KEMP'S RIDLEY SEA TURTLE



GREEN SEA TURTLE



LEATHERBACK SEA TURTLE



LOGGERHEAD SEA TURTLE

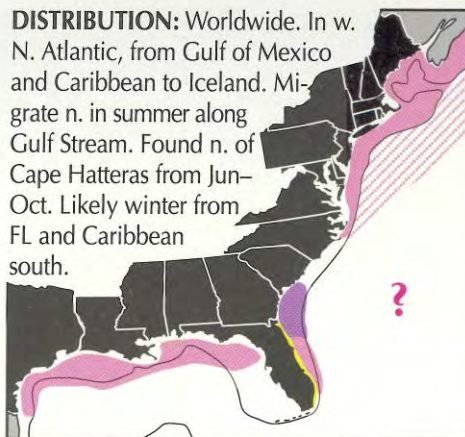


SIZE: Adult shell to 1.8 m SCL (6 ft), 727 kg to 1 ton.

BODY/SHELL: Largest living turtle. **Lacks shell scutes, head and body scales.** Covered by **leathery skin.** Carapace divided longitudinally by 7 ridges; hingeless plastron divided by 5 ridges; head short, blunt, with **2 cusps projecting from upper jaw.** Limbs **clawless.**

COLOR: **Only black marine turtle in Atlantic,** but often spotted with white or pinkish blue on undersides of head, limbs, body.

BEHAVIOR: Solitary at sea, but adults may congregate off nesting beaches or while feeding on jellyfish. Relatively fast swimmers (>10 knots), breach occasionally. Spend majority of time feeding or basking near or at water surface. Most dives <200 m (660 ft), <20 min; but can dive to 1,300 m (4,290 ft).



DISTRIBUTION: Worldwide. In w. N. Atlantic, from Gulf of Mexico and Caribbean to Iceland. Migrate n. in summer along Gulf Stream. Found n. of Cape Hatteras from Jun–Oct. Likely winter from FL and Caribbean south.

HABITAT: Highly pelagic, migratory. Occasionally enter shallow waters of bays and estuaries.

DIET: Primarily jellyfish.

LIFE HISTORY: Courtship and mating thought to occur off nesting beaches. In w. Atlantic, nesting occurs Apr–Nov on e. coast of FL, Caribbean, and s; rarely in TX, GA, SC, NC. Mature females may oviposit >6 times per year, laying 50–170 eggs per clutch. Incubation lasts 53–74 days. Little is known about hatchling, juvenile movements.

STATUS AND HUMAN INTERACTIONS: Endangered. Principal threats in U.S. Atlantic are entanglement in fixed fishing gear, boat collisions, debris ingestion. Threats to eggs and hatchlings include nesting beach alteration and artificial lighting.

Right photo: The leatherback lacks a bony shell. Instead, the shell is covered by a thin, black, leathery skin raised in 7 ridges.

The two cusps on the upper jaw of a leatherback assist in grasping slippery jellyfish prey. ▼

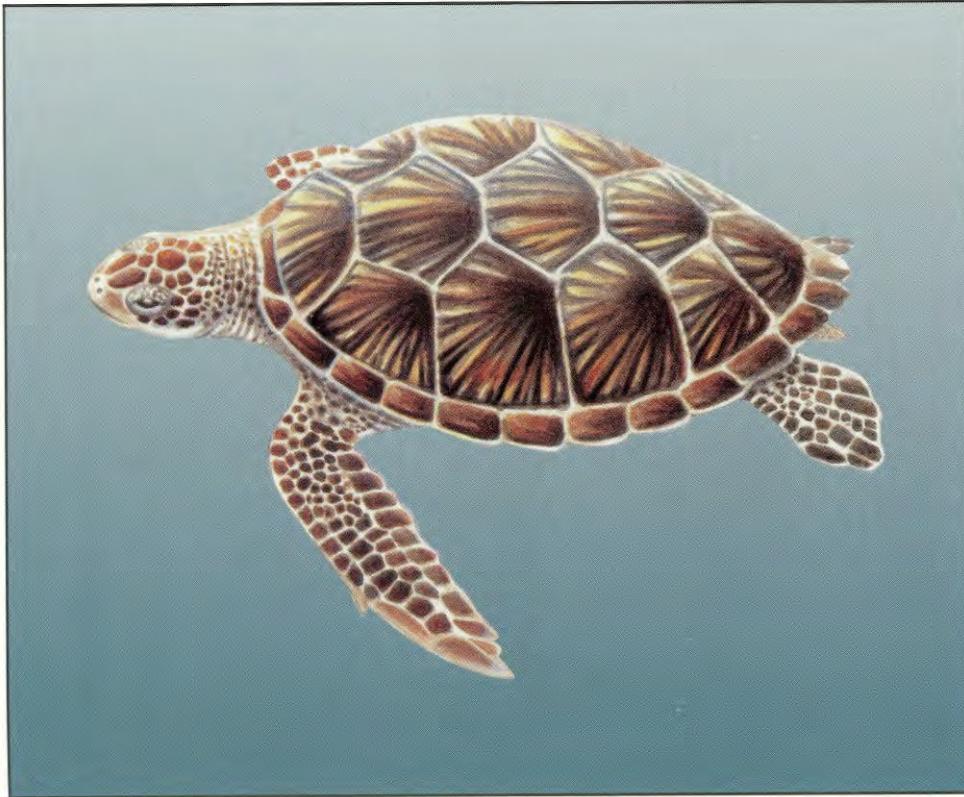


Larry Wood/MCJB



Scott Kraus/NEA

NOTE: Mortality of marine turtles found entangled/entrapped can be reduced: Place turtle carapace-up; keep moist and in shade until flipper activity resumes.



SIZE: Avg adult shell 1 m SCL (3.3 ft); avg weight 150 kg.

BODY/SHELL: Largest hard-shelled sea turtle. **Carapace smooth**, heart-shaped or oval, covered with horny scutes, with **4 pairs costals**, **nuchal scute not touching first costal**. **Head relatively small, rounded, with 1 pair prefrontals**. One claw on each forelimb.

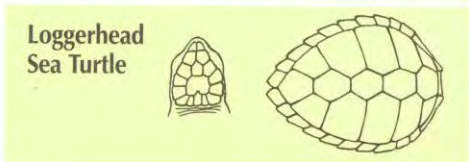
COLOR: Carapace and head olive to brown, some with mottled, radiating, or wavy pattern on scutes; plastron yellowish white. Hatchlings black above, white below.

BEHAVIOR: Can migrate great distances from nesting beaches to foraging grounds.

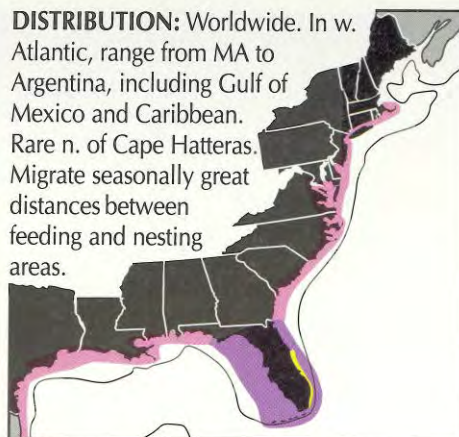
HABITAT: Pelagic as hatchlings (to 0.25 m SCL), then move to benthic feeding grounds; juveniles and adults congregate in relatively shallow, protected waters containing seagrass, macroalgae "pastures;" also coral reefs, worm reefs, rocky bottoms.



CAN BE CONFUSED WITH:



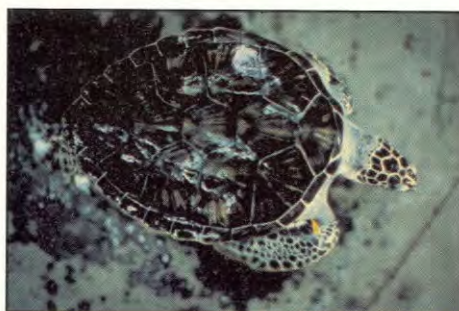
Greens can be distinguished by their smooth carapace and only 1 pair of prefrontal scales between the eyes. Note that carapace color is highly variable. ▶



DIET: Pelagic-stage hatchlings and juveniles eat molluscs, jellyfish, crustaceans. Diet shifts to seagrasses, macroalgae as juveniles mature and move inshore.

LIFE HISTORY: Mating occurs off nesting beaches close to shore. Mature females nest Mar–Oct (peak May–Jun). U.S. nesting occurs on tropical beaches in FL, Puerto Rico, U.S. Virgin Islands. Females oviposit avg 2–3 times per season, laying 100–150 eggs per clutch. Incubation lasts 45–60 days.

STATUS AND HUMAN INTERACTIONS: Breeding population endangered in FL; threatened elsewhere. Historically exploited for eggs, meat. In U.S. Atlantic, degradation of nesting and feeding habitats, boat collisions, fishing gear entanglement, and disease are serious problems.



Tom Doty/CETAP

NOTE: Mortality of marine turtles found entangled/entrapped can be reduced: Place turtle carapace-up; keep moist and in shade until flipper activity resumes.



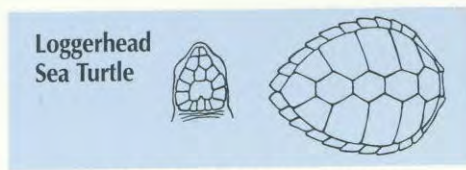
SIZE: Avg adult shell 0.92 m SCL (3 ft), can reach 1.2 m; avg adult weight 115 kg.

BODY/SHELL: Carapace covered with horny scutes, with **5 pairs costals, nuchal scute touches first costal; 3 pairs inframarginals present on bridge.** Head large, broad, with 2 pairs prefrontals; jaws powerful for crushing prey. Two claws on each forelimb.

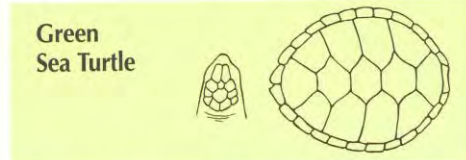
COLOR: Carapace and head yellow-orange to reddish brown, often covered by barnacles, fouling organisms; plastron yellowish to light brown. Hatchlings light brown to almost black.

BEHAVIOR: Hatchlings engage in "swimming frenzy" for about 20 hrs after hatching, carrying them offshore. May live in sargassum rafts until reach approx 0.45 m SCL. Juveniles, adults tend to congregate at same nearshore feeding grounds each year. Loggerheads may hibernate in winter.

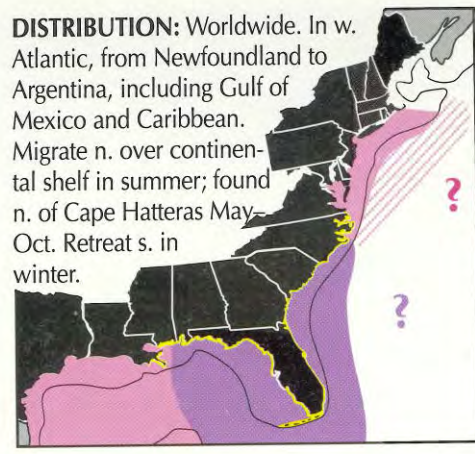
HABITAT: Pelagic as hatchlings, then migrate to nearshore waters. Adults, juveniles inhabit subtropical continental shelf and coastal waters (bays, lagoons, river mouths).



CAN BE CONFUSED WITH:



Loggerheads have a large, broad head and often have fouling organisms, such as barnacles, on the shell and body.

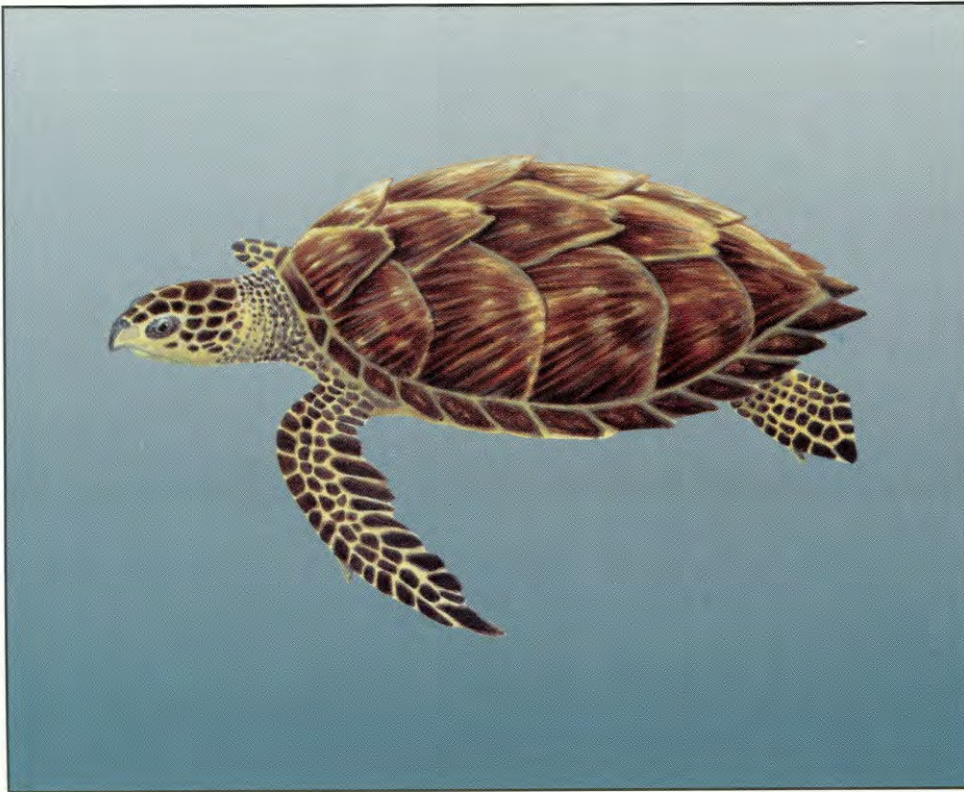


DIET: Primarily benthic feeders on crustaceans, molluscs.

LIFE HISTORY: Sexes thought to migrate together from foraging sites to nesting beaches, where mating occurs in surface waters. Nest Apr–Sep (peak Jun–Jul) on temperate beaches from s. NJ to FL; major U.S. nesting area is e. FL. Mature females may oviposit 3–6 times per season, laying 95–150 eggs per clutch. Incubation lasts 49–71 days.

STATUS AND HUMAN INTERACTIONS: Threatened. In U.S. Atlantic, greatest known mortality is entanglement in towed or fixed fishing gear. Boat collisions are also a serious problem. Threats to eggs, hatchlings include nesting beach degradation (development, erosion control, etc.) and artificial lighting.

NOTE: Mortality of marine turtles found entangled/entrapped can be reduced: Place turtle carapace-up; keep moist and in shade until flipper activity resumes.



SIZE: Avg adult shell 0.66–0.86 m SCL (2.2–2.8 ft); avg weight 82 kg.

BODY/SHELL: Carapace shield-shaped, covered with **thick, horny, overlapping scutes, with 4 pairs costals, nuchal scute not touching first costal.** Head narrow with 2 pairs prefrontals, **beak-like snout.** Two claws on each forelimb.

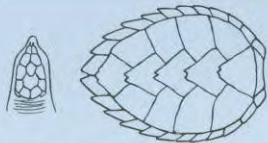
COLOR: Carapace pattern “tortoiseshell,” with radiating brown, black, amber streaks; head scales dark brown with yellow margins; plastron yellow.

BEHAVIOR: Migrate between feeding and nesting grounds. Adults, large juveniles capable of making deep dives (>100 m) to forage on deep-water sponges.

HABITAT: Pelagic as hatchlings and juveniles (to 0.25 m SCL), then move to feeding grounds in rocky or coral reef waters in the tropics, subtropics. Pelagic and benthic habitats poorly understood. Juveniles favor shallow waters, adults may forage in deeper waters.

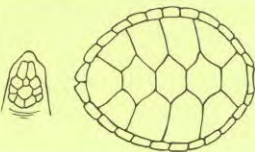


Hawksbill Sea Turtle

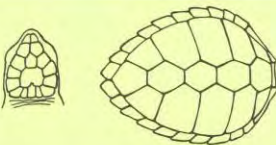


CAN BE CONFUSED WITH:

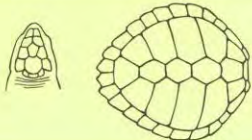
Green Sea Turtle



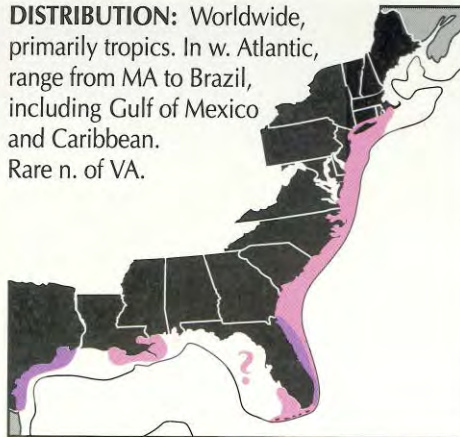
Loggerhead Sea Turtle



Kemp's Ridley Sea Turtle



DISTRIBUTION: Worldwide, primarily tropics. In w. Atlantic, range from MA to Brazil, including Gulf of Mexico and Caribbean. Rare n. of VA.



DIET: Primarily sponges and benthic invertebrates.

LIFE HISTORY: Nesting occurs year-round. In w. Atlantic, nest on beaches in Caribbean, C. and S. America. Rare nesting in FL. Mature females oviposit avg 4–6 times per season, laying 140–160 eggs per clutch. Incubation lasts 47–77 days.

STATUS AND HUMAN INTERACTIONS: Endangered. Highly exploited worldwide for tortoiseshell, and more recently, whole stuffed turtles. In U.S. Atlantic and Caribbean, degradation of coral reefs and nesting beaches remains a serious problem.



Rob Nawojchik/MA

NOTE: Mortality of marine turtles found entangled/entrapped can be reduced: Place turtle carapace-up; keep moist and in shade until flipper activity resumes.

The bird-like “beak” of the hawksbill aids in feeding from crevices and hard surfaces, such as coral reefs.



SIZE: Smallest sea turtle; adult shell 0.58–0.80 m SCL (1.9–2.6 ft); weight 40–50 kg.

BODY/SHELL: Carapace heart-shaped, covered with horny scutes, with 5 costals, nuchal scute touches first costal; 4 inframarginals with pores present on bridge. Head broad, but pointed, with 2 pairs prefrontals; jaws powerful and strongly ridged. One claw on each forelimb.

COLOR: Carapace light olive to gray; head and limbs gray; plastron white. Hatchlings dark gray to black.

BEHAVIOR: Adults found at feeding grounds primarily in the Gulf of Mexico. Juveniles feed in nearshore waters along the East Coast and Gulf; migrate s. for winter. Some remain too long, are caught in cold water, become cold-stunned, and die.

HABITAT: Pelagic as hatchlings (to 0.20 m SCL), then enter nearshore waters, primarily those with seagrass beds or mud bottoms favored by crabs. Adults, juveniles utilize similar inshore coastal waters.



Kemp's Ridley Sea Turtle

CAN BE CONFUSED WITH:

Loggerhead Sea Turtle

Hawksbill Sea Turtle

Green Sea Turtle

The smallest sea turtle, Kemp's ridley can be distinguished by a heart-shaped carapace and a large, broad head.

DISTRIBUTION: Atlantic, primarily w. N. Atlantic. Range: Nova Scotia to Mexico. Adults and juveniles found year-round in Gulf of Mexico; many juveniles migrate n. along the East Coast in summer, then retreat s. in fall.

DIET: Primarily crabs but also shrimp, molluscs.

LIFE HISTORY: Both sexes migrate to waters off nesting beaches to mate. Ridleys are unique: Females may nest in mass aggregations called "arribadas" (Spanish for "arrival"); they nest during the day; and 99% of all nesting occurs on several beaches near Rancho Nuevo, Mexico. Some single nesting occurs on beaches in Mexico, TX, FL, SC, NC. Nest Apr–Aug (peak Apr–Jun) and oviposit avg 3 times per season, laying avg 103 eggs per clutch. Incubation lasts 48–65 days.

STATUS AND HUMAN INTERACTIONS: Endangered. Egg collection, taking of nesting females, and entanglement in towed fishing gear have decimated the species. Mexican and U.S. law now prohibits taking of eggs and turtles. Entanglement in trawls remains the primary source of mortality despite TED regulations.

NOTE: Mortality of marine turtles found entangled/entrapped can be reduced: Place turtle carapace-up; keep moist and in shade until flipper activity resumes.



Tom Doty/CETAP

Marine Animal Stranding Patrols



- **In conjunction with Sea Turtle Nest Surveys**
 - **Beach Patrol**
 - Site, Sound & Smell
 - Who to Call...
- **Read Marine Species Stranding Reporting Procedures Document and Complete Associated Datasheet.**
 - This document is included as part of the Sea Turtle Program SOP appendices.

Local Natural Resources Contacts



- **Mr. Lawrence McGrogan,**
 - Conservation Law-Enforcement Officer/BST
 - PWD NAS Oceana
 - Office: (757) 433-2151
 - Cell: (757) 635-5436

- **Mr. Mark Edwards,**
 - Biological Science Technician (BST)
 - PWD NAS Oceana
 - Office: (757) 433-2151
 - Cell: (757) 636-4370

- **Ms. Michael Wright,**
 - Natural Resources Specialist (NRS) & TL
 - PWD NAS Oceana
 - Office: (757) 433-3461
 - Cell: (757) 373-8531

Servicing: NAS Oceana, NASO Dam Neck Annex, NALF Fentress, NSA Hampton Roads Northwest Annex, and Navy Dare County Bombing Range.

Appendix D

Map

NASO DNA Sea Turtle Patrol Reference Map (Rev May 2013)









0.5

Miles

810

Meters

-  Storage Shed
-  Vehicle Beach Access
-  ATV Beach Access
-  Walkover Beach Access
-  Range Restricted Beach Access
-  Alternate Route

No Alt. Route
as of May 2014

Appendix E

Sunrise/Sunset Table

Sunrise and Sunset Timetable

Richmond, Virginia

Sunrise-sunset times below are Eastern Standard Time
Add one hour for Daylight Saving Time, if and when in use.

Day	JULY		AUG		SEPT		OCT		NOV		DEC		JAN		FEB		MAR		APR		MAY		JUNE	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
1	4:52	7:35	5:14	7:18	5:40	6:39	6:05	7:53	6:35	5:12	7:06	4:52	7:25	5:02	7:14	5:33	6:41	6:04	5:55	6:33	5:14	7:00	4:50	7:26
2	4:53	7:35	5:14	7:17	5:41	6:38	6:06	5:52	6:36	5:11	7:06	4:52	7:25	5:03	7:13	5:34	6:39	6:05	5:53	6:34	5:13	7:01	4:50	7:26
3	4:53	7:35	5:15	7:16	5:42	6:36	6:07	5:50	6:37	5:10	7:07	4:52	7:25	5:04	7:12	5:36	6:38	6:06	5:52	6:38	5:12	7:02	4:49	7:27
4	4:54	7:35	5:16	7:15	5:42	6:35	6:08	5:49	6:38	5:09	7:08	4:51	7:25	5:05	7:11	5:37	6:36	6:07	5:50	6:36	5:11	7:03	4:49	7:28
5	4:54	7:34	5:17	7:14	5:43	6:33	6:09	5:47	6:39	5:08	7:09	4:51	7:25	5:05	7:10	5:38	6:35	6:08	5:49	6:37	5:10	7:04	4:49	7:28
6	4:55	7:34	5:18	7:13	5:44	6:32	6:09	5:46	6:40	5:07	7:10	4:51	7:25	5:06	7:09	5:39	6:34	6:09	5:47	6:38	5:09	7:05	4:49	7:29
7	4:55	7:34	5:19	7:12	5:45	6:30	6:10	5:44	6:41	5:06	7:11	4:51	7:25	5:07	7:08	5:40	6:32	6:10	5:46	6:38	5:08	7:06	4:49	7:29
8	4:56	7:34	5:20	7:11	5:46	6:29	6:11	5:43	6:42	5:05	7:12	4:51	7:25	5:08	7:07	5:41	6:31	6:11	5:44	6:39	5:07	7:07	4:48	7:30
9	4:57	7:33	5:20	7:10	5:47	6:27	6:12	5:42	6:43	5:04	7:13	4:51	7:25	5:09	7:06	5:42	6:29	6:12	5:43	6:40	5:06	7:07	4:48	7:30
10	4:57	7:33	5:21	7:09	5:47	6:26	6:13	5:40	6:44	5:03	7:13	4:52	7:25	5:10	7:05	5:43	6:28	6:13	5:41	6:41	5:05	7:08	4:48	7:31
11	4:58	7:33	5:22	7:07	5:48	6:24	6:14	5:39	6:45	5:02	7:14	4:52	7:25	5:11	7:04	5:44	6:26	6:14	5:40	6:42	5:04	7:09	4:48	7:31
12	4:59	7:32	5:23	7:06	5:49	6:23	6:15	5:37	6:46	5:01	7:15	4:52	7:24	5:12	7:03	5:45	6:25	6:15	5:39	6:43	5:03	7:10	4:48	7:32
13	4:59	7:32	5:24	7:05	5:50	6:21	6:16	5:36	6:47	5:01	7:16	4:52	7:24	5:13	7:02	5:47	6:23	6:16	5:37	6:44	5:02	7:11	4:48	7:32
14	5:00	7:31	5:25	7:04	5:51	6:20	6:17	5:34	6:48	5:00	7:16	4:52	7:24	5:14	7:01	5:48	6:22	6:17	5:36	6:45	5:01	7:12	4:48	7:33
15	5:01	7:31	5:25	7:03	5:52	6:18	6:18	5:33	6:49	4:59	7:17	4:53	7:24	5:15	7:00	5:49	6:20	6:18	5:34	6:46	5:00	7:13	4:48	7:33
16	5:01	7:30	5:26	7:01	5:52	6:17	6:19	5:32	6:50	4:59	7:18	4:53	7:23	5:16	6:59	5:50	6:19	6:18	5:33	6:47	4:59	7:14	4:48	7:33
17	5:02	7:30	5:27	7:00	5:53	6:15	6:20	5:30	6:51	4:58	7:18	4:53	7:23	5:17	6:57	5:51	6:17	6:19	5:32	6:48	4:59	7:14	4:48	7:34
18	5:03	7:29	5:28	6:59	5:54	6:13	6:21	5:29	6:52	4:57	7:19	4:54	7:23	5:18	6:56	5:52	6:16	6:20	5:30	6:48	4:58	7:15	4:48	7:34
19	5:03	7:28	5:29	6:57	5:55	6:12	6:22	5:28	6:53	4:57	7:20	4:54	7:22	5:19	6:55	5:53	6:14	6:21	5:29	6:49	4:57	7:16	4:49	7:34
20	5:04	7:28	5:30	6:56	5:56	6:10	6:22	5:26	6:55	4:56	7:20	4:55	7:22	5:20	6:54	5:54	6:13	6:22	5:28	6:50	4:56	7:17	4:49	7:34
21	5:05	7:27	5:31	6:55	5:57	6:08	6:23	5:25	6:56	4:55	7:21	4:55	7:21	5:21	6:53	5:55	6:11	6:23	5:26	6:51	4:56	7:18	4:49	7:34
22	5:06	7:27	5:31	6:53	5:57	6:07	6:24	5:24	6:57	4:55	7:21	4:55	7:21	5:22	6:51	5:56	6:10	6:24	5:25	6:52	4:55	7:18	4:49	7:35
23	5:06	7:26	5:32	6:52	5:58	6:06	6:25	5:22	6:58	4:55	7:22	4:56	7:20	5:23	6:50	5:57	6:08	6:25	5:24	6:53	4:54	7:19	4:50	7:35
24	5:07	7:25	5:33	6:51	5:59	6:04	6:26	5:21	6:59	4:54	7:22	4:57	7:20	5:25	6:49	5:58	6:07	6:26	5:22	6:54	4:54	7:20	4:50	7:35
25	5:08	7:24	5:34	6:49	6:00	6:03	6:27	5:20	7:00	4:54	7:23	4:57	7:19	5:26	6:47	5:59	6:05	6:27	5:21	6:55	4:53	7:21	4:50	7:35
26	5:09	7:24	5:35	6:48	6:01	6:01	6:28	5:19	7:01	4:53	7:23	4:58	7:18	5:27	6:46	6:00	6:04	6:28	5:20	6:56	4:53	7:22	4:50	7:35
27	5:09	7:23	5:36	6:47	6:02	6:00	6:29	5:18	7:02	4:53	7:23	4:58	7:18	5:28	6:45	6:01	6:02	6:29	5:19	6:57	4:52	7:22	4:51	7:35
28	5:10	7:22	5:37	6:45	6:02	5:58	6:30	5:16	7:03	4:53	7:24	4:59	7:17	5:29	6:43	6:02	6:01	6:29	5:18	6:58	4:52	7:23	4:51	7:35
29	5:11	7:21	5:37	6:44	6:03	5:56	6:31	5:15	7:04	4:52	7:24	5:00	7:16	5:30	6:42	6:03	5:59	6:30	5:16	6:58	4:51	7:24	4:52	7:35
30	5:12	7:20	5:38	6:42	6:04	5:55	6:32	5:14	7:05	4:52	7:24	5:01	7:15	5:31			5:58	6:31	5:15	6:59	4:51	7:24	4:52	7:35
31	5:13	7:19	5:39	6:41			6:33	5:13			7:24	5:02	7:15	5:32			5:56	6:32			4:50	7:25		

Apply corrections below to Richmond sunrise-sunset times
to obtain official times at other Virginia locations.

Location	Correction	Location	Correction
Newport News	-5 minutes	Bristol	+19 minutes
Norfolk	-5 minutes	Cape Charles	-6 minutes
Roanoke	+10 minutes	Charlottesville	+4 minutes
Tazewell	+16 minutes	Chincoteague	-8 minutes
Williamsburg	-3 minutes	Danville	+8 minutes
Winchester	+3 minutes	Fredericksburg	0 minutes

Appendix F

Sea Turtle Patrol Log

Appendix G

Stranding Reporting Procedures and Datasheet

STRANDING REPORTING PROCESS

1. Contact the VA Aquarium Stranding Team (757-385-7575, 0830-1630 hours or 757-385-7576 for afterhours live stranding emergencies) for sea turtle, sturgeon, and marine mammal strandings. For fish strandings (such as Sharks, mass non-shark fish strandings, sturgeon, large unusual fish strandings, or any other protected fish species of concern) contact the Virginia Aquarium's Curator of Fishes, Beth Firchau, 757-434-0745.
2. Fill-out the STRANDING REPORT FORM (see below) for on-land or open water identified strandings and Return to your installation Natural Resources Manager (NRM), ASAP.
3. Notify your NRM of the Stranding(s), immediately. If the stranding involves marine mammals or sturgeon provide them the information in the stranding report form. (Michael Wright, 757-373-8531) The NRM will notify the NAVFAC MIDLANT EV22 Subject Matter Expert (SME) and NOAA POCs, as appropriate.
4. The NRM will Call OPNAVINST 3100.6H Reportable Strandings into CNO N45, Washington DC 703-695-5271 (Frank Stone), 703-342-6455 (Bob Gisiner) &/ or the NOC Battalion Watch Captain (703-692-9284); COMLANTFLT 757-836-5221 (Richard "Jene" Nissen); and NAVFAC MIDLANT Core (Jessica Bassi, 757-341-0493).
 - o The following strandings are OPNAVIST reportable events:
 - Any stranding that involves a Northern Right Whale or Beaked Whale.
 - Any stranding that involves a floating whale in open water.
 - Any discovery of a whale stranded ashore.
 - Any mass stranding (two or more animals) of whales, or dolphins that results in coverage by the local or national media.
 - Claims of unusual marine mammal behavior reported in the media, or by National Marine Fisheries Service, a private party or non-governmental entity in which naval operations, exercises or training have been implicated are reportable events.
 - Any other incident involving marine mammals, which have significant media interest and may implicate naval operations at sea are also reportable events. Examples of such marine mammal events might include manatee strandings or mass strandings (two or more) of dolphins, seals, sea lions, otters, etc.
5. If it is determined that an OPREP 3 Navy Blue report is required related to the stranding event the Natural Resources Manager will coordinate with the CDO to complete the initial report.
6. Enter Stranding Report Data into the NASO Natural Resources Access Database.

Note: Regarding Sea turtles, Marine Mammals, Sturgeon and/or other Protected Species, ONLY an individual/organization containing the appropriate Regulatory Issued Permits (e.g., USFWS, NOAA, VAST, VDGIF, VCU, etc.) is legally authorized to relocate/touch these animals. The NASO NRM has obtained a NOAA-NMFS issued permit regarding sturgeon salvage and is inquiring regarding obtaining permits regarding sea turtles with USFWS via VDGIF.

Key Contacts:

- Navy on Scene Coordinator (NOSC) = 757-341-0449(o);
757-636-4378(c)
- Regional Operations Center (ROC) = 757-322-2609(24hrs);
757-322-3093
- NASO Command Duty Officer (CDO) = 757-438-3159 (24hrs)
- NASO Natural Resources Manager (NRM) = 757-433-3461(o);
757-373- 8531(c)
- NASO Conservation Law-enforcement Officer (CLEO) =
757-433-2151(o); 757-635-5436(c)
- NASO Environmental Program Director = 757-433-3437(o)
- NAVFAC MIDLANT Core Marine Animal Media Manager = 757-341-0493(o)
- NAVFAC MIDLANT Core Natural Resources Supervisor =
757-341-0495(o)
- NAVFAC MIDLANT Core Environmental Conservation and Planning
Director = 757-341-1988(o)
- NOAA Sturgeon POC = 978-282-8473(o)
- Virginia Aquarium Stranding Team (VAST) = 757-385-7575;
757-385-7576(emergency#)

Note: The ROC and the CDO should be able to assist with locating and getting equipment (if available) for emergency response. Jessica Bassi has developed the NAVFAC MIDLANT Regional Stranding Investigation Assistance Plans (RSIAP), which has received final approvals.

Note: The RSIAP indicates that the CDO will coordinate trying to obtain equipment to assist with marine animal stranding response, when needed. The need would be for large animal (e.g., whales) and mass stranding events (e.g., multiple dolphins stranding at the same time). Heavy equipment that can access and operate on a beach would be needed, primarily fork-lift type vehicles and vehicles that can dig large deep holes for burials.

- MACS-24 has provided emergency assistance previously.
 - Sgt. Leonard Oleson 757-492-6465 x229
 - GySgt Eric Orth 757-492-3878/3891
 - Maj Woodworth 757-492-6465 x234
- NSWDG may be able to assist (CLEO, Lawrence McGrogan may have additional POCs)
 - Keith Crutchfield 757-862-9006(o); 757-619-1145(c)
 - John Puvogel 757-862-9004(o)
 - Ken O'Malley 757-862-9002(o)
 - Sally Torgler 757-862-9001(o)
- VAANG Camp Pendleton CO has indicated that they have a battalion that could assist us upon request with equipment needs
 - SSG Reynaldo Abeng 757-493-3123(o); 757-2024268(c)
 - SFC Randy Carter 434-294-2100(c)
 - LTC Elena M. Scarbrough 757-493-3128(o); 434-480-7465(bb)

STRANDING REPORT FORM

1. Date of incident: _____
2. Time of incident(local vice zulu time): _____
3. Type of incident (turtle, dolphin, whale, seal, shark, sturgeon, other):
-

4. Location of incident(include lat/long; base or property name; and geographical location, floating in Atlantic Ocean nearshore, laying on beach in surf, laying on beach in rack line, laying on beach between the dune and the rack line, etc.) :
_____ / _____

5. Identity of person who discovered event (e.g. military, civilian, other government personnel):

6. Identity of person preparing this report (name, command, job position):

7. Time strandings commenced: _____

8. Time of last stranding: _____

9. Stranded Marine Animal Condition:

Species	Total #	Alive	Dead	Severely Decayed	Necropsy Completed (Yes, No, In Process)

10. Who performed or will be performing the necropsy.

11. Date & Time VA Aquarium Stranding Team was notified:

12. Date & Time VA Aquarium Stranding Team Responded on site:

13. Were Photos Taken, If so by whom, attach photos to report (send digital copies to the installation Natural Resources Manager):

14. Additional Notes:

15. Below Space Left Open for Additional Notes or Drawings:

REGIONAL STRANDING
INVESTIGATION ASSISTANCE PLAN

BETWEEN

NORTHEAST REGION, NATIONAL MARINE FISHERIES SERVICE OF THE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
DEPARTMENT OF COMMERCE
AND
MID-ATLANTIC REGION, UNITED STATES NAVY
DEPARTMENT OF DEFENSE

I. PURPOSE

The purpose of this Regional Stranding Investigation Assistance Plan (RSIAP or Plan) is to implement the National Memorandum of Understanding (MOU) (Attachment 1). The MOU establishes a framework consistent with federal fiscal law requirements whereby the Navy may assist the National Marine Fisheries Service (NMFS) with the Phase 1 and 2 investigations (See attachment (2) for definition of Phase 1 and 2, USE and MTEs) of uncommon stranding events (USE) during major training exercises (MTE) in specific geographical locations through the provision of in-kind services as specified later in this document. This Plan is intended to act as an instrument to more effectively respond to USEs during MTEs, subject to fiscal and procurement law requirements, and consistent with resource availability, military security, logistical feasibility, and operational or installation commitments. Additionally, this RSIAP ensures the optimum efficiency and maximum benefit to the United States by establishing a framework for cooperation and coordination between NMFS Northeast Region and Mid-Atlantic Region, U.S. Navy (the Parties) on marine mammal health and stranding responsibilities. This Plan is necessary and essential to further the mission of the Parties in that it will serve as an umbrella agreement that sets forth the general terms and conditions under which the Parties may seek cooperative programs and activities.

II. BACKGROUND

a. Through a National Coordinator and six regional coordinators, NMFS oversees, coordinates, and authorizes marine mammal stranding responses, associated activities and training to personnel. To respond to strandings, volunteer stranding networks have been established in all coastal states and are authorized through Letters of Authority from the NMFS regional offices.

b. Pursuant to the Atlantic Fleet Active Sonar Training (AFAST), Southern California Range Complex (SOCAL), Hawaii Range Complex (HRC), Mariana Islands Range Complex (MIRC), and Gulf of Alaska (GOA) Marine Mammal Protection Act (MMPA) Final Rules, the National MOU was created to establish a framework whereby the Navy can assist NMFS with Phase 1 and Phase 2 Investigations of USEs during MTEs. The National MOU requires completion of

RSIAPs for these areas to further identify regional assets that might be requested by NMFS during a USE. In addition, the National MOU requires each RSIAP to identify high priority species based on the USE species identified below:

(1) Uncommon Stranding Event (USE) – A stranding event that takes place during a major training exercise (MTE) and involves any one of the following:

(i) Two or more individuals of any cetacean species (not including mother/calf pairs), unless of species of concern listed in the next subparagraph found dead or live on shore within a 2-day period and occurring within 30 miles of one another.

(ii) A single individual or mother/calf pair of any of the following marine mammals of concern: beaked whale of any species, dwarf or pygmy sperm whales, melon-headed whales, pilot whales, right whales, humpback whales, sperm whales, blue whales, fin whales, or sei whales.

(iii) A group of 2 or more cetaceans of any species exhibiting indicators of distress.

III. AUTHORITIES

a. NMFS and Navy regions are authorized to enter into RSIAPs pursuant to the Marine Mammal Protection Act, 16 U.S.C. § 1361 et seq., and other authorities, as described in the National MOU (See paragraphs 3 & 5.e. of MOU).

b. The Economy Act, 31 U.S.C. § 1535, which provides that an agency may place an order with a major organizational unit within the same agency or another agency for goods or services if:

(A) Amounts are available;

(B) The ordering agency decides the order is in the best interest of the United States Government;

(C) The agency to fill the order is able to provide or get by contract the ordered goods or services; and

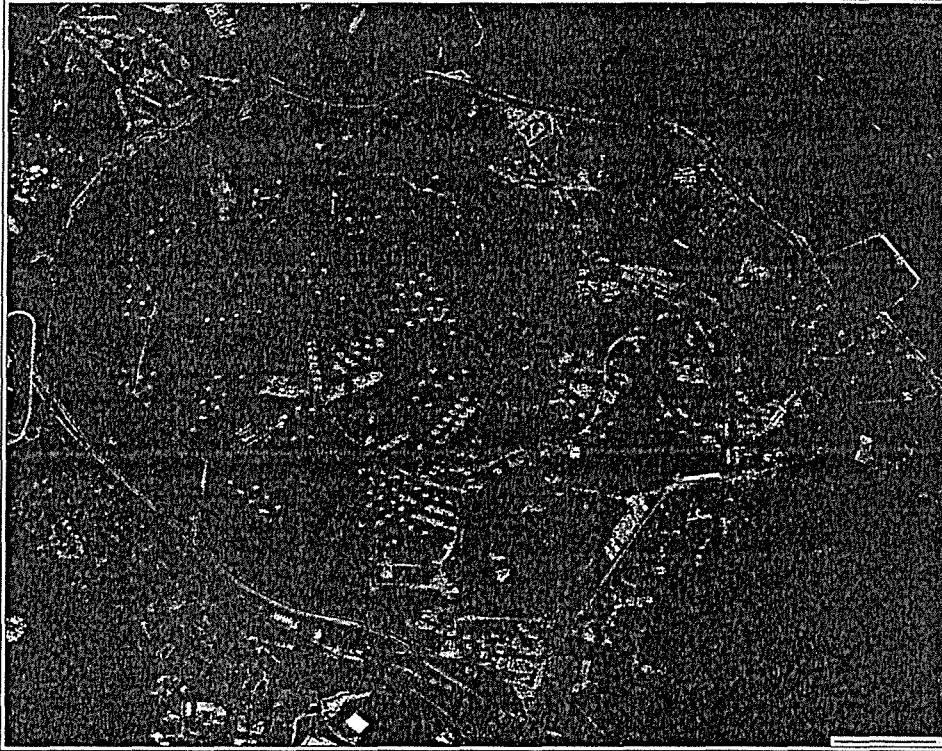
(D) The agency decides ordered goods or services cannot be provided by contract as conveniently or cheaply by a commercial enterprise (payments must be made on the basis of the actual cost of goods or services provided)

IV. SCOPE

a. INSTALLATIONS AND POCs FOR EACH INSTALLATION.

This Regional Stranding Investigation Assistance Plan is intended to address an agreement between Navy Region MIDLANT and NMFS Northeast Region. Navy installations covered by this agreement include the following:

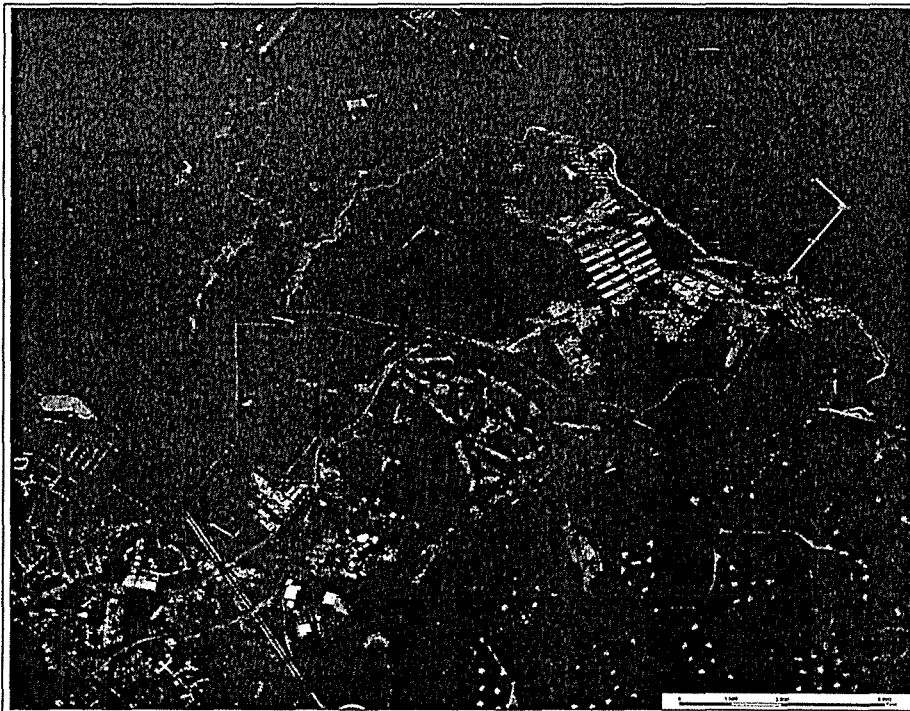
1.



Cheatham
Annex,

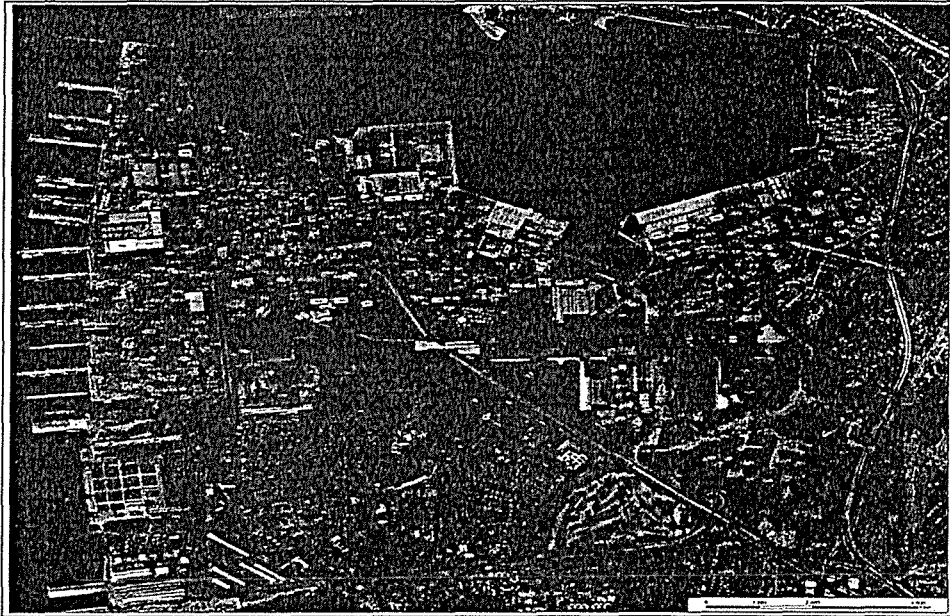
Yorktown, VA

POC: Trevor Manning (IEPD), telephone 757-887-4086, e-mail;
trevor.manning@navy.mil and (PWO) LT Trevor Bingham, telephone 757-887-4636,
email; trevor.bingham@navy.mil



2. Naval Weapons Station (NWS) Yorktown, Yorktown, VA
POC: Trevor Manning (IEPD), telephone 757-887-4086, e-mail;
trevor.manning@navy.mil and (PWO) LT Trevor Bingham, telephone 757-887-4636,
email; trevor.bingham@navy.mil

3. Naval Station Norfolk, Norfolk, VA
POC: Sharon Bauman (IEPD), telephone 757-341-0523, email; Sharon.bauman@navy.mil and (Port Ops) LCDR Morris Oxendine, telephone 757-442-0942, email; morris.oxendine@navy.mil



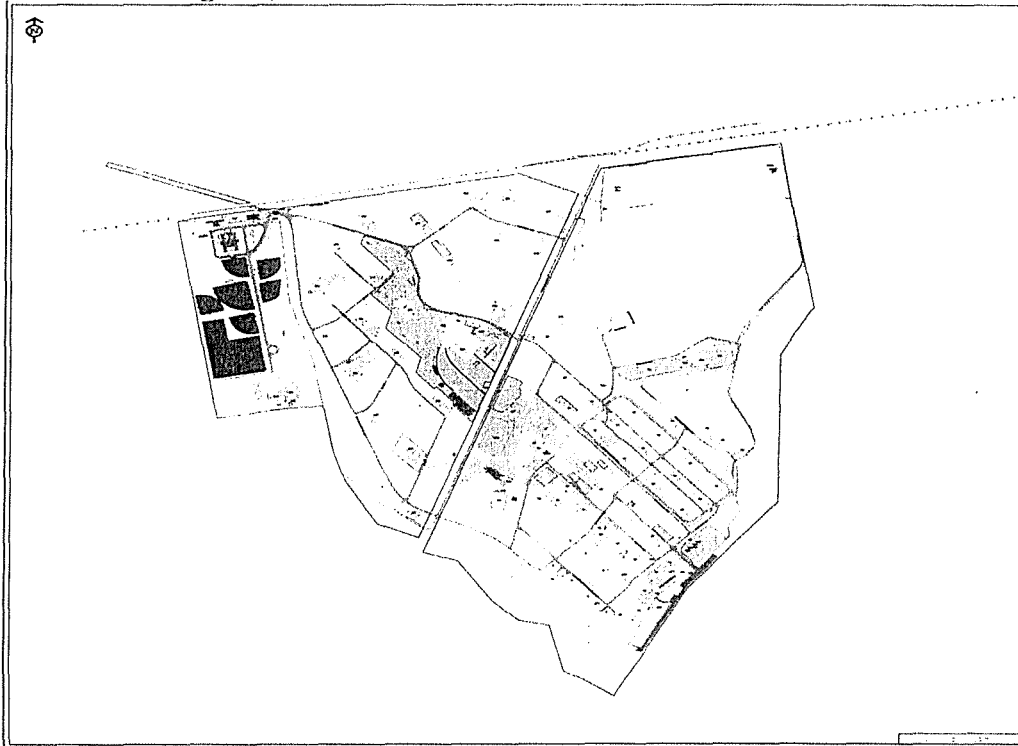
4. Norfolk Naval Shipyard, Portsmouth, VA
POC: Valerie Walker (IEPD), telephone 757 396-8270, email; valerie.walker@navy.mil.



5. Craney Island Fuel Depot, Portsmouth, VA
POC: Caren Hendrickson, telephone 757-445-3113, email;
caren.hendrickson@navy.mil.



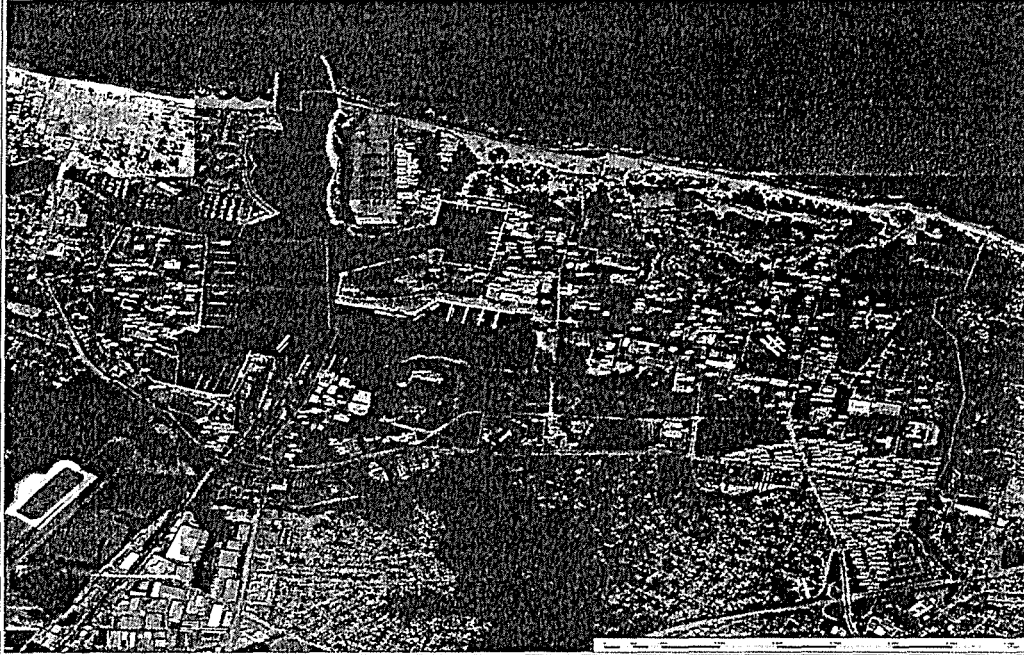
6. St. Julian's Creek Annex, Portsmouth, VA
POC: Valerie Walker (IEPD), telephone 757-396-8270, email;
Valerie.walker@navy.mil



7. Joint Expeditionary Base Little Creek-Fort Story

POC: Sharon Waligora (IEPD), telephone 757-462-5350, email;
Sharon.waligora@navy.mil

Little Creek:



Fort Story:

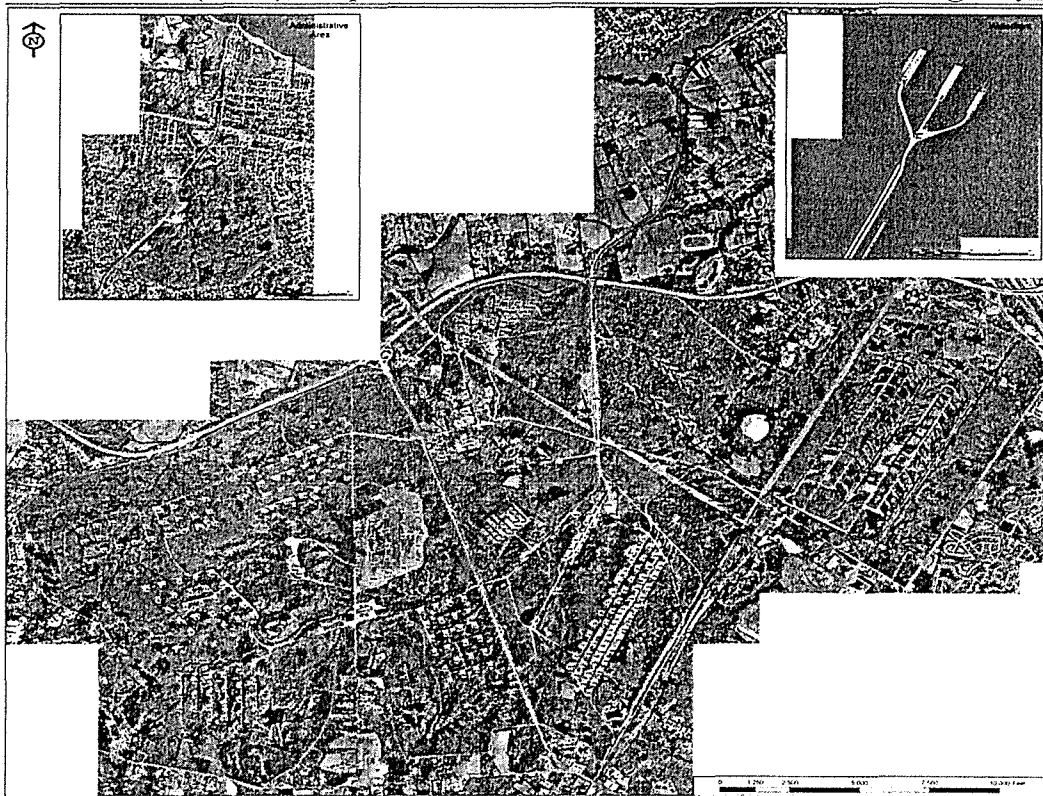


8. Dam Neck Annex, Virginia Beach, VA
POC's: Michael Wright (NRS), telephone 4757-433-3461, cell 757-373-8531, email; Michael.wright@navy.mil and Conservation Law Enforcement Officer (CLEO), telephone 757-433-2151, Cell 757-635-5436



9. Naval Weapons Station (NWS) Earle, Earle, NJ

POC: Eric Helms, telephone 732-866-2540, email; eric.helms@navy.mil and LCDR Matthew Tolhurst (PWO), telephone 732-866-2317, email: matthew.tolhurst@navy.mil



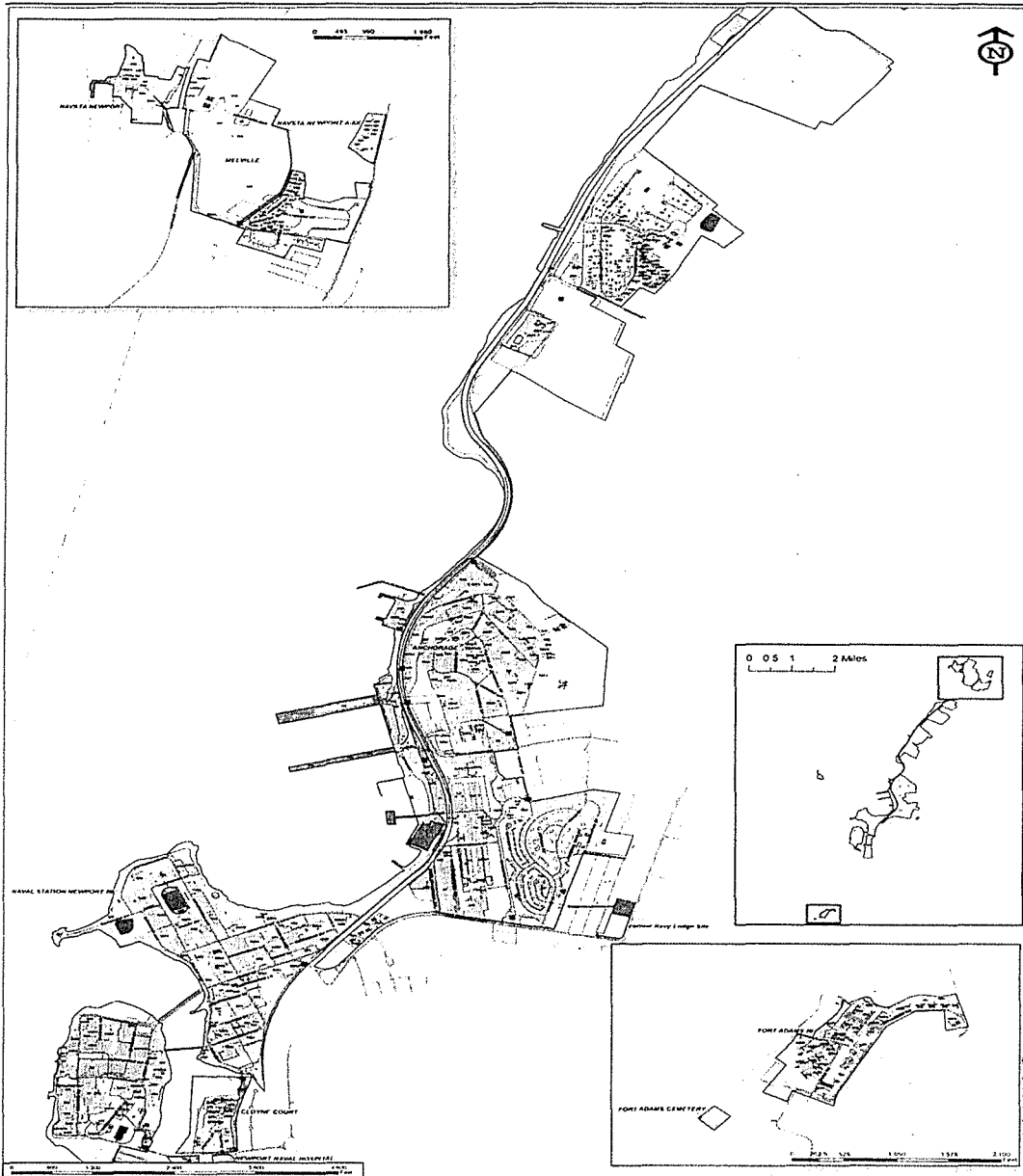
10. Naval Submarine Base New London, Groton, CT

POC: Michael Brown (IEPD), telephone 860-694-3976, email; michael.brown13@navy.mil



11. Naval Station Newport, Newport, RI

POC: Shannon Kam, (NRS), telephone 401 841-6377, email; shannon.kam@navy.mil

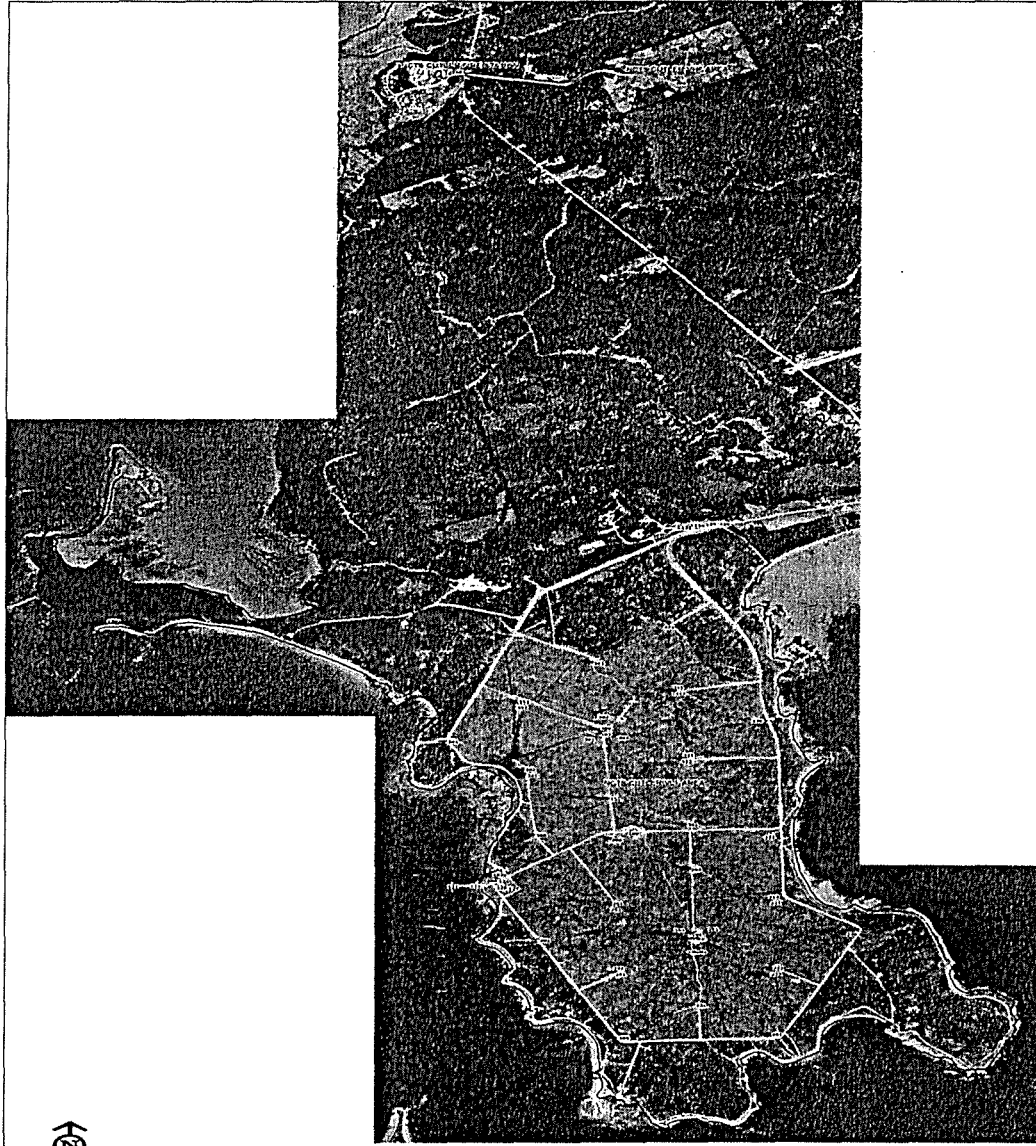


12. Portsmouth Naval Shipyard, Kittery, ME

POC: Ian Trefry (NRM), telephone 207-438-4362, email: ian.trefry@navy.mil and Lisa Joy (IEPD), telephone 207-438-4707, email: lisa.joy@navy.mil.



13. Naval Computer and Telecommunications (NCTAMS) Cutler, Cutler, ME
POC: Ian Trefry (NRM), telephone 207-438-4362, email: ian.trefry@navy.mil and Clifford
"Mark" Staggs (EPS), telephone 207-259-8282, email: clifford.staggs@navy.mil



V. GOALS AND OBJECTIVES

a. The Fleets and NMFS have developed a Stranding Protocol and Communication Plan that includes a flowchart with points of contact if a USE occurs. This is a related but separate requirement that remains unaffected by this document. This Plan is being developed to provide a consistent process for Navy support for Marine Mammal Stranding Investigations and Assistance when there is a USE during a MTE. This process may enable scientists to obtain better data on mechanisms involved in a marine mammal stranding.

b. Subject to the limitations in paragraph VI of this Plan, the Parties agree to cooperate on stranding response and investigations through the use of U.S. Navy and NMFS in-kind services when available. In-kind services by installation may include:

1. Cheatham Annex

- GROUND VEHICLES: Three front end loaders, 3 backhoes, 1 rubber tire excavator, 1 track excavator, and 2 skid steer loaders.
- PERSONNEL: Five equipment operators, as well as escorts to locations of stranding occurrences on the installation.

2. Naval Weapons Station Yorktown

- Same resources as Cheatham Annex.

3. Naval Station Norfolk (NSN)

- PERSONNEL: Operators for equipment listed below.
- BOATS: NSN can provide 1 small service boat.
- GROUND VEHICLES: NSN has four 6K forklifts and 2 pickup trucks.
- ACCESS TO BASE: The IEPD contact will provide Security with the information of who will be responding (agency and/or individual, and an example of a badge, if possible) and security will ensure they obtain access.

4. Norfolk Naval Shipyard (NNSY)

- BOATS: NNSY has limited small boat support through Port Operations.
- ACCESS TO BASE: Base access protocol is to contact the security office. The security POC is Glenn Hawthorne, Security Director, phone 757-396-5131.

5. Craney Island Fuel Depot

- ACCESS TO BASE: Coordinate with installation POC Caren Hendrickson.

6. St. Julian's Creek Annex

- BOATS: NNSY has limited small boat support through Port Operations.
- ACCESS TO BASE: Base access protocol is to contact the security office. The security POC is Glenn Hawthorne, Security Director, phone 757-396-5131.

7. Joint Expeditionary Base Little Creek-Fort Story

- No resources identified at this time.

8. Dam Neck Annex

- The Command Duty Office (CDO) will assist with locating and obtaining equipment. The CDO is manned 24 hours a day and can be reached by telephone at 757-433-2366.

9. NWS Earle

- ACCESS TO BASE: Temporary access can be coordinated on a case by case basis in accordance with the needs of the stranding response.
- BOATS: Vessels and operators are available for sighting animals in the vicinity of the Earle piers. Other small vessels may be available.
- GROUND VEHICLES: Cranes, backhoes, and frontend loaders are available. Personnel transport vehicles are available as well as dump trucks and flatbed trucks.
- PERSONNEL: Heavy equipment operators are available and security personnel are available on a case by case basis.
- OTHER SERVICES AND EQUIPMENT: Lifting straps, chains, and cargo nets available. The installation has a waste disposal contract if dumpsters need to be requested.

10. Subase New London

- GROUND VEHICLES: New London can offer 1 tractor trailer and flat bed truck and one landing craft mechanized (LCM) boat.
- ACCESS TO BASE: Contact Michael Brown, IEPD, for installation access.

11. Naval Station Newport

- Naval Station Newport has a current memorandum of agreement (MOA) with the NMFS NERO (Attachment 2). All protocols specified in the MOU will be adhered to and this MOA provides the following information:
- ACCESS TO BASE: The NMFS will be granted base access to perform necropsies at the Stillwater Basin boat ramp and parking lot, contingent upon ramp operations, and the beaches as a backup necropsy site. NMFS will be allowed to bring a vessel into the installation's restricted waters provided it stays 100 feet from any Navy or Coast Guard vessel. Security must be notified 3 days in advance of NMFS intentions to come onto the installation, except in emergency situations. Installation and/or security POCs will assist NFMS in obtaining the necessary camera and equipment passes.

12. Portsmouth Naval Shipyard

- ACCESS TO BASE: There is a landing site at Jamaica Island Beach and a temporary response set up location can be available at Jamaica Island.
- Anti-Terrorism Office (ATO) may be able to provide tug boat assistance provided mission requirements are not compromised. The Facility Response Team (FRT) has several small vessels available for nearshore operations.
- GROUND VEHICLES: Bob Landry (Transportation), phone 207-438-5557 may be able to secure an excavator, skid-steer, rubber tire crane, flat bed trucks, and/or passenger vans (for personnel transport).
- PERSONNEL: Heavy equipment operators, public relations coordination, enforcement, labor.
- OTHER SERVICES AND EQUIPMENT: Lifting straps, chains, shackles, and life jackets.

13. NCTAMS Cutler

- ACCESS TO BASE: There are landing sites at Davis Beach, Little Holly Cove, and Little Machias Bay Coastline. A temporary response set up location can be available at the old Coast Guard Landing Area, Davis Beach, and Little Holly Cove.
- PERSONNEL: Enforcement and general labor.

c. The Parties agree to share data (as clearance procedures allow) relevant to projects and activities conducted under this plan pursuant to the Atlantic Fleet Active Sonar Training (AFAST), Southern California Range Complex (SOCAL), Hawaii Range Complex (HRC), Mariana Islands Range Complex (MIRC), and Gulf of Alaska (GOA) Marine Mammal Protection Act (MMPA) Final Rules.

d. The Parties recognize that NMFS possesses limited marine mammal stranding response and investigation resources and may not be in a position to fully implement all of the tests and procedures listed as part of Phase 1 and Phase 2 Investigations. If NMFS identifies that specific tests, procedures, or analyses are needed to complete Phase 1 and Phase 2 Investigations, NMFS may request assistance from the Navy to do so. NMFS and the Navy may enter into additional implementing agreements to authorize the Navy to transfer funds to NMFS consistent with federal fiscal law, to support the implementation of the necessary investigational procedures/tests/analyses.

e. As soon as practical, upon completion of a project or activity year, NMFS agrees to provide an accounting of each project's expenditures for projects or activities with applicable statutes, regulations, and policies.

f. The Parties will meet annually in March to discuss the implementation and progress of the prior year(s) projects and activities, provide contact updates, and submit a report documenting data collected supported by this MOU. A template will be developed for submitting the annual report. The plan will be reviewed during the annual meeting for operation and effect.

g. NMFS will work with Navy POCs to ensure Navy personnel providing assistance have knowledge and expertise consistent with NMFS' stranding response protocols, procedures and guidelines.

VI. LIMITATIONS

This RSIAP is meant to serve as a regional framework for cooperation between the U.S. Navy and NMFS for assistance and response related to USEs during MTEs. Actions or activities agreed to in this Plan may not exceed the agreement between the Navy and NMFS in the National MOU. Nothing in this Plan obligates either Party to expend appropriations, provide in-kind services or equipment, or enter into any contract or other obligation. Projects or activities conducted under this Plan must comply with all applicable statutes and regulations, including those statutes and regulations applicable to procurement and the Economy Act, further, the projects or activities are contingent upon resource availability and logistic feasibility and must not negatively affect Navy operational or installation commitments or military security.

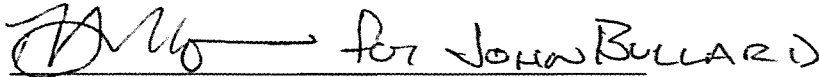
SIGNATURES



Rear Admiral Dixon R. Smith
Commander, Navy Region Mid-Atlantic

1/17/14

Date



NMFS Northeast Regional Administrator

11/21/13

Date



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

Michael F. Wright, Natural Resources Specialist, TL
DoD Partners in Flight Rep. (VA)
NAS Oceana Public Works Department
Environmental Program Division
953 Hornet Dr.
Bldg. 820, Suite 206
Virginia Beach, VA 23460-2190

MAY 29 2015

Dear Mr. Wright:

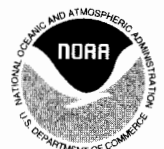
By this letter you are hereby designated to act as the primary contact and Co-Investigator for the DoD Partners in Flight Rep. (VA), Naval Air Station Oceana, Public Works Department, Environmental Program Division, for the Greater Atlantic Regional Fisheries Office under Endangered Species Act scientific research Permit No. 17273 to maximize the use of dead Atlantic (*Acipenser oxyrinchus oxyrinchus*) and shortnose (*Acipenser brevirostrum*) sturgeon parts for research and educational purposes. The Naval Air Station Oceana is acting as a Cooperating Facility under Permit No. 17273. Sturgeon samples may be obtained from individuals authorized to collect them in the course of salvage activities or any U.S. facility authorized to hold captive sturgeon. Sturgeon parts and samples may be used to support law enforcement actions, research studies, and outreach education. This authorization shall be subject to the following conditions:

1. A copy of this permit shall be in your possession during the proposed work.
2. Please read the permit and note the research conditions relating to activities authorized under the permit and detailed reporting requirements.
3. This letter authorizes you to utilize whole sturgeon or parts and pieces resulting from sturgeon salvage incidents for research and education purposes as well as respond to sturgeon salvage incidents.
4. This authorization is in force until August 9, 2018. This permit expires on the date indicated and is non-renewable. This permit may be extended by the Director, NMFS Office of Protected Resources, pursuant to applicable regulations and the requirements of the ESA.

Sincerely,

Jessica A. Pruden
Principal Investigator

Enclosure - Permit No. 17273, Appendices 3a-c
ecc: Mike Payne, F/PR1, Jennifer Skidmore, F/PR1





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

Permit No. 17273
Expiration Date: August 9, 2018
Reports Due: November 9th, annually

PERMIT TO TAKE/COLLECT, RECEIVE/POSSESS, AND IMPORT/EXPORT PROTECTED SPECIES¹ PARTS FOR SCIENTIFIC PURPOSES

I. Authorization

This permit is issued to NOAA Fisheries Northeast Region, Protected Resources Division (hereinafter "Permit Holder"), One Blackburn Drive, Gloucester, MA 01930, [Responsible Party: Mary Colligan], pursuant to the provisions of the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq.*); the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR Parts 222-226).

II. Abstract

The objective of the permitted activity, as described in the application, is to maximize the use of dead Atlantic (*Acipenser oxyrinchus oxyrinchus*) and shortnose (*A. brevirostrum*) sturgeon parts for research and educational purposes. Sturgeon samples may be obtained from individuals authorized to collect them in the course of scientific research, salvage activities, any U.S. facility authorized to hold captive sturgeon, or taken during other authorized activities. Sturgeon parts and samples may be used to support law enforcement actions, research studies (primarily genetics), and outreach education.

III. Terms and Conditions

The activities authorized herein must occur by the means, in the areas, and for the purposes set forth in the permit application, and as limited by the Terms and Conditions specified in this permit, including all attachments and appendices. Any permit noncompliance constitutes a violation and is grounds for permit modification, suspension, or revocation, and for enforcement action.

A. Duration of Permit

1. Personnel listed in Condition C.1 of this permit (hereinafter "Researchers") may conduct activities authorized by this permit through August 9, 2018. This permit expires on the date indicated and is non-renewable. This permit may be extended by the Director, NMFS Office of Protected Resources, pursuant to applicable regulations and the requirements of the ESA.

¹ "Protected species" include species listed as threatened or endangered under the ESA, and marine mammals.



2. Researchers must suspend all permitted activities occurring in the field in the event harassment, serious injury, or mortality² of protected species occurs during specimen collection in the field, or if authorized take³ or receipt/import/export of specimens is exceeded. The Permit Holder must submit a written incident report as described in Condition E.2. The Permits Division may grant authorization to resume permitted activities based on review of the incident report and in consideration of the Terms and Conditions of this permit.

B. Number and Kind(s) of Protected Species, Location(s) and Manner of Taking

1. The table below outlines the number of animals, by species, and the number of parts/specimens authorized to be taken/collected, and the locations and time periods in which these activities may occur.

Table 1: Activities authorized under Permit No. 17273, annually. Specimens may be salvaged from U.S. East coast rivers from Maine to Florida. Sturgeon parts/carcasses of any Distinct Population Segment (i.e., range-wide) may be collected.

SPECIES	PRODUCTION /ORIGIN	LIFESTAGE/ SEX	EXPECTED TAKE	TAKE ACTION	DETAILS
Sturgeon, shortnose	Wild	All	100	Import/export/ receive only	collection, receipt, and transport of dead animals
Sturgeon, shortnose	Captive	All	350	Import/export/ receive only	take action = receipt and transport only
Sturgeon, Atlantic	Wild	All	100	Import/export/ receive only	collection, receipt, and transport of dead animals
Sturgeon, Atlantic	Captive	All	75	Import/export/ receive only	take action = receipt and transport only

² This permit does not allow for unintentional harassment, serious injury, or mortality caused by the presence or actions of researchers in the field when collecting specimens from dead marine mammals. This includes, but is not limited to, harassment, injury, or death of animals attempting to avoid researchers (e.g., a pinniped stampede).

³ By regulation, a take under the MMPA includes the collection of dead animals, or parts thereof.

2. This permit does not authorize the harassment of any protected species.
3. In the case of an unusual mortality event, takes may be increased up to 1,000 animals with written approval from the Director, Office of Protected Resources.
4. Researchers must comply with all provisions specified in Appendix 1 of this permit for biological samples taken/collected, received/possessed, or imported/exported under authority of this permit.
5. Researchers working under this permit may collect visual images (*i.e.*, any form of still photographs, film, video, or other footage) as needed to document the permitted activities, provided the collection of such images in the field does not result in harassment of protected species.
 - a. The Permit Holder may use these images in printed materials (including commercial or scientific publications) and presentations provided the images are accompanied by a statement indicating that the activity depicted was conducted pursuant to Permit No. 17273. This statement must accompany the images in all subsequent uses or sales.
 - b. Annual reports required pursuant to Condition E.3 must note such incidental scientific, educational, or commercial uses of the images.
6. Upon written request from the Permit Holder, approval for photography, filming, or audio recording activities not essential to achieving the objectives of the permitted activities in the field, including allowing personnel not essential to the research (*e.g.* a documentary film crew) to be present, may be granted by the Chief, Permits Division.
 - a. Where such non-essential photography, filming, or recording activities are authorized they must not influence the conduct of permitted activities in any way or result in takes of protected species.
 - b. Personnel authorized to accompany the Researchers during permitted activities for the purpose of non-essential photography, filming, or recording activities are not allowed to participate in the permitted activities.
 - c. The Permit Holder and Researchers cannot require or accept compensation in return for allowing non-essential personnel to accompany Researchers to conduct non-essential photography, filming, or recording activities.

C. Qualifications, Responsibilities, and Designation of Personnel

1. At the discretion of the Permit Holder, the following Researchers may participate in the conduct of the permitted activities in accordance with their qualifications and the limitations specified herein:
 - a. Principal Investigator – Jessica Pruden;
 - b. Co-Investigators – See Appendix 3;
 - c. Research Assistants – any personnel identified by the Permit Holder or Principal Investigator and qualified to act pursuant to Conditions C.2, C.3, and C.4 of this permit.
2. Individuals conducting permitted activities must possess qualifications commensurate with their roles and responsibilities. The roles and responsibilities of personnel operating under this permit are as follows:
 - a. The Permit Holder is ultimately responsible for all activities of any individual who is operating under the authority of this permit. Where the Permit Holder is an institution/facility, the Responsible Party is the person at the institution/facility who is responsible for the supervision of the Principal Investigator.
 - b. The Principal Investigator (PI) is the individual primarily responsible for the taking, import, export and any related activities conducted under the permit. The PI must be on site during any activities conducted under this permit unless a Co-Investigator named in Condition C.1 is present to act in place of the PI.
 - c. Co-Investigators (CIs) are individuals who are qualified to conduct activities authorized by the permit without the on-site supervision of the PI. CIs assume the role and responsibility of the PI in the PI's absence.
 - d. Research Assistants (RAs) are individuals who work under the direct and on-site supervision of the PI or a CI. RAs cannot conduct permitted activities in the absence of the PI or a CI.
3. Personnel involved in permitted activities in the field must be reasonable in number and essential to conduct of the permitted activities. Essential personnel are limited to:
 - a. Individuals who perform a function directly supportive of and necessary to the permitted activity;

- b. Individuals included as backup for those personnel essential to the conduct of the permitted activity; and
 - c. Individuals included for training purposes.
4. Persons who require state or Federal licenses to conduct activities authorized under the permit must be duly licensed when undertaking such activities.
5. The Permit Holder or PI may designate additional CIs provided that a copy of the letter designating the individual, and a copy of the individual's curriculum vitae, is provided to the Permits Division via the online permits system (APPS: <https://apps.nmfs.noaa.gov>) on the day of designation and confirmed by mail. The Permit Holder cannot require or receive any direct or indirect compensation in return for requesting authorization for such person to act as a PI, CI, or RA under the permit.

D. Possession of Permit

1. This permit cannot be transferred or assigned to any other person.
2. The Permit Holder and all other persons operating under the authority of this permit must possess a copy of this permit: when engaged in a permitted activity; when a protected species part is in transit incidental to a permitted activity; and during any other time when any protected species part taken under such permit is in the possession of such persons.
3. A duplicate copy of this permit must be attached to the container, package, enclosure, or other means of containment in which a protected species part is placed for purposes of storage, transit, supervision, or care.

E. Reports

1. The Permit Holder must submit annual, final, and incident reports, and any papers or publications resulting from the research authorized herein to the Chief, Permits Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Room 13705, Silver Spring, MD 20910; phone (301) 427-8401; fax (301) 713-0376. The Permit Holder must submit annual, final, and incident reports, and any papers or publications resulting from the research authorized herein to the Permits Division. Reports may be submitted:
 - through the online system at <https://apps.nmfs.noaa.gov>;
 - by email attachment to the permit analyst for this permit; or
 - by hard copy mailed or faxed to the Chief, Permits Division, at the address listed above.

2. Written incident reports related to harassment, serious injury, or mortality events or to exceeding authorized take or receipt/import/export collection takes, must be submitted to the Chief, Permits Division within two weeks of the incident. The incident report must include a complete description of the events and identification of steps that will be taken to reduce the potential for additional incidents.
3. An annual report must be submitted to the Chief, Permits Division by November 9th for each year the permit is valid (August 9th – August 8th of each year). The annual report describing activities conducted during the previous permit year must follow the format in Appendix 2.
4. A final report must be submitted to the Chief, Permits Division within 180 days after expiration of the permit (February 9, 2019), or, if the research concludes prior to permit expiration, within 180 days of completion of the research. The final report must follow the format in Appendix 2.
5. Research results must be published or otherwise made available to the scientific community in a reasonable period of time.

F. Coordination

1. To the maximum extent practical, the Permit Holder must coordinate collection activities in the field with activities of other Permit Holders conducting the same or similar studies on the same species, in the same locations, or at the same times of year to avoid disturbance of animals.

G. Observers and Inspections

1. NMFS may review activities conducted pursuant to this permit. At the request of NMFS, the Permit Holder must cooperate with any such review by:
 - a. Allowing any employee of NOAA or any other person designated by the Director, NMFS Office of Protected Resources to observe permitted activities; and
 - b. Providing any documents or other information relating to the permitted activities.

H. Modification, Suspension, and Revocation

1. All permits are subject to suspension, revocation, modification, and denial in accordance with the provisions of subpart D [Permit Sanctions and Denials] of 15 CFR part 904.

2. The Director, NMFS Office of Protected Resources may modify, suspend, or revoke this permit in whole or in part:
 - a. In order to make the permit consistent with any change made after the date of permit issuance with respect to any applicable regulation prescribed under section 4 of the ESA;
 - b. In any case in which a violation of the terms and conditions of the permit is found;
 - c. In response to a written request⁴ from the Permit Holder;
 - d. If NMFS determines that the application or other information pertaining to the permitted activities (including, but not limited to, reports pursuant to Section E of this permit and information provided to NOAA personnel pursuant to Section G of this permit) includes false information; and
 - c. If NMFS determines that the authorized activities will operate to the disadvantage of threatened or endangered species or are otherwise no longer consistent with the purposes and policy in section 2 of the ESA.
3. Issuance of this permit does not guarantee or imply that NMFS will issue or approve subsequent permits or amendments for the same or similar activities requested by the Permit Holder, including those of a continuing nature.

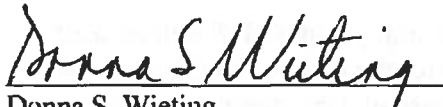
I. Penalties and Permit Sanctions

1. Any person who violates any provision of this permit, the ESA, or the regulations at 50 CFR parts 222-226 is subject to civil and criminal penalties, permit sanctions, and forfeiture as authorized under the ESA, and 15 CFR part 904.
2. NMFS shall be the sole arbiter of whether a given activity is within the scope and bounds of the authorization granted in this permit. The Permit Holder must contact the NMFS Permits Division for verification before conducting the activity if they are unsure whether an activity is within the scope of the permit. Failure to verify, where NMFS subsequently determines that an activity was outside the scope of the permit, may be used as evidence of a violation of the permit, the ESA, and applicable regulations in any enforcement actions.

⁴ The Permit Holder may request changes to the permit related to: the objectives or purposes of the permitted activities; the species or number of animals taken; and the location, time, or manner of taking/collecting, possessing, importing and exporting protected species. Such requests must be submitted in writing to the Chief, Permits Division in the format specified in the application instructions.

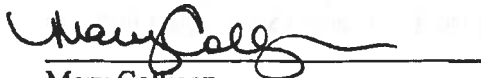
J. Acceptance of Permit

1. In signing this permit, the Permit Holder:
 - a. Agrees to abide by all terms and conditions set forth in the permit, all restrictions and relevant regulations under 50 CFR Parts 222-226, and all restrictions and requirements under the ESA;
 - b. Acknowledges that the authority to conduct certain activities specified in the permit is conditional and subject to authorization by the NMFS Office Director; and
 - c. Acknowledges that this permit does not relieve the Permit Holder of the responsibility to obtain any other permits, or comply with any other Federal, State, local, or international laws or regulations.


Donna S. Wieting
Director, Office of Protected Resources
National Marine Fisheries Service

AUG 09 2013

Date Issued

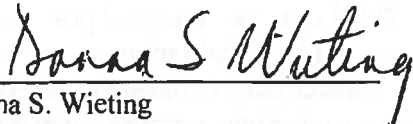

Mary Colligan
Assistant Regional Administrator,
NOAA Fisheries Northeast Regional Office
Responsible Party

8/29/13

Date Effective

J. Acceptance of Permit

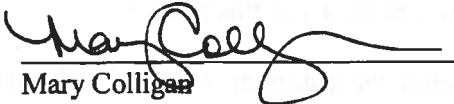
1. In signing this permit, the Permit Holder:
 - a. Agrees to abide by all terms and conditions set forth in the permit, all restrictions and relevant regulations under 50 CFR Parts 222-226, and all restrictions and requirements under the ESA;
 - b. Acknowledges that the authority to conduct certain activities specified in the permit is conditional and subject to authorization by the NMFS Office Director; and
 - c. Acknowledges that this permit does not relieve the Permit Holder of the responsibility to obtain any other permits, or comply with any other Federal, State, local, or international laws or regulations.



Donna S. Wieting
Director, Office of Protected Resources
National Marine Fisheries Service

AUG 09 2013

Date Issued



Mary Colligan
Assistant Regional Administrator,
NOAA Fisheries Northeast Regional Office
Responsible Party

8/29/13

Date Effective

FILE COPY

Appendix 1

Disposition of Biological Samples

1. All biological samples collected or received under the authority of this permit must be maintained according to accepted curatorial standards. The Terms and Conditions of this permit shall remain in effect as long as the biological samples authorized hereunder are maintained under the authority and responsibility of the Permit Holder.
2. Unless other disposition is specified in the permit application, the Permit Holder may retain biological samples not consumed in analysis or otherwise disposed of during or after research or enhancement activities authorized by this permit if the specimens are maintained in a properly curated collection and made available for research or enhancement purposes at the request of the Office Director. Remaining samples may be archived for analysis by the Permit Holder not described in the permit application provided that the project descriptions are provided to the Permits, Conservation and Education Division for inclusion in the permit file. NMFS encourages Researchers to transport any remaining samples to the National Ocean Service (NOS), Marine Forensics Laboratory, 219 Fort Johnson Road, Charleston, South Carolina 29412, phone (843)762-8547, fax (843)762-8700.
3. The Responsible Party [Mary Colligan, Assistant Regional Administrator; One Blackburn Drive; Gloucester, MA 01930; phone (978) 281-9116] must be contacted prior to, and where necessary, approve and authorize the transfer of biological samples to persons not listed in the permit application. Researchers may transfer parts collected or received under this permit for scientific research, curation, or educational purposes to recipients authorized as Co-Investigators by the Responsible Party.
4. Under no circumstances may any endangered species parts collected or obtained under the authority of this permit be bought or sold. Recipients of any biological samples taken under the authority of this permit must adhere to the conditions of this permit.
5. The Permit Holder must maintain a record of all biological specimens obtained under this permit. This record must include the number and type of specimens; a description of each animal from which specimen materials were taken including, species, age, size, weight, sex, reproductive condition; date and location of acquisition; preservative; and circumstances causing death or nature of specimen collection. Where samples are received from facilities (*i.e.*, power plants) documentation regarding the original legal take must also be maintained by the Permit Holder.
6. No animals may be intentionally killed for the purpose of providing specimens under this permit, and no remuneration, either financial or in-kind, can be offered for the taking of animals from the wild. This does not preclude legitimate logistical collection and transportation expenses.

Appendix 2: Protected Species Parts Permit Report Form

Reports may be submitted

- through the online system at <https://apps.nmfs.noaa.gov>
- by email attachment to the permit analyst for this permit
- by hard copy mailed or faxed to the Chief, Permits Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Room 13705, Silver Spring, MD 20910; phone (301)427-8401; fax (301)713-0376.

The following is only an EXAMPLE of the report form. If you do not intend to submit your report online, please contact your permit analyst for an electronic report form to fill out and return.

Date: _____ **Reporting Period:** _____

Permit Number: _____ **Permit Holder's Name:** _____

Contact Name: _____ **Contact Email:** _____

Contact Phone #: _____
(Contact = person submitting report)

Part I: Take Table. Enter information on the actual number of animals from which parts were collected, received, or imported/exported during this reporting period according to the table in your permit. Note: You must complete a table that looks like the Permit Table (Take Table 1 of your permit), with an additional column for you to enter the "actual number of animals taken" in the last permit year. You must contact your permit analyst for an electronic version of this table or use the on-line report system.

Also provide the information in the following table (Table 2). You must contact your permit analyst for an electronic version of this additional table and provide it as an attachment to your report.

Date	Type of activity (e.g., receipt or import)	Species (common and scientific name)	Description of and number of parts (e.g., 2 teeth)	Description of animal from which part was taken (age, size, sex, reproductive condition)	Sample origination (e.g., subsistence hunt); and date and location of collection	Country of origin and authorizing government agency (include NMFS permit number if applicable)	Disposition of part ⁵

⁵ Indicate whether part was consumed in analysis, is curated (if so, how), or was transferred. For transfers to other researchers, include the sample ID, person and location to which the part was transferred, description of secondary use, and how the person was authorized to receive the part from you.

Part II: Narrative. Provide responses to the following, as applicable:

1. Describe any problems or unforeseen events encountered during the permitted activities and any steps taken or proposed to resolve such problems.
2. Describe what measures were taken to minimize incidental effects of permitted activities on animals in the wild, such as disturbance to nearby animals, and the effectiveness of these measures, as applicable.
3. Describe steps taken to coordinate the permitted activities with other permit holders.
4. Summarize any preliminary findings. Did you accomplish the goals of your permitted activities?
5. List titles of reports, publications, etc. resulting from this reporting period. Attach copies of any final documents as available. If these documents are not yet available, indicate when you anticipate that they will be completed and submitted. When reports and publications are available, send to the Chief, Permits Division, and include the permit number in subject line.
6. Note the number and type of non-permitted species harassed or otherwise taken, and the observed effects of such taking.
7. Note any incidental (non-research related) use of photographs, film, or other images (e.g., on websites, in commercial publications or documentaries).
8. Indicate any additional findings, results, or information you would like to report or comment on.
9. Copies of the following must be submitted with this report:
 - a. Foreign collection and export authorizations; and
 - b. Foreign CITES export permits and stamped wildlife declaration forms, and Form 3-177 for each import.

Guidance for Co-Investigators

Thank you for your interest in being a Co-Investigator on permit (File No. 17273) to collect, necropsy, sample, and salvage dead shortnose and Atlantic sturgeon, etc., as specified in the permit and permit application for the purposes of education and scientific research.

During the review of the application we were advised to develop guidance for the many Co-Investigators named on the application. Also, we were asked to name which type of Co-Investigator each of you might be. We divided Co-Investigator activities into the following three categories: Response, Research and Education. Accordingly, this document serves as guidance for all Co-Investigators broken down by type of anticipated activity. See Attachment A to determine which categories you fall under.

I. Response:

Co-Investigators responding to reports of dead shortnose and Atlantic sturgeon are generally natural resource managers, researchers from the various states or Federal services, or researchers from Universities. Dead sturgeon are likely to be found washed ashore or, in some cases, floating. Since dead sturgeon may be located in sensitive areas such as protected islands, wildlife management areas, National refuges, state parks and historical sites, etc., you are urged to work with local officials to gain access to these areas. Be aware and mindful of any sensitive habitats/protected resources you may encounter as you attempt to investigate and/or retrieve a sturgeon carcass. You are advised to seek permission before entering these areas and to obtain additional permits as necessary.

Please be aware that your activities may disrupt other wild animals, including protected species such as other fishes, waterfowl, seabirds and marine mammals. This permit does not allow the harassment of any protected species other than shortnose and Atlantic sturgeon; please be sure to conduct research in such a manner that disturbance of any non-target species does not occur. Information on keeping a safe distance from protected marine wildlife can be found at: <http://www.nmfs.noaa.gov/pr/education/viewing.htm>. Additional guidance for working around wildlife may be obtained at: http://www.watchablewildlife.org/publications/marine_wildlife_viewing_guidelines.htm. Lastly, in some cases, the area may be too sensitive to enter and the Co-Investigator should refrain from responding (i.e., should not disturb nesting piping plovers to access a sturgeon carcass).

All Co-Investigators responding to a dead sturgeon are required to fill out a sturgeon salvage form (Attachment B) or provide data to NMFS for insertion in the form, for each sturgeon carcass you collect/obtain and submit it within 30 days to the appropriate regional contact:

Greater Atlantic Regional Fisheries Office

Jessica Pruden, Shortnose Sturgeon Recovery Coordinator

Phone: 978-282-8482

Fax: 978-281-9394

E-Mail Jessica.Pruden@noaa.gov

Lynn Lankshear

Atlantic Sturgeon Recovery Coordinator

Phone: 978-282-8473

Fax: 978-281-9394

E-Mail Lynn.Lankshear@noaa.gov

Southeast Region

Kelly Shotts, Atlantic and Shortnose Sturgeon Recovery Coordinators

Phone: 727-551-5603

Fax: 727-824-5309

E-Mail Kelly.Shotts@noaa.gov

Please find and review Attachment B, the sturgeon salvage form, as you read the following instructions for filling out form. This is a working document; we appreciate your help in field testing the form and hope you will provide comments for improving it. Comments should be sent to Jessica Pruden (contact information given above). Instructions are based on blocks in the salvage form as pictured below.

- Record investigator's (responding Co-Investigator) contact information.

INVESTIGATORS'S CONTACT INFORMATION	
Name: First _____	Last _____
Agency Affiliation _____	Email _____
Address _____	

Area code/Phone number _____	

- Call appropriate NMFS regional contact identified above to obtain a unique identifier and record it in the top block.
- Record the date sturgeon carcass was first reported to investigator.
- Record the date sturgeon carcass was collected/examined by investigator.

UNIQUE IDENTIFIER (Assigned by NMFS)

DATE REPORTED:

Month Day Year 20

DATE EXAMINED:

Month Day Year 20

- Identify to species (if possible).

SPECIES: (check one)

shortnose sturgeon

Atlantic sturgeon

Unidentified *Acipenser* species

Check "Unidentified" if uncertain. See reverse side of this form for aid in identification.

- Record location where carcass was found.

LOCATION FOUND: <input type="checkbox"/> Offshore (Atlantic or Gulf beach) <input type="checkbox"/> Inshore (bay, river, sound, inlet, etc)	
River/Body of Water _____	City _____ State _____
Descriptive location (be specific) _____	

Latitude _____ N (Dec. Degrees)	Longitude _____ W (Dec. Degrees)

- Determine stage of decomposition at the time of examination. Record carcass condition.
 - Fresh dead = Normal appearance, usually with little scavenger damage; fresh smell (edible); minimal drying and wrinkling of skin, eyes and mucous membranes; eyes clear; carcass not bloated, muscles firm, viscera intact and well-defined; body intact and easily moved.
 - Moderately decomposed = Carcass intact, bloating evident, possible scavenger damage; mild odor; mucous membranes dry, eyes sunken or missing; muscles soft and poorly defined; viscera soft, friable but still intact; body fragile but can usually be moved intact.
 - Severely decomposed = Carcass may be intact, but collapsed; often severe scavenger damage; strong odor; muscles nearly liquefied and easily torn; viscera often identifiable but friable, easily torn, and difficult to dissect; body fragile and comes apart if moved.
 - Dried carcass = Skin may be draped over skeletal remains; any remaining tissues are desiccated.
 - Skeletal, scutes & cartilage = Only pieces of carcass can be found and identified.

CARCASS CONDITION at time examined: (check one) <input type="checkbox"/> 1 = Fresh dead <input type="checkbox"/> 2 = Moderately decomposed <input type="checkbox"/> 3 = Severely decomposed <input type="checkbox"/> 4 = Dried carcass <input type="checkbox"/> 5 = Skeletal, scutes & cartilage
--

Record sex and how this was determined.

SEX: <input type="checkbox"/> Undetermined <input type="checkbox"/> Female <input type="checkbox"/> Male How was sex determined? <input type="checkbox"/> Necropsy <input type="checkbox"/> Eggs/milt present when pressed <input type="checkbox"/> Borescope
--

- Examine externally and record signs of external injury etc (see back of form).

Describe any wounds / abnormalities (note tar or oil, gear or debris entanglement, propeller damage, etc.). Please note if no wounds / abnormalities are found.

- Record length and weight measurements and circle the unit of measurement used. Also indicate if the length and weight measurements were actual or estimates. (i.e., some length measurements of severely decomposed carcasses are estimates because carcass may not be intact).

MEASUREMENTS:	<i>Circle unit</i>
Fork length	_____ cm / in
Total length	_____ cm / in
Length <input type="checkbox"/> actual <input type="checkbox"/> estimate	
Mouth width (inside lips, see reverse side)	_____ cm / in
Interorbital width (see reverse side)	_____ cm / in
Weight <input type="checkbox"/> actual <input type="checkbox"/> estimate	_____ kg / lb

- Examine the fish externally for tags and scan for internal tags. Record any tag information.
- Note: All tag information recorded on this form will be shared with the US Fish and Wildlife Cooperative Sturgeon Tagging Database (NMFS will share tag information with staff at the MD Fishery Resource Office using salvage forms submitted by Co-Investigators).
<http://www.fws.gov/northeast/marylandfisheries/mfrofactsheet.htm>

TAGS PRESENT? Examine for external tags including fin clips? <input type="checkbox"/> Yes <input type="checkbox"/> No		Scanned for PIT tags? <input type="checkbox"/> Yes <input type="checkbox"/> No
Tag #	Tag Type	Location of tag on carcass
_____	_____	_____
_____	_____	_____

- Take photo/video and record where the images will be maintained.

PHOTODOCUMENTATION: Photos/video taken? <input type="checkbox"/> Yes <input type="checkbox"/> No Disposition of Photos/Video: _____ _____ _____
--

- If possible/appropriate, necropsy carcass. Record the date the fish was necropsied and the name of the person who conducted the necropsy.
- Record any observations during necropsy and submit this information with the salvage form.

Carcass Necropsied? <input type="checkbox"/> Yes <input type="checkbox"/> No Date Necropsied: _____ Necropsy Lead: _____

- If possible/appropriate, sample carcass. Record what samples were collected, how they were preserved and where they were sent/archived. Please be aware that sturgeon parts and tissues may only be sent to persons/labs that are listed as a CI on this permit.
- All responders are required to sample shortnose and Atlantic sturgeon carcasses for genetic tissue. The tissue sampling and shipment must be coordinated with Julie Carter. Julie Carter will send sampling instructions, chain of custody form and vials for the tissue samples (see also Attachment C for sampling instructions):
 - Julie Carter
 NOS Marine Forensic Branch
 219 Fort Johnson Road
 Charleston, SC 29412
 phone: 843-762-8547
 fax: 843-762-8700
 Email: Julie.Carter@noaa.gov
- Permanently label all samples with a unique identifier assigned by NOAA fisheries. [Call appropriate NMFS regional contact identified above to obtain number – See top right block on salvage form].

SAMPLES COLLECTED? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Sample	How preserved	Disposition (person, affiliation, use)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- Record the final disposition of the majority of the remains.

CARCASS DISPOSITION: (check one or more)

1 = Left where found

2 = Buried

3 = Collected for necropsy/salvage

4 = Frozen for later examination

5 = Other (describe)

- Record any additional comments at the bottom of the front page.

Comments:

- Submit Completed forms to appropriate NMFS regional contact identified above within 30 days of the date the carcass was reported.

Submit completed forms (within 30 days of date of investigation) to: Greater Atlantic Regional Fisheries Office
Contacts – Shortnose Sturgeon Recovery Coordinator (Jessica Pruden, Jessica.Pruden@noaa.gov, 978-282-8482) or Atlantic Sturgeon Recovery Coordinator (Lynn Lankshear, Lynn.Lankshear@noaa.gov, 978-282-8473); **Southeast Region Contacts**- Shortnose and Atlantic Sturgeon Recovery Coordinator (Kelly Shotts, Kelly.Shotts@noaa.gov, 727-551-5603).

Safety:

- Shortnose and Atlantic sturgeon carcasses will be in various stages of decomposition and may harbor diseases, parasites etc. Practice common sense in examining and sampling dead shortnose sturgeon. Wear protective clothing including gloves and a mask. Wash yourself and your gear thoroughly after handling a dead sturgeon.
- Maintain appropriate training, licenses and certificates and use caution in the operation of motorized vehicles (boats, trucks, cars, etc.).
- Safely transfer specimens to authorized researchers, educators, laboratories, etc., following Material Safety Data Sheet (M.S.D.S) protocol for shipment and handling. Please be aware that shortnose sturgeon parts and tissues may only be sent to persons/labs that are listed as a CI on this permit.
- Safely dispose of unused portions of shortnose sturgeon carcasses

Data Access Policy for shortnose sturgeon salvage form

Upon written request, information submitted to National Marine Fisheries Service (NOAA Fisheries) on this form will be released to a requestor provided that the requestor credits the collector of the information and NOAA Fisheries. NOAA Fisheries will notify the collector that these data have been requested and the intent of their use.

II. Research:

Those Co-Investigators interested in research activities may receive sturgeon specimens from responders as they become available. There are many researchers who are also interested in response and in this case will directly use the specimens they collect themselves under the permit.

Anticipated uses for scientific research: morphology; genetics; histopathology; contaminants; age, growth and maturity analyses; cryopreservation of sperm; food habits; parasitology; examination for potential human impacts (oil spill, ship strike, bycatch in fisheries, dredging, blasting, impingement/entrainment etc.) and investigation of unusual mortality events/fish kills.

Researcher responsibilities include the following:

1. Credit contributing responders (i.e. those Co-Investigators that provided the data or specimens) and NOAA Fisheries. Any research published as a result of work performed on samples or information received under this permit must acknowledge the cooperating Co-Investigators, NOAA Fisheries, and the permit number in any publications or other reports resulting from the use of the transferred material/data
2. Share copies of any resultant publications/unpublished reports with Co-Investigators by submitting these reports to the appropriate NMFS regional contact.

Additional research needs may be identified during the 5-year term of the permit. Contact the appropriate NMFS regional contact to relay your research interests. Please be aware that responders are acting on a voluntary basis and there are generally relatively few sturgeon carcasses reported dead each year (~10) so it may take some time to meet your needs.

III. Education:

Many Co-Investigators that are responders and researchers also have an interest in obtaining and maintaining specimens for outreach and education. The permit will authorize the retention and maintenance of sturgeon (whole and parts) for education. The anticipated educational uses follow:

Educational uses: taxidermy; collection of hard parts such as individual scutes, bones and entire cartilaginous skeleton; clear and stain of small fish; casts of sturgeon carcasses, plastomer reproductions, dissection (necropsy) and development of sampling and necropsy procedures and manuals.

Educator responsibilities include the following:

1. As appropriate, credit contributing responders, NOAA Fisheries, and cite the permit number in resultant publications/outreach materials.
2. Share copies of any resultant publications/outreach materials with Co-Investigators by submitting them to the appropriate NMFS regional contact.

Additional educational needs may be identified during the 5-year term of the permit. Contact the appropriate NMFS regional contact to relay your education or outreach interests. Please be aware that responders are acting on a voluntary basis and there are generally relatively few sturgeon carcasses reported dead each year (~10) so it may take some time to meet your needs.

IV: Instructions for Transfer and Shipment of Specimens

Transfer:

Because shortnose and Atlantic sturgeon are listed species under the Endangered Species Act, transfer of specimens must be carefully documented and the persons/labs receiving

specimens must be authorized to have them. Therefore, once specimens are salvaged from a dead sturgeon, they may only be transferred to other Co-Investigators or cooperating diagnostic labs listed on this permit, No 17273 (see Attachment A). Transfer of specimens to Co- Investigators/cooperators must be documented on the “SAMPLES COLLECTED” block of the Sturgeon Salvage Form. All samples must be labeled with the Unique Identifier recorded in the top right block of the salvage form.

Any further transfer of specimens among Co-Investigators/cooperating diagnostic labs (i.e. beyond what was recorded on the salvage form) may be permissible on a case by case basis. You must contact the appropriate NMFS regional contact to arrange for the transfer. NMFS must report annually all sturgeon salvaged and collected under this permit and the disposition of all samples and subsamples.

Shipment:

Follow Material Safety Data Sheet (M.S.D.S) protocol for safe shipment and handling. Double check that all specimens are labeled with the Unique Identifier recorded in the top right block of the Sturgeon Salvage Form.

Include the following documentation with each shipment:

- Copy of Sturgeon Salvage Form
- Copy of the NMFS research permit authorizing the collection of the sample(s)
- Chain of Custody Form (as requested or appropriate)

Place the samples in leak-proof containers/bags; place the documentation on top of the samples. Seal the samples and documents together in the shipping container and send to authorized Co-Investigator(s)/cooperating diagnostic lab(s).

V. Adding Co-Investigators to the permit:

The permit, if issued, is expected to be valid for five years from the date of issuance. Qualified Co-Investigators or Cooperating Diagnostic Labs may be added to this permit on a case by case basis through an authorization provided by the Responsible Party of the permit. Interested persons should contact Jessica Pruden for more information:

Jessica Pruden
Shortnose Sturgeon Recovery Coordinator
NOAA Fisheries Greater Atlantic Regional Fisheries Office
55 Great Republic Drive
Gloucester, MA 01930
Phone: 978-282-8482
Fax: 978-281-9394
E-Mail Jessica.Pruden@noaa.gov

Appendix 2 Permit No. 17273: List of Co-Investigators, their agency affiliation and location, and their anticipated activity type (0=No and 1=Yes for Response, Research, or Education).

#	Co-Investigator last name	Co-Investigator first name	Affiliation	Location	Response	Research	Education	Comments
1	Adams	Robert	NYDEC	Suffern, NY	1	1	1	
2	Balazik	Matthew	Virginia Commonwealth University	Quinton, VA	1	1	1	
3	Bolden	Stephania	NOAA	St Petersburg, FL	1	1	1	Taxidermy, scutes
4	Bonacci	Lisa	NYDEC	East Setauket, NY	1	1	1	
5	Bowers-Altman	Jeanette	NJ DFW	Sicklerville, NJ	1	1	1	
6	Brownell	Prescott	NOAA	Charleston, SC	1	1	1	
7	Bouchard	Deborah	U ME	Orono, ME	0	1	0	
8	Brundage	Hal	Environmental Res. & Consult.	Kennet Square, PA	1	1	1	
9	Burns	Peter	Harvard U	Cambridge, MA	0	1	1	Zooarchaeology (museum)
10	Burnett	Christopher	Normandeau Associates	Indian Point, NY	1	1	0	
11	Carter	Julie	NOAA	Charleston, SC	0	1	1	Archiving genetic tissue
12	Casper	Brandon	U of MD	College Park, MD	1	1	1	
13	Chalupnicki	Marc	USGS Tunison Lab	Cortland, NY	0	1	1	Otolith study
14	Chapman	Demian	Stony Brook University	Stony Brook, NY	1	1	1	
15	Collins	Mark	SC DNR	Charleston, SC	1	1	1	
16	Corbett	Heather	NJ DFW	Port Republic, NJ	1	1	1	
17	Damon-Randall	Kim	NOAA	Gloucester, MA	1	0	1	
18	Darden	Tanya	SC DNR	Charleston, SC	1	1	1	
19	Deshpande	Ashok	NOAA	Highlands, NJ	1	1	1	
20	Draxler	Andrew	NOAA	Highlands, NJ	1	1	1	
21	DuBeck	Guy	GA Dept of Natural Resources	Richmond Hill, GA	1	1	1	
22	Dunton	Keith	Stony Brook University	Stony Brook, NY	1	1	1	
23	Exler	Ross	AKRF, Inc	Hanover, MD	1	1	1	
24	Figel	Chester	Warm Springs Fish Tech. Center	Warm Springs, GA	1	1	1	
25	Fire	Spencer	NOAA NOS	Charleston, SC	0	1	0	
26	Fischel	Helen	Delaware Nature Society	Hockessin, DE	0	0	1	
27	Fisher	Matthew	DE Division Fish and Wildlife	Smyrna, DE	1	1	1	
28	Fox	Dewayne	DE State U	Dover, DE	1	1	1	
29	Friedman	Ed	Friends of Merrymeeting Bay	Bowdoinham, ME	1	0	1	
30	Frisk	Michael	Stony Brook University	Stony Brook, NY	1	1	1	
31	Furman	William	Normandeau Associates	Indian Point, NY	1	1	0	
32	Garman	Greg	Virginia Commonwealth University	Richmond, VA	1	1	1	
33	Hartel	Karsten	Harvard U	Cambridge, MA	0	1	1	Ichthyology (museum)
34	Hattala	Kathy	NY DEC	New Paltz, NY	1	1	1	
35	Hazel	Allan	SC DNR	Charleston, SC	0	1	1	Taxidermy
36	Hightower	Joe	USGS	Raliegh, NC	1	1	1	
37	Hilton	Eric	VIMS	Gloucester Point, VA	1	1	1	
38	Hopler	David	Virginia Commonwealth University	Richmond, VA	1	1	1	
39	Jacobini	Jared	DE Division Fish and Wildlife	Port Penn, DE	1	1	1	
40	Jordaan	Adrian	Stony Brook University	Stony Brook, NY	1	1	1	
41	Kieffer	Micah	USGS	Turners Falls, MA	1	1	1	
42	King	Tim	USGS	Kearneysville, WV	0	1	1	Genetic analyses
43	Kinnison	Michael	U ME	Orono, ME	1	1	1	
44	Krebs	Justin	AKRF, Inc	Hanover, MD	1	1	1	
45	Kynard	Boyd	USGS and UMASS (Emeritus)	Turners Falls, MA	1	1	1	
46	Lichtenwaler	Anne	U ME	Orono, ME	0	1	0	
47	Lipsky	Christine	NOAA	Orono, ME	1	1	1	
48	Luscombe	Bruce Anthony	NPS, Gateway National Rec. Area	Brooklyn, NY	1	0	0	

Appendix 2 Permit No. 17273: List of Co-Investigators, their agency affiliation and location, and their anticipated activity type (0=No and 1=Yes for Response, Research, or Education).

49	Lynott	Maggie	VA AQ	VA Beach, VA	1	1	1	
50	Mangold	Mike	US F&W	Annapolis, MD	1	1	1	
51	Matsche	Mark	Maryland DNR	Easton, MD	1	1	1	Health studies, education
52	Mattson	Mark	Normandeau Associates	Indian Point, NY	1	1	0	
53	McIninch	Stephen	Virginia Commonwealth University	Richmond, VA	1	1	1	
54	McKown	Kim	NYDEC	East Setauket, NY	1	1	1	
55	Mierzykowski	Steve	US F&W	Old Town, ME	1	1	1	Contaminants
56	Minkkinen	Steve	US F&W	Annapolis, MD	1	1	1	
57	Mohead	Malcolm	NOAA	Silver Spring, MD	1	0	1	
58	Morse	Richard	New York State Education Dept	Troy, NY	1	1	1	
59	Nash	James	AKRF, Inc	White Plains, NY	1	1	1	
60	Parsons	Alexandra	NPS Southeastern Archeological Ctr	Tallahassee, Florida	1	1	1	
61	Peterson	Doug	U of GA	Athens, GA	1	1	1	
62	Pikitch	Ellen	Stony Brook University	Stony Brook, NY	1	1	1	
63	Popper	Arthur	U of MD	College Park, MD	1	1	1	
64	Ragusa	James	Fire Island NS resident	Ocean Beach, NY	1	0	0	Response only
65	Renshaw	Mark	Notre Dame University	Notre Dame, IN	0	1	1	
66	Richardson	Brian	Maryland DNR	Stevensville, Maryland	1	1	1	
67	Richmond	Alan	UMASS Amherst	Amherst, MA	0	1	1	Ichthyology (U. collection)
68	Ricci	Michael	Normandeau Associates	Indian Point, NY	1	1	0	
69	Saul	Bruce	GA Regents University	Augusta, GA	0	1	1	
70	Savoy	Thomas	CT DEP	Old Lyme, CT	1	1	1	
71	Secor	Dave	U of MD	Solomons, MD	1	1	1	Age structures
72	Schanke	Scott	Normandeau Associates	Indian Point, NY	1	1	0	
73	Seewagen	Chad	Pace University	Pleasantville, NY	1	1	1	
74	Sheehan	Timothy	NOAA	Woods Hole, MA	1	1	1	
75	Shirey	Craig	DE DFW	Smyrna, DE	1	1	1	Taxidermy
76	Shotts	Kelly	NOAA	St. Petersburg, FL	1	1	1	
77	Slater	Caleb	Mass Wildlife	Westborough, MA	1	1	1	
78	Sokolowski	Mark	Stony Brook University	Stony Brook, NY	1	1	1	
79	Somes	Robert	NJ DFW	Robbinsville, NJ	1	1	1	
80	Spiess	Arthur	Maine Historic Preservation Com.	Augusta, ME	1	1	1	
81	Starnes	Wayne	NC State Museum of Nat History	Raleigh, NC	0	1	1	(museum)
82	Sulak	Ken	USGS	Gainesville, FL	1	1	1	
83	Sulikowski	James	University of New England	Biddeford, ME	1	1	1	
84	Sweeney	Charles	Normandeau Associates	Indian Point, NY	1	1	0	
85	Swingle	Mark	VA AQ	VA Beach, VA	1	1	1	
86	Taft	Natalia	University of Chicago	Chicago, IL	0	1	0	
87	Tomichek	Christine	Kleinschmidt Associates	Essex, CT	1	1	1	
88	Van Atten	Amy	NOAA	Woods Hole, MA	0	1	0	
89	Weatherwax	Bryan	New York State Museum	Albany, NY	1	1	1	
90	Wieczorek	Daniel	NOAA	Highlands, NJ	1	1	1	
91	Wilcox	Jeffrey	FL Fish & Wildlife	Tallahassee, Florida	1	1	1	
92	Williams	Jeff	Smithsonian Institution	Washington, DC	0	1	1	(museum)
93	Wippelhauser	Gail	ME DMR	Augusta, ME	1	1	1	
94	Wirgin	Ike	NYU	Tuxedo, NY	0	1	0	Genetic analyses
95	Zydlowski	Gayle	U ME	Orono, ME	1	1	1	

Appendix 2 Continued: Cooperating Facilities Holding Captive-Bred Shortnose Sturgeon and Anticipated Cooperating Diagnostic Laboratories

#	Cooperating Facilities Holding Captive-Bred Shortnose Sturgeon	Primary Contact	Location
1	USFWS Bears Bluff NFH	Kent Ware	Wadmalaw Island, SC
2	USFWS Warm Springs Fish Technology Center	Chester Figel	Warm Springs, GA
3	Alden Research Labs	Steve Amaral	Holden, MA
4	USGS Conte Anadromous Fish Laboratory	Micah Kieffer	Turners Falls, MA

#	Cooperating Diagnostic Laboratories	Primary Contact	Location
1	USFWS Northeast Fisheries Center	Jerre Mohler	Lamar, PA
2	USFWS Analytical Control Facility	Judy Bischoff	Shepherdstown, WV
3	NOAA Fisheries NEFSC, James J. Howard Marine Sciences Laboratory	Andy Draxler	Sandy Hook, NJ
4	Maryland Department of Natural Resources, Cooperative Oxford Laboratory	Mark Matsche	Oxford, MD
5	ANTECH	No one contact	Lake Success, NY
6	New York University School of Medicine, Division: Environmental Medicine	Ike Wirgin	Tuxedo, NY
7	USGS - Biological Resources Division, Leetown Science Center	Tim King	Kearneysville, WV
8	UC Davis, Department of Medicine and Epidemiology	Ron Hedrick	Davis, CA
9	University of Georgia, College of Veterinary Medicine	Susan Knowles	Athens, GA
10	Dept. of Pathobiology and Vet. Services, UCONN	Sylvain Deguise	Storrs, CT
11	Cornell University, College of Veterinary Medicine	Paul Bowser	Ithaca, NY
12	Micro Technologies	Bill Kelliher	Richmond, ME
13	USGS Columbia Environmental Research Center	David Alvarez	Columbia, MO
14	USGS Western Fisheries Research Center	Jim Winton	Seattle, WA
15	New England Aquarium	Charlie Innis	Boston, MA
16	Burris Logistics	Tine Hawkins	Harrington, DE

Appendix 3a:

Certification, Identification and Chain of Custody Form for Submitting Sturgeon Genetic Tissue Samples.^{1, 2}

(A) CERTIFICATION OF SPECIES (Collector)

I, _____, hereby certify that I have positively identified the
 Full Name
 fish or fishes sampled in this shipment as: shortnose sturgeon; Atlantic sturgeon; other unknown
 based on my knowledge and experience as a _____,
 Position Job Title
 Signature: _____ Date Identified: _____
 Address: _____
 Phone Number: _____

(B) SAMPLE IDENTIFICATION

Species Identification: shortnose sturgeon; Atlantic sturgeon; unknown
 Unique ID No: _____; Tissue Type: _____; Preservative: _____;
 Location: (River: _____; River-km: _____; Lat/Long: _____);
 River Location Description: _____;
 Total Length (TL) of Specimen (mm): _____ Weight of Specimen (g): _____; Sex (if known) _____

Specific comments on take: _____

Check here if multiple samples are submitted and use *Field Collection Report* (Appendix 3b) with the data fields listed in this section.

(C) EVIDENCE OF CHAIN OF CUSTODY

1.	_____	_____	_____	_____
	Release Signature	NMFS Permit No.	Method of Transfer	Date
	_____	_____	_____	_____
	Receipt Signature	NMFS Permit No.		Date
2.	_____	_____	_____	_____
	Release Signature	NMFS Permit No.	Method of Transfer	Date
	_____	_____	_____	_____
	Receipt Signature	NMFS Permit No.		Date
3.	_____	_____	_____	_____
	Release Signature	NMFS Permit No.	Method of Transfer	Date
	_____	_____	_____	_____
	Receipt Signature	NMFS Permit No.		Date

¹ Instructions on next page.

² If multiple samples are shipped, attach summary sheet in Appendix 3b.

Instructions: Collecting, Certifying, Identifying & Shipping Tissue Samples Collected from Sturgeon.

1. **Species Certification:**

For each shipment a “*Certification of Species Identification*” (Section A) must be provided. This form documents the collector has identified the fish or fishes sampled in the shipment as either a shortnose or Atlantic sturgeon. If there is any doubt about the identity of a sample, then mark unknown and include comments on the take.

2. **Sample Identification:**

Assign a unique number identifying each individual fish captured and subsequently sampled. This number must be recorded in Section B and on the collection vial for each sample taken. Record tissue type; preservative used; date of capture; location of capture (river & description, lat/long, river km, and nearest city); length of specimen; weight; and sex, if known. Check the box provided if you are submitting multiple samples, and provide a hard-copy and/or email a copy of the sample spreadsheet with information for each of the data fields listed above.

3. **Tissue Sampling Instructions:**

a. Cleanliness of Samples: Cross contamination should be avoided. For each fish, use a clean cutting tool, syringe, etc. for collecting and handling samples.

b. Preserving & Packaging Samples:

- i. Label vial with fish’s unique ID number.
- ii. Place a 1-2 cm² section of pelvic fin clip in vial with preservative (95% absolute ETOH (un-denatured), recommended).
- iii. Seal individual vials or containers with leak proof positive measure (e.g., tape).
- iv. Package vials and absorbent within a double sealed container (e.g., zip lock baggie).
- v. Label air package properly identifying ETOH warning label (**See Appendix 3c**).

c. Shipping Instructions:

When shipping samples, place separately Appendix 3a, 3b and 3c (Sample ID and Chain of Custody Forms and Shipping Training Form) in container and seal the shipping box to maintain the chain of custody. (**Note:** A copy of the ESA permit authorizing the collection of the sample(s) must also accompany the sample(s)).

Important Notice: You must be certified before shipping tissue samples preserved with 95% ETOH in “excepted quantities” (A Class 3 Hazardous Material Due to Flammable Nature). See **Appendix 3c: “NMFS Guidelines for Air-Shipments of Excepted Quantities of Ethanol Solutions”** to comply with the DOT/IATA federal regulations.

4. **Chain of Custody Instructions:**

The “*Chain of Custody*” (Section C) should be maintained for each shipment of tissue samples and must accompany the sample(s) at all times. To maintain the chain of custody, when sample(s) are transferred, the sample(s) and the documentation should be packaged and sealed together to ensure that no tampering has occurred. All subsequent handlers breaking the seal must also sign and document the chain of custody section.

5. **Contact Information:**

A. NMFS, Office of Protected Resources:

i. Primary Contact: (Greater Atlantic Regional Fisheries Office) Shortnose Sturgeon Recovery Coordinator (Jessica Pruden, jessica.pruden@noaa.gov, 978/282-8482); Atlantic Sturgeon Recovery Coordinator (Lynn Lankshear, lynn.lankshear@noaa.gov, 978/282-8473)

ii. Primary Contact: (Southeast) Shortnose Sturgeon and Atlantic Sturgeon Recovery Coordinator (Kelly Shotts, kelly.shotts@noaa.gov, 727/551-5603)

i. Secondary Contact: Malcolm Mohead (malcolm.mohead@noaa.gov) Phone: 301/713-2289

ii. Secondary Contact: Jennifer Skidmore (jennifer.skidmore@noaa.gov) Phone: 301/713-2289

B. NOS Archive:

i. Primary Contact: Julie Carter (julie.carter@noaa.gov) Phone: 843/762-8547

Appendix 3b Summary Sheet for Genetic Tissue Samples Collected^{1,2}

Date	Species	Unique ID No.	Genetic Tissue Type	Preservative	Location: (River)	Location (River-km)	Location (Lat/Long)	Total Length (mm)	Weight (g)	Sex	Comments

1. Please coordinate with NMFS to receive a file copy of this appendix in spreadsheet format and include file on disk with shipment.
2. If multiple samples are shipped, attach this form to supplement Appendix 3a.

Appendix 3c

NMFS Guidelines for Air-Shipment of "Excepted Quantities" of Ethanol Solutions

These guidelines have been adapted with permission from the University of New Hampshire-Office of Environmental Health & Safety; our appreciation is to Andy Glode for providing reference materials upon which this guide was created.

The U.S. Department of Transportation (DOT: 49 CFR 173.4) and the International Air Transport Association (IATA: 2007 Dangerous Goods Regulations, Sec. 2.7) regulate shipments of ethanol (ETOH) in *excepted quantities*. As a result, specific procedures must be followed as well as certifying proper training of individuals prior to packaging and shipping specimens preserved in ETOH. These guidelines will inform proper shipping and also satisfy certifying requirements. Failure to meet such requirements could result in regulatory fines and/or imprisonment.

Therefore, prior to submitting ETOH preserved samples and appropriate documentation (*e.g.*, a FedEx Airbill) to a carrier, please read, initial and sign this document, affirming you have understood the requirements as outlined. Please include this document in the shipping package and retain a copy for your records.

- 1) Packages and documents submitted to a carrier must not contain any materials other than those described in this document (*i.e.* containers holding ethanol-preserved specimens and related absorbent and packaging materials). Also, laboratory or sampling equipment, *unrelated documents*, or other goods must be packaged and shipped in separate boxes. (Note: ETOH solutions are not permitted to be transported in checked baggage, carry-on baggage, or airmail.) **I understand (____)**
- 2) Please read the manufacturer's Material Safety Data Sheet (MSDS) for ETOH recognizing ETOH (55 - 100%) is classed as hazardous flammable material (NFPA Rating = 3). Note also, its vapor is capable of traveling a considerable distance to an ignition source causing "flashback." Properly packaging and labeling shipments of ethanol solutions will minimize the chance of leakage, and would also communicate the potential hazard to transport workers in the event of a leak. **I understand (____)**
 - a) **Quantity Limits:** Small quantities (inner container less than 30 ml, with a maximum net quantity of 500 ml for the entire package) of ETOH can be shipped with "Excepted Quantities" labels without completion of a Dangerous Goods Declaration. (*e.g.*, If shipping vials having a maximum volume of 10 ml each, you may put up to 50 vials in one box.) **I understand (____)**
 - b) **Package Components:**
 - i. **Inner (primary) packaging (*e.g.*, vial, tube, jar, etc.):** Do not completely fill inner packaging; allow 10% head-space for liquid expansion. Liquids must not completely fill inner packaging at a temperature of 55°C (130°F). Closures of inner packaging (*e.g.*, vials with tops) must be held securely in place with tape or other positive means. **I understand (____)**
 - ii. **Intermediate (secondary) packaging (*e.g.* Ziplock or other plastic bag):** Place inner container(s) (*e.g.*, vials with ETOH) into a high-quality plastic bag. Then add an absorbent material capable of absorbing any spillage without reacting with the ethanol. Seal the first bag tightly and then tape the locking seals. Next, seal the inner bag within a second bag for added safety. **I understand (____)**
 - iii. **Outer packaging (*e.g.*, cardboard box):** Ethanol solutions may not be shipped in envelopes, Tyvek® sleeves, or other non-rigid mailers. The dimensions of the outer box must be at least 100 mm (~4 inches) on two sides. Any space between the inner packing containers placed in the outer packaging should be eliminated with additional filler. **I understand (____)**
 - c) **Package Labels:**
 - i. **Dangerous Goods in Excepted Quantities Label (Figure 1):** The label must display a "3" as the ethanol hazard class number using a black marker. You may obtain self-adhesive labels from NMFS, or else, order online. **I understand (____)**
 - ii. **Name and Address:** The outer container must display the name and address of the shipper and consignee. When using shipping boxes, completely remove or black out all unnecessary labels or marks. **I understand (____)**

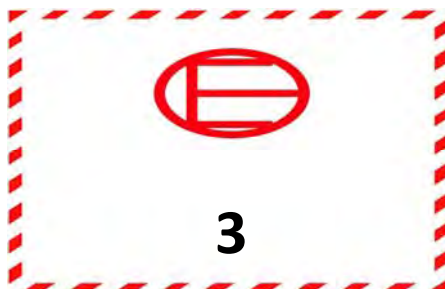


Figure 1. Dangerous Goods in Excepted Quantities label

Appendix 3c (continued)

d) **Package Tests:**

A representative example of packaging used for excepted quantities of ethanol solutions must pass a drop test and compressive load test without any breakage or leakage of any inner packaging and without any significant reduction in package effectiveness. Perform the following tests on a representative example of your packaging and keep a record of the results.

i. **Drop Test:** Drop a representative package from a height of 1.8 m (5.9 feet) directly onto a solid unyielding surface:

Test Results

- a. One drop flat on the base; (_____)
- b. One drop flat on top; (_____)
- c. One drop flat on the longest side; (_____)
- d. One drop flat on the shortest side; and (_____)
- e. One drop on a corner. (_____)

ii. **Compressive Load Test:** Apply a force to the top surface of a representative package for a duration of 24 hours, equivalent to the total weight of identical packages if stacked to a height of 3 meters. (_____)

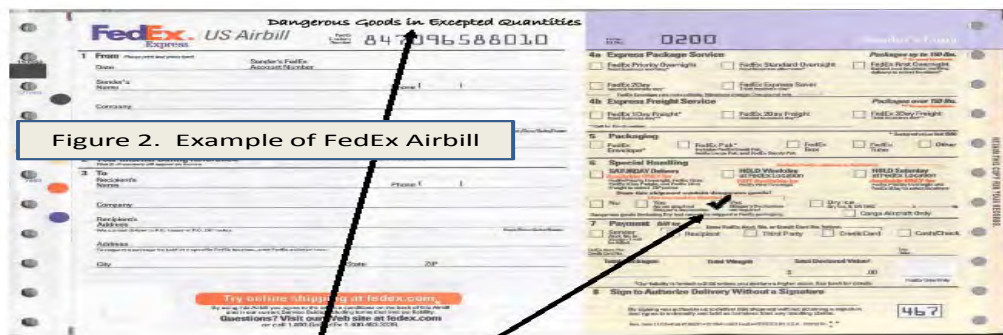
e) **Package Documentation:**

Proper documentation is required for all shipments of hazardous materials. Incorrect documentation is the most common cause for package refusal. If using documentation for couriers other than FedEx, UPS and DHL, please contact NMFS for assistance.

i. **FedEx:** For domestic shipments with FedEx Express, fill out the standard US Airbill. Fill out the form completely including the following information:

- a. In Section 6, Special Handling, check the box “Yes, Shipper’s Declaration not required.”
- b. On the top of the form above the FedEx tracking number, include the statement, “**Dangerous Goods in Excepted Quantities**” See example in **Figure 2**. I understand (_____)

ii. **DHL:** The “*Nature and Quantity of Goods*” box of the air waybill must include “**Dangerous Goods in Excepted Quantities.**” I understand (_____)



Include this statement and check this box.

By signing this document, I affirm I understand the hazards associated with ethanol and the shipping requirements for ethanol solutions, as outlined in this guide. I also understand I am required to include a copy of this document in the package and that it should be appended to an ESA permit (if listed samples are shipped).

Print Name:		Signature:	
Employer:		Employer Address:	
Date:			Phone:

STURGEON SALVAGE FORM

For use in documenting dead sturgeon in the wild under ESA permit no. 17273 (version 1-30-2014)

INVESTIGATORS'S CONTACT INFORMATION
 Name: First _____ Last _____
 Agency Affiliation _____ Email _____
 Address _____

 Area code/Phone number _____

UNIQUE IDENTIFIER (Assigned by NMFS)

DATE REPORTED:
 Month Day Year 20

DATE EXAMINED:
 Month Day Year 20

SPECIES: (check one)
 shortnose sturgeon
 Atlantic sturgeon
 Unidentified *Acipenser* species
 Check "Unidentified" if uncertain.
 See reverse side of this form for aid in identification.

LOCATION FOUND: Offshore (Atlantic or Gulf beach) Inshore (bay, river, sound, inlet, etc)
 River/Body of Water _____ City _____ State _____
 Descriptive location (be specific) _____

 Latitude _____ N (Dec. Degrees) Longitude _____ W (Dec. Degrees)

CARCASS CONDITION at time examined: (check one)
 1 = Fresh dead
 2 = Moderately decomposed
 3 = Severely decomposed
 4 = Dried carcass
 5 = Skeletal, scutes & cartilage

SEX:
 Undetermined
 Female Male
 How was sex determined?
 Necropsy
 Eggs/milt present when pressed
 Borescope

MEASUREMENTS: Circle unit
 Fork length _____ cm / in
 Total length _____ cm / in
 Length actual estimate
 Mouth width (inside lips, see reverse side) _____ cm / in
 Interorbital width (see reverse side) _____ cm / in
 Weight actual estimate _____ kg / lb

TAGS PRESENT? Examined for external tags including fin clips? Yes No Scanned for PIT tags? Yes No

Tag #	Tag Type	Location of tag on carcass
_____	_____	_____
_____	_____	_____

CARCASS DISPOSITION: (check one or more)
 1 = Left where found
 2 = Buried
 3 = Collected for necropsy/salvage
 4 = Frozen for later examination
 5 = Other (describe) _____

Carcass Necropsied?
 Yes No
 Date Necropsied: _____
 Necropsy Lead: _____

PHOTODOCUMENTATION:
 Photos/video taken? Yes No
 Disposition of Photos/Video: _____

SAMPLES COLLECTED? Yes No

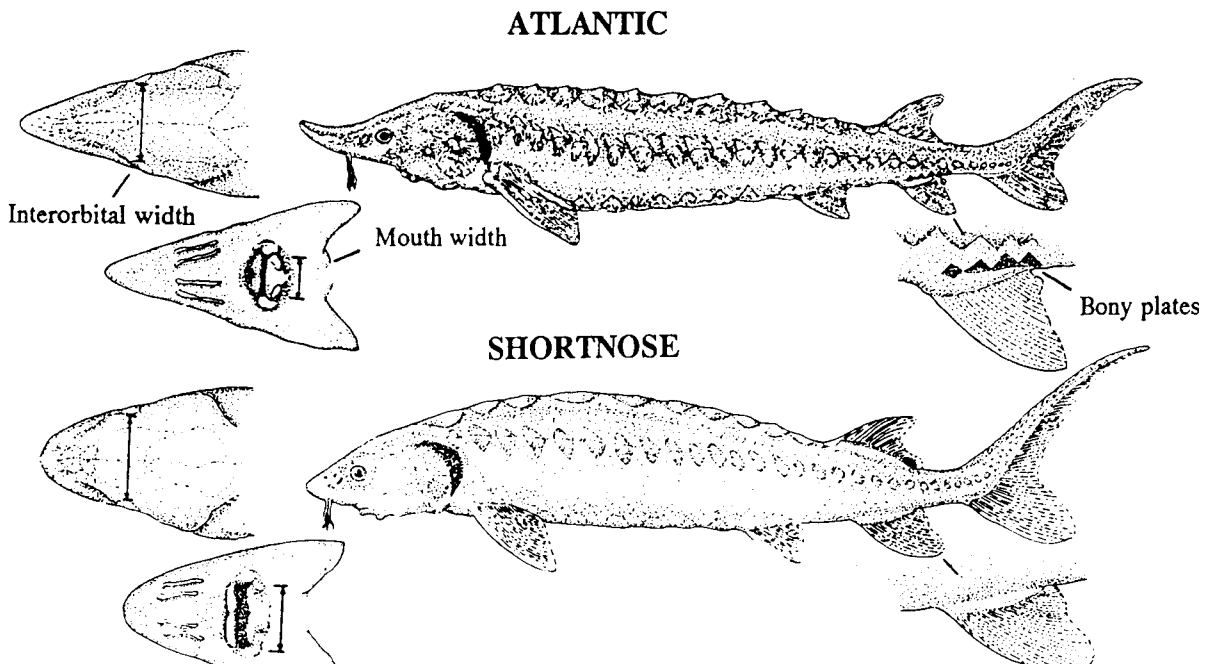
Sample	How preserved	Disposition (person, affiliation, use)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Comments:

Distinguishing Characteristics of Atlantic and Shortnose Sturgeon (version 01-30-2014)

Characteristic	Atlantic Sturgeon, <i>Acipenser oxyrinchus</i>	Shortnose Sturgeon, <i>Acipenser brevirostrum</i>
Maximum length	> 9 feet/ 274 cm	4 feet/ 122 cm
Mouth	Football shaped and small. Width inside lips < 55% of bony interorbital width	Wide and oval in shape. Width inside lips > 62% of bony interorbital width
*Pre-anal plates	Paired plates posterior to the rectum & anterior to the anal fin.	1-3 pre-anal plates almost always occurring as median structures (occurring singly)
Plates along the anal fin	Rhombic, bony plates found along the lateral base of the anal fin (see diagram below)	No plates along the base of anal fin
Habitat/Range	Anadromous; spawn in freshwater but primarily lead a marine existence	Freshwater amphidromous; found primarily in fresh water but does make some coastal migrations

* From Vecsei and Peterson, 2004



Describe any wounds / abnormalities (note tar or oil, gear or debris entanglement, propeller damage, etc.). Please note if no wounds / abnormalities are found.

Data Access Policy: Upon written request, information submitted to National Marine Fisheries Service (NOAA Fisheries) on this form will be released to the requestor provided that the requestor credit the collector of the information and NOAA Fisheries. NOAA Fisheries will notify the collector that these data have been requested and the intent of their use.

Submit completed forms (within 30 days of date of investigation) to: Greater Atlantic Regional Fisheries Office
Contacts – Shortnose Sturgeon Recovery Coordinator (Jessica Pruden, Jessica.Pruden@noaa.gov, 978-282-8482) or Atlantic Sturgeon Recovery Coordinator (Lynn Lankshear, Lynn.Lankshear@noaa.gov, 978-282-8473); **Southeast Region Contact**- Shortnose and Atlantic Sturgeon Recovery Coordinator (Kelly Shotts, Kelly.Shotts@noaa.gov, 727-551-5603).

NOAA Marine Biotoxins Program – Analytical Response Team

Sampling Protocol for Algal Identification and Toxin Analysis

Supplies

- * Bucket
- * Plastic bottles (100 ml and 1 liter)
- * Plankton net (10 µm nylon mesh) if available
- * Lugol's iodine fixative
or
- * glutaraldehyde fixative

Lugol's iodine: - dissolve 10 g potassium iodide (KI) in 100 ml distilled water
- add 5 g crystalline iodine (I₂)
- add 10 ml glacial acetic acid

Protocol

1. Look for discolored water patches (record observations). *There may not be discolored water in association with some toxic algal events.* Record temperature, salinity, and dissolved oxygen if possible.
2. For qualitative analysis, collect sample with a plankton net, if available, using vertical tow (bottom to surface). Transfer ~100 ml of concentrated sample to a 100 ml plastic bottle. Add preservative: Lugol's to make a tea color (1-2 ml) or glutaraldehyde to make 2% final concentration (2 ml).
3. For quantitative analysis, collect surface water samples using bucket.
 - a. Transfer water into two 1 L bottles (rinsed soda bottles are acceptable) for toxin analysis. Wrap bottles with wet paper towels. Store in a cool, dark place (do not freeze). Ship overnight if possible in styrofoam cooler containing wet paper towels and refrigerated blue ice packs (keep these from actually touching the bottle).
 - b. Transfer ~100ml sub-sample to 100 ml plastic bottles. Add preservative: Lugol's to make a tea color (1-2 ml) or glutaraldehyde to make 2% final concentration (2 ml). Store in cool, dark place until shipping.

Sampling Protocol for Toxin Analysis in Animals

Supplies

- * Normal sized samples: 50-mL plastic centrifuge tubes or other plastic tubes
- * Large samples: sealable/ziplock plastic bags or bottles

** Prior to collection, obtain required permits or licenses in order to comply with state and/or federal regulations for shellfish or protected species (marine mammals, sea turtles).

Invertebrates, (clams, oysters, mussels, scallops, crustaceans)

Generally collect entire animal. Freeze whole or shucked – 100 g meat/tissue. Samples can be stored in ziplock bags on ice until they can be frozen. Freeze (-20°C) and ship on dry ice.

Collection of shellfish is most easily accomplished by the use of available harvesting methods (rakes, dredges, etc.)

Prey Fish

If possible, the species should be identified before freezing. Small fish should be collected and frozen, then shipped whole. For large species, stomach contents (whole stomach), liver and flesh should be sampled and stored separately. Minimum of 50 g flesh should be obtained. All tissues can be stored frozen (-20°C) in ziplock bags until shipment on dry ice.

Mammals

(also see Geraci, J.R. and Lounsbury, V.J. 2005. Marine Mammals Ashore: A Field Guide for Strandings. National Aquarium, Baltimore, MD, 372 pp. for detailed necropsy sampling procedures). Limit sampling to code 1 or 2 animals (see above reference for definition), as changes in toxin structure and tissue matrix may occur in degraded tissue samples.

The most useful tissues/fluids for confirming biotoxin exposure are generally feces, urine and stomach contents. However, samples from additional tissues (gastric fluid, liver, kidney, lung, brain, serum) are important for metabolism and body burden studies. All samples should be immediately placed in a cooler on ice and frozen (-20°C) as soon as possible after collection. Samples should be shipped on dry ice to the laboratory for analysis. Prior to shipping samples, please contact receiving laboratory to ensure proper receipt of the samples.

All samples must be labeled with animal ID, date, species in indelible ink. Additionally, a small tag containing sample information inserted inside the sample container may be useful in some cases. Additional details, including location (latitude/longitude or closest landmark), animal length, weight, condition code, sex, and additional relevant information must be recorded on a sample log and a hard copy must accompany samples. In addition, also send a digital version to your contact at the laboratory. See the attached sample information sheet as an example.

Urine - Collect a minimum of 0.5 ml urine, more if available (5-10 ml). Store frozen (-20°C) in capped plastic centrifuge tubes.

Feces – Collect a minimum of 5 g (preferably 50 g). Store frozen (-20°C) in capped plastic centrifuge tubes or other container suitable for freezer storage.

Intestinal contents - Collect a minimum of 5 g (preferably 50 g). Store frozen (-20°C) in capped plastic centrifuge tubes or other container suitable for freezer storage. Indicate which portion of the intestine was sampled (e.g. upper, mid-, lower intestine)

Stomach contents – Collect a minimum of 5 g (preferably 50 g) of solid or semi-solid contents if available. Store frozen (-20°C) in capped plastic centrifuge tubes or other container suitable for freezer storage. If stomach fluid only is available, collect at least 5ml in a plastic tube or vial.

Gastric fluid, liver, kidney, lung, spleen, brain – collect 100 g (or mL) if possible. Store frozen (-20°C) in separate ziploc bags.

Serum – obtain serum by centrifugation (1500-3000 x g; 5 minutes) of whole, heparinized blood. The top layer is the serum. Collect >0.5 ml of serum and store frozen (-20°C) in a plastic tube.

Whole blood -Heparinized whole blood can be spotted directly onto blood collection cards and stored at room temperature in the presence of dessicant pouches. Blood cards with detailed instructions can be obtained from your contact at the Marine Biotoxins Program laboratory.

Birds

Collect as above for mammals, substituting cloacal contents for feces and urine, and with the addition of gizzard contents.

Marine Mammal Stranding Response Agreement

Between

Northeast Region
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
Department of Commerce

AND

Virginia Aquarium & Marine Science Center
Stranding Response Program

Articles III, IV, V, and VI are reserved and issued at the discretion of the NMFS Regional Administrator.



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Article I: General Provisions

A. Authority

1. This Marine Mammal Stranding Response Agreement (hereinafter Agreement) is entered into between the Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) Northeast Region, and the Stranding Network Participant Virginia Aquarium & Marine Science Center Stranding Response Program (Participant), under the authority of section 112(c) and section 403 of the Marine Mammal Protection Act of 1972 (MMPA), as amended. **This Agreement supersedes all pre-existing Stranding Agreements between these parties. An organizational representative with signatory authority (e.g. Executive Director, President, CEO) must sign this Agreement on behalf of the Stranding Network Organization.**
2. NMFS has been delegated authority by the Department of Commerce to administer the MMPA. To assist in the implementation and administration of the MMPA, the Stranding Network has been established to respond to stranded marine mammals within NMFS' Northeast Region of the United States. The Northeast Region consists of the following coastal states and territories: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, New Jersey, Delaware, Maryland and Virginia.

B. Scope

1. Under the MMPA, NMFS is responsible for mammals of the **Order Cetacea** and the **Order Pinnipedia** other than walruses (hereinafter marine mammals).
2. The geographic response area assigned to Participant consists of the following: coastal and tidal waters of Virginia, including the Virginia portion of Chesapeake Bay and its tributaries. The Participant may assist in stranding response within the Region outside of their assigned response area, if requested by NMFS or by another Participant. Outside the Northeast Region, the Participant may assist with stranding response upon request from the appropriate NMFS Regional Stranding Coordinator(s).

C. Limitations

1. This Agreement creates an authorization for the Participant to take marine mammals, which would be otherwise prohibited by the MMPA. This taking authorization only applies to the Participant and its authorized personnel (see Article VI) for activities that are consistent with this Agreement.
2. In particular, this Agreement does not authorize:

- a. The taking of any marine mammal species listed as endangered or threatened under the Endangered Species Act of 1973 (ESA), as amended. Authorization to take ESA listed species is provided under an MMPA/ESA Permit No. 932-1489-09, as amended, issued to the NMFS National Marine Mammal Health and Stranding Response Program Coordinator and **requires authorization and direction from the NMFS Regional Stranding Coordinator in the event of a stranding involving a threatened or endangered marine mammal.**
- b. The sale or offer of sale of any marine mammal or marine mammal parts including cells, gametes, or cell cultures.

D. Definitions

All terms used in the Agreement shall be interpreted to have the meaning specified in the MMPA section 3 and section 409 and NMFS implementing regulations 50 CFR 216.3 unless the context or specific language requires otherwise. For ease of reference, those definitions, as well as additional terms and definitions for this Agreement, are provided in Attachment A.

Article II: Purpose and General Responsibilities

A. Purpose of Agreement. NMFS and the Participant enter into this Agreement for the following purposes:

1. To provide for rapid response and investigation of stranded marine mammals (Order Cetacea and Order Pinnipedia) within the Northeast Region in accordance with the purposes and policies of the MMPA.
2. To implement Title IV (Marine Mammal Health and Stranding Response Program) of the MMPA:
 - a. to facilitate the collection and dissemination of reference data on the health of marine mammals and health trends of marine mammal populations in the wild;
 - b. to correlate the health of marine mammals and marine mammal populations in the wild with available data on physical, chemical, and biological environmental parameters; and
 - c. to detect and coordinate effective responses to Marine Mammal Unusual Mortality Events (UMEs).
3. To specify the activities during which the Participant may take stranded marine mammals (Order Cetacea and Order Pinnipedia) or marine mammal parts for the primary purpose of ensuring the appropriate response, rehabilitation, disposition, and utilization of stranded marine mammals or marine mammal parts under MMPA sections 109(h), 112(c), and 403 and the Agreement.
4. To define the nature and extent of services that the Participant will provide NMFS under this Agreement and NMFS' responsibilities to the Participant.
5. To specify the requirements for the preparation and maintenance and reporting of records containing scientific data obtained from dead and live stranded marine mammals or parts from dead stranded marine mammals.
6. To provide for the timely exchange of information for use by both parties and other network members in furthering the objectives of the MMPA under this Agreement.

B. Joint Responsibilities

NMFS and the Participant will work cooperatively to:

1. Implement Title IV of the MMPA;

2. Effectively respond to and investigate the causes and impacts of UMEs;
3. Collect the appropriate data for determination of serious injuries and mortalities due to human interactions;
4. Collect reference data on marine mammal health and diseases;
5. Collect data on the frequency and causes of strandings; and
6. Interpret findings and identify health trends and diseases of concern to include emerging, reportable, and zoonotic diseases.

C. NMFS Responsibilities

NMFS Shall:

1. Provide the Participant with notice of any changes to laws, regulations, policies and/or guidelines applicable to or promulgated by NMFS that may apply to the Participant's activities. This includes criteria for issuance, renewal and termination of stranding agreements. Notwithstanding this provision, it is the responsibility of the Participant to comply with all laws, regulations, policies and/or guidelines that apply to the Participant's activities.
2. Conduct periodic compliance reviews of Stranding Agreements as stated in Article IX.
3. Provide guidance and assistance regarding investigation of marine mammal unusual mortality events including financial and physical resources (example: NOAA laboratory assistance) and financial resources when available and authorized (in accordance with section 405 of the MMPA – UME National Contingency Fund) and in coordination with the Working Group on Marine Mammal Unusual Mortality Events.
4. Alert the Participant when NMFS has been notified that there are diseases of concern that are emerging, reportable, and/or zoonotic within the Northeast Region.
5. Pursuant to criteria established under the MMPA section 407, provide access to the National Marine Mammal Health and Stranding Response Program Database, as developed, and access to marine mammal tissues in the National Marine Mammal Tissue Bank following NMFS data and tissue access procedures and policies.
6. As needed and as resources are available, provide specialized marine mammal stranding response equipment and investigation training on a local, regional or national basis.

7. Pursuant to MMPA section 402, collect and update periodically and make available to stranding network participants and other qualified scientists, existing information on:
 - a. procedures and practices for rescuing and rehabilitating stranded marine mammals;
 - b. species by species criteria used by the stranding network participants, for determining at what point a marine mammal undergoing rescue and rehabilitation is returnable to the wild based on its ability to survive in the wild and risk to the wild population of marine mammals;
 - c. procedures and practices for collecting, preserving, labeling, and transporting marine mammal tissues for physical, chemical, and biological analyses;
 - d. relevant scientific literature on marine mammal health, disease, and rehabilitation;
 - e. compilation and analyses of strandings by region to monitor species, numbers, conditions, and causes of illness and death in stranded marine mammals; and
 - f. other life history and reference level data, including marine mammal tissue analyses that would allow comparison of the causes of illness and death in stranded marine mammals with physical, chemical, and biological environmental parameters.
8. Identify a Northeast Region Marine Mammal Stranding Response Program Coordinator who will serve as the Participant's primary point of contact for notification, coordination, reporting, response and rehabilitation activities as specified throughout this Agreement. The NMFS Regional Administrator will serve as the Participant's primary point of contact for administration of the Agreement, as well as dispositions and other management activities as specified throughout the Agreement. **The NMFS Regional Administrator's designated point of contact for this Agreement is the NMFS Northeast Region Marine Mammal Stranding Coordinator, Northeast Regional Office, Protected Resources Division.** (see Attachment B for contact information).
9. In certain circumstances such as large scale events (e.g. mass stranding, unusual mortality events, live right whale stranding), NMFS may establish a formal Incident Command System (ICS) for response, including the identification of an Incident Commander. Events such as oil spills, NMFS will follow direction from United States Coast Guard (USCG). Opportunities for ICS training can be accessed through the Federal Emergency Management Agency (see <http://www.training.fema.gov/EMIWeb/IS/is100.asp>), USCG, or NMFS. If necessary, guidance will be provided by NMFS on a case-by-case basis.

10. Relay reports of stranded marine mammals (live or dead) within the Participant's geographic range to the Participant and inquire whether the Participant has the capability to respond. If the Participant cannot respond, the Stranding Coordinator may make requests to other regional Stranding Participants to respond.
11. Coordinate regional activities to maximize geographic coverage while facilitating appropriate division of responsibilities among regional Participants according to institutional abilities and authorities.
12. Respond to the Participant's completed requests for authorizations such as requests for parts authorizations, parts transfers, and release determinations.
13. Provide information regarding availability of Prescott Grants and any other relevant NMFS funding opportunities.
14. For emergency stranding events (live or dead), provide and maintain a 24-hour stranding hotline number: 1-866-755-NOAA (6622).

D. Participant Responsibilities

The Participant shall:

1. Comply with laws, regulations, policies and/or guidelines applicable to or promulgated by NMFS that apply to activities under this Agreement; or any Federal, state or municipal laws that pertain to stranding network operations (e.g., municipal water management laws).
2. Cooperate with other members of the Northeast Region Stranding Network and the National Marine Mammal Stranding Program as well as Federal, state, and local officials and employees in matters supporting the purposes of this Agreement.
3. Be subject to the direction of a designated employee (e.g., NMFS Marine Mammal Stranding Coordinator or NMFS Special Agent) representing the NMFS Northeast Regional Administrator or Office of Law Enforcement with respect to the taking of a stranded marine mammal.
4. Manage any and all expenses that the Participant incurs associated with the activities authorized by this Agreement. NMFS does not have funds to reimburse volunteers for expenses incurred in responding to stranding events. However under the marine mammal UME process, funding may be available for costs associated with specific analyses and additional requests in accordance with section 405 of the MMPA UME National Contingency Fund and in coordination with the Working Group on Marine Mammal Unusual Mortality Events. Additionally, competitive funding opportunities for Stranding Network Participants may be available through the Prescott Stranding Assistance Grant Program (see

<http://www.nmfs.noaa.gov/pr/health/prescott/>). Non-competitive funds to supplement equipment and training needs may become available on a year by year basis. NMFS will provide notification of the availability of these funds.

5. Promote human and public safety by taking precautions against injury or disease to any network personnel, volunteers, and the general public when working with live or dead marine mammals.
6. Notify immediately the NMFS Stranding Coordinator upon learning of any diseases of concern (e.g., emerging, reportable, and/or zoonotic diseases) that are detected and/or confirmed that could be a potential hazard for public health or animal health (NMFS will provide guidance on reportable diseases as it becomes available);
7. Transfer of marine mammal parts (50 CFR 216.22 and 216.37):
 - a. Non-diagnostic parts, tissues, cells, gametes, or cell cultures to be used for scientific research, species enhancement, or education shall be transferred only to persons or labs that have received prior written authorization from the NMFS MMPA/ESA scientific research permit or a Regional Parts Authorization Letter. A unique field number assigned by NMFS (e.g., NMFS Registration Number) or the Participant must be marked on or affixed to the marine mammal part or container.
 - b. Diagnostic parts, tissue samples, fluid specimens, parts, or cells may be transferred to labs within the United States for diagnostic use without any additional authorizations.
8. Work cooperatively with the NMFS and the USCG in a hazardous waste spill (i.e., oil spills) ICS if implemented.
9. Notify the NMFS Regional Administrator in writing within 30 days of any changes in its Designee organizations, key personnel (see Attachment A), capabilities, and/or geographic area of response.
10. If requested, the Participant shall coordinate with NMFS to develop and implement a media plan relating to stranding events.
11. Photo documenting (still or video) for other than diagnostic or identification purposes (such as dorsal fin identification, documentation of lesions, scars, etc.) must not interfere or influence the conduct of the stranding responders and response in any way or cause additional harassment to marine mammals.
12. If requested by the NMFS Regional Stranding Coordinator, the Participant will provide copies of any photographs, films, and/or videotapes documenting any stranding, particularly for those strandings when human interactions are

reported or suspected. Reimbursement for this request is subject to negotiation between NMFS and the Participant. Any photography, film and/or videotape of the stranding response use for educational or commercial purposes of stranding response by the Participant should include a credit, acknowledgment, or caption indicating that the stranding response was conducted under a Stranding Agreement between NMFS and the Participant under the authority of the MMPA. NMFS will not reproduce, modify, distribute, or publicly display the photograph, film and/or videotape without consent of the owner, unless required to release a copy under Federal law or order (such as the Freedom of Information Act).

13. By its nature, the handling of stranded marine mammals (dead or alive) is potentially a dangerous activity. The Participant shall indemnify and hold harmless the United States Government from any and all losses, damages, or liability -or claims therefore -on account of personal injury, death, or property damage of any nature whatsoever, arising out of the activities of the Participant, his/her/its employees, his/her/its qualified representatives, designees, subcontractors, volunteers, or agents. Liability for person(s) acting under this agreement is addressed in sections 406(a) and (b) of the MMPA [16 U.S.C. 1421(e)].
14. Provide accurate and honest information in all reports to NMFS.
15. Except where a longer period is specified (e.g., 15 years for rehabilitation cases, see Attachment D *NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release – Standard for Rehabilitation Facilities*), maintain records upon which required reports are based for at least 3 years on-site.
16. Upon request by the NMFS Regional Administrator, allow the Regional Stranding Coordinator, other appropriate NMFS employees, or any other appropriate person duly designated by the Regional Administrator, to inspect the facilities and inspect and/or request records that pertain to stranding network activities.
17. Verbally report any right whale sightings that occur or are reported as part of their normal activities. See Attachment B for contact information.

Article III: Dead Animal Response

A. The Participant may take species of marine mammals under the MMPA for the purpose of dead animal investigation and response.

Subject to the conditions contained in this Agreement, the MMPA, and the implementing regulations, the Participant may take dead stranded marine mammals or parts there from for the collection of data on the health and health trends of wild populations, for the detection of marine mammal UMEs, for the detection of signs of human interaction, for research or education on marine mammal biology and life history, for the determination of cause of death, for the detection of human caused and natural mortality, or for other research as deemed appropriate by the NMFS. These activities specifically include: obtaining measurements and biological samples from dead stranded marine mammals; disposing, or assisting in the disposal, of dead stranded marine mammals at an appropriate landfill or other suitable location; and taking and transporting dead stranded or floating dead marine mammals, or parts there from, to facilities or individuals approved pursuant to 50 CFR. 216.22 for scientific research, maintenance in a properly curated, professionally accredited scientific collection, or for educational purposes.

B. Terms and Conditions for Dead Animal Response

1. Response

- a. The Participant shall respond as practicable to reports of dead stranded marine mammals within the geographic range or response specified under Article I, Number B.2. If the Participant is the closest and/or first responder, the Participant is considered to be the on-site coordinating organization and is in charge of all on-site activities. In certain circumstances such as a UME, mass stranding, or endangered marine mammal stranding, NMFS may implement the ICS structure and designate an on-site coordinator to be in charge of the event (see Article II C9). In all situations, the Participant will cooperate with Federal, state and local government officials and employees and other stranding network participants when responding to these strandings. If the Participant receives a verified report of a dead stranded marine mammal and does not have the capability to respond appropriately to the report, the Participant shall notify the NMFS Regional Stranding Coordinator and/or adjacent stranding network participants within 24 hours if feasible.
- b. If the Participant leaves a dead animal at the stranding site or in the case of a UME or mass stranding response, the Participant shall, if feasible, mark each animal with a tag or mark, such as roto-tags or grease stick, to assist with data collection and to prevent multiple reports on the same animal(s).

- c. If requested by NMFS Regional Stranding Coordinator and if feasible and practicable, the Participant will assist with stranding response in neighboring areas outside the Participant geographic range (specified in Article I B2).

2. Data Collection and Reporting. The Participant shall collect and provide the following information for each stranded marine mammal they respond to:

- a. Complete the NOAA Form 89-864, OMB #0648-0178 (the Marine Mammal Stranding Report - "Level A" Form) for each stranded marine mammal. Completed forms shall be sent to the NMFS Regional Stranding Coordinator via the NMFS National Marine Mammal Stranding Database or in writing (see Attachment B), no later than 30 days after responding to the stranding event. If requested by the NMFS Regional Stranding Coordinator and if feasible, the Participant shall provide preliminary data (verbal or written) from the Level A - Marine Mammal Stranding Report within 24 hours.
- b. As resources are available, collect additional Level B and Level C data.
- c. Notify the Regional Stranding Coordinator of the following cases within 24 hours or according to the specific reporting guidance provided by the Stranding Coordinator:
 - 1. possible or confirmed human interactions (including military activity),
 - 2. suspected UMEs,
 - 3. extralimital or out-of-habitat situations,
 - 4. mass stranding events and/or mass mortalities,
 - 5. large whale strandings, and
 - 6. any stranding involving endangered or threatened species or identified species of concern.
- d. In certain circumstances (e.g., listed or rare species stranding, UME, possible human interaction case, extralimital or out-of-habitat situation), the NMFS Regional Stranding Coordinator may request necropsies be conducted by a Necropsy Team Leader, or that additional and expedited reporting (verbal or written) of Level B and C data such as analytical results and necropsy reports if available. NMFS will not reproduce, modify, distribute, or publish the data without consent of the Participant unless required to release the data under Federal law or order (such as the Freedom of Information Act);
- e. Collect and make available any gear, debris, or other objects (e.g., bullets, arrows, net webbing, etc.) recovered from a stranded marine mammal that may be evidence of human interaction. The Participant must comply with chain of custody procedures

or any other instructions as specified and supported by NMFS Northeast Region and/or NMFS Office of Law Enforcement personnel.

3. **Parts Disposition.** Diagnostic parts, tissue samples, fluid specimens, parts or cells may be transferred to labs within the United States for diagnostic use without any additional authorizations. For non-diagnostic parts or samples:
 - a. **Retention:** Marine mammal parts may be retained by the Participant for education and/or research purposes, provided they are properly indicated in the "Specimen Disposition" field of NOAA Form 89-864, OMB #0648-0178 (the Marine Mammal Stranding Report - "Level A" Form). Parts and/or containers must be marked with the field identification number assigned by the Participant or by NMFS (i.e., NMFS registration number). Authorization to take parts from ESA listed species in the Northeast Region is currently provided under MMPA/ESA Permit No. 932-1489-09, as amended, issued to the NMFS Marine Mammal Health and Stranding Response Program Coordinator, and requires authorization and direction from the NMFS Regional Stranding Coordinator in the event of a stranding involving a threatened or endangered marine mammal, prior to any action by the Participant.
 - b. **Transfer:** Report to the NMFS Regional Administrator (See Attachment B) within 30 days of the stranding event, the transfer of any parts salvaged from the stranded marine mammal collected under this Agreement as required by 50 CFR 216.22 or 50 CFR 216.37. The Participant must provide the institution name where specimen materials have been deposited and ensure that the retained or transferred parts are marked with the field identification number or assigned NMFS Registration number in the "Specimen Disposition" field on the NOAA Form 89864, OMB #0648-0178 (the Marine Mammal Stranding Report - Level "A" Form) and ensure that retained or transferred parts are marked with the field identification number or the NMFS Registration Number. If parts are being transferred, the Participant must ensure the receiving institution is authorized by the NMFS Regional Administrator to receive marine mammal parts.
4. **Site cleanup.** The Participant shall make every reasonable effort to assist in the clean up of beach areas where their activities (e.g., necropsy or specimen collection) under this Agreement that may contribute to soiling of the site.

Article IV: Live Animal Response – First Response

A. The Participant may take species of marine mammals covered under the MMPA for the purpose of live stranding first response (initial assessment and care at the site of stranding and assist in the appropriate disposition of the animal), beach triage, beach release, temporary holding for assessment and triage, translocation and/or transportation to a NMFS authorized rehabilitation center within the Northeast Region.

1. The Participant must take live stranded marine mammals in a humane manner (as defined in 50 CFR 216.3, see Attachment A) for the protection or welfare of the marine mammal. If the animal dies during the course of response and/or investigation, then the terms and responsibilities contained in Article III of this Agreement become operative. In addition to the activities authorized in Articles I, II, and III, the Participant is authorized to implement the following activities under this article:
 - a. Take measurements and collecting blood or other diagnostic samples from live stranded marine mammals for health assessment.
 - b. Return live stranded marine mammals, as directed by the NMFS Regional Stranding Coordinator, to their natural habitat and tagging such animals.
 - c. Transport live stranded marine mammals for rescue and rehabilitation to a NMFS approved rehabilitation facility or temporary holding facility.
 - d. Perform humane euthanasia. Euthanasia shall only be performed by the attending veterinarian or by a person acting under the direction of the attending veterinarian and following approved guidelines such as those referenced in Attachment C (2007 Report of the American Veterinary Medical Association Panel on Euthanasia, 2nd Edition of the CRC Handbook of Marine Mammal Medicine, 2006 Journal of the American Association for Zoo Veterinarians). When using controlled drugs, such person(s) shall comply with all applicable state and Federal laws and regulations (i.e., registered with the Drug Enforcement Administration). Authorization for euthanasia of ESA-listed species provided under MMPA/ESA Permit No. 932-1489-09, as amended, and requires prior approval and direction from the NMFS Regional Stranding Coordinator.
2. This Agreement does not authorize any projects involving “intrusive research” (as defined in 50 CFR 216.3). Measurements or sampling for scientific research purposes (i.e., outside the scope of accepted diagnostic and treatment practices for the care of an animal) must be authorized under a NMFS MMPA/ESA scientific research permit.

B. Terms and Conditions for Live Stranding - First Response

1. Response

- a. The Participant shall respond to reports of live stranded marine mammals (Order Cetacea and Order Pinnipedia). If the Participant is the closest and/or first responder, the VAQS is considered to be the on-site coordinator and is in charge of all on-site activities. In certain circumstances such as a UME, mass stranding, or endangered marine mammal stranding, NMFS may implement the ICS structure and designate an on-site coordinator to be in charge of the event (see Article II C9). In all situations, the Participant will cooperate with Federal, state and local government officials and employees and other stranding network participants when responding to these strandings. If the Participant receives a verified report of a live stranded marine mammal and does not have the capability to respond appropriately to the report, the Participant shall notify the NMFS Regional Stranding Coordinator without delay. Also, if the NMFS Regional Stranding Coordinator receives a report of a live stranded marine mammal, the Regional Stranding Coordinator may contact the Participant to determine whether the Participant has the capability to respond to the stranding. If the Participant cannot respond in a timely manner, the NMFS Regional Stranding Coordinator may request another Stranding Network participant to respond.
- b. The Participant shall take all steps reasonably practicable under the circumstances to prevent further injury to any live stranded marine mammal, injury to any network personnel, volunteers, government personnel and the general public.
- c. The Participant shall tag or mark any animals that are immediately released to their natural habitat using a NMFS approved tag, such as one-bolt roto tag, cattle ear tags, or freeze branding. Application of other tagging methods must first be approved by the NMFS Regional Stranding Coordinator. Tagging and post-tagging activities are restricted to monitoring the success of marine mammals released to the wild. Any projects outside the scope of monitoring the success of a release must be authorized under a NMFS MMPA/ESA scientific research permit.
- d. If the Participant determines that it is necessary to temporarily hold or triage a stranded marine mammal at a separate site from the NMFS approved rehabilitation facility, the animal(s) cannot be moved until the Participant obtains verbal approval from the NMFS Regional Stranding Coordinator.

- e. Written documentation of the need for an interim location and written concurrence from the NMFS Regional Stranding Coordinator with any associated conditions must be provided at the earliest time practicable within 24 hours.
 - f. If the Participant considers responding to an “out-of-habitat” or free-swimming marine mammal in distress (e.g., entanglement), the Participant must first contact the NMFS Regional Stranding Coordinator for approval and discuss plans for live capture and/or needs for assistance. The NMFS Regional Stranding Coordinator may require a NMFS employee to be present at the time of capture.
 - g. The Participant shall follow the guidance provided by the Northeast Region in Attachment E, Disposition of Live Stranded Marine Mammals, and shall consult with the NMFS Stranding Coordinator and the attending veterinarian to make a determination regarding immediate release, rehabilitation, or euthanasia of live stranded marine mammals or cetaceans.
2. **Data Collection and Reporting.** The Participant shall collect and provide the following information for each stranded marine mammal they respond to:
- a. Complete the NOAA Form 89-864, OMB #0648-0178 (the Marine Mammal Stranding Report - “Level A” Form) for each stranded marine mammal. Completed forms shall be sent to the NMFS Regional Stranding Coordinator via the NMFS National Marine Mammal Stranding Database or in writing (see Attachment B), no later than 30 days after responding to the stranding event. If requested by the NMFS Regional Stranding Coordinator and if feasible, the Participant shall provide preliminary data (verbal or written) from the Level A - Marine Mammal Stranding Report within 24 hours.
 - b. If temporarily holding a stranded animal prior to transferring to a NMFS approved rehabilitation facility acting in accordance with this Article, the Participant shall complete the NOAA Form 89878, OMB # 0648-0178 (the Marine Mammal Rehabilitation Disposition Report). This report shall be sent to the NMFS Regional Stranding Coordinator via the NMFS National Marine Mammal Stranding Database or in writing (see Attachment B), no later than 30 days after responding to the stranding event. If requested by the NMFS Regional Stranding Coordinator and if feasible, the Participant shall provide preliminary data (verbal or written) from the Marine Mammal Rehabilitation Disposition Form within 24 hours.
 - c. As resources are available, collect additional Level B and Level C data.

- d. Notify the NMFS Regional Stranding Coordinator of the following cases within 24 hours or according to the specific reporting guidance provided by the Stranding Coordinator:
 - 1). possible or confirmed human interactions (including military activity),
 - 2). suspected UMEs,
 - 3). extralimital or out-of-habitat situations (see B.1.e. of this Article),
 - 4). mass stranding events and/or mass mortalities,
 - 5). large whale strandings, and
 - 6). any stranding involving endangered or threatened species or identified species of concern.
 - e. In certain circumstances (e.g., UME, possible human interaction case, extralimital or out-of-habitat situation), the NMFS Regional Stranding Coordinator may request additional and expedited reporting (verbal or written) of Level B and C data such as analytical results and necropsy reports if available. NMFS will not reproduce, modify, distribute, or publish the data without consent of the Participant unless required to release the data under Federal law or order (such as the Freedom of Information Act);
 - f. Collect and make available any gear, debris, or other objects (e.g., bullets, arrows, net webbing, etc.) recovered from a stranded marine mammal that may be evidence of human interaction. The Participant must comply with chain of custody procedures or any other instructions as specified and supported by NMFS Northeast Region and/or NMFS Office of Law Enforcement personnel.
4. **Site Cleanup.** The Participant shall make every reasonable effort to assist in the clean up of beach areas where their activities (e.g., euthanasia, necropsy, or specimen collection) under this Agreement.

Article V: Live Animal Response – Rehabilitation and Final Disposition

A. The Participant may take live stranded marine mammals in a humane manner with the goal of rehabilitation and release. If the animal dies during the course of rehabilitation, then the terms and responsibilities contained in Article III of this Agreement become operative. In addition to the activities authorized in Articles I, II, III, and IV of this Agreement and subject to the conditions contained in this Agreement, the MMPA, and the implementing regulations, the Participant is authorized to implement the following activities under this article:

1. In accordance with applicable regulations and NMFS guidelines and best practices, transfer marine mammals to another NMFS approved rehabilitation facility within the Northeast Region for:
 - a. release back to the wild;
 - b. temporary placement in a scientific research facility holding a current NMFS scientific research permit and a United States Department of Agriculture Animal and Plant Health Inspection Service (APHIS) Research License; or
 - c. permanent disposition at an authorized facility (i.e. holds an APHIS exhibitors license {7 U.S.C. 2131 *et seq.*}) after consultation with, and authorization by, the NMFS Office of Protected Resources Permits, Conservation and Education Division.
2. Conduct scientific research on stranded animals in a rehabilitation facility, only if the responsible individual has a NMFS scientific research permit and the facility holds an APHIS research license in accordance with the Animal Welfare Act (see 50 CFR 216.27 (c)(6)).
3. Return rehabilitated stranded marine mammals to their natural habitat. A decision regarding whether or not a marine mammal has the potential to be released must be made as early as possible during the rehabilitation period. Any marine mammal eligible for release must be released as early as possible and no later than six months after being taken for rehabilitation unless the attending veterinarian determines that: the marine mammal might adversely affect marine mammals in the wild; release is unlikely to be successful due to the physical condition and behavior of the marine mammal; or more time is needed to make a determination. Release plans must be submitted to the NMFS Regional Administrator at least 15 days prior to the release, unless advanced notice is waived by the NMFS Regional Administrator. The NMFS Regional Administrator may require the participant to provide additional information, modify the release plan, or dispose of the marine mammal in another manner (see 50 CFR 216.27(a) and the *NMFS/FWS Best*

Practices for Marine Mammal Stranding Response, Rehabilitation, and Release – Standards for Release.)

4. Tag rehabilitated stranded marine mammals, strictly for purposes of monitoring success of release to the wild using a NMFS approved tag, such as one-bolt roto-tag, cattle ear tags, or freeze branding. Application of other tagging methods must first be approved by the NMFS Regional Stranding Coordinator. Tagging and post-tagging activities are restricted to monitoring the success of marine mammals released to the wild. Any projects outside the scope of monitoring the success of a release must be authorized under a NMFS MMPA/ESA scientific research permit.
5. Perform humane euthanasia. Euthanasia shall only be performed by the attending veterinarian or by a person acting under the direction of the attending veterinarian and following approved guidelines such as those referenced in Attachment C (*2007 Report of the American Veterinary Medical Association Panel on Euthanasia, 2nd Edition of the CRC Handbook of Marine Mammal Medicine, 2006 Journal of the American Association for Zoo Veterinarians*). When using controlled drugs, such person(s) shall comply with all applicable state and Federal laws and regulations (i.e., registered with the Drug Enforcement Administration). Authorization for the euthanasia of ESA-listed species provided under MMPA/ESA Permit No. 932-1489-09, as amended, and requires prior approval and direction from the NMFS Regional Stranding Coordinator.

B. Terms and Conditions for Live Animal Response: Rehabilitation, Release, or Final Disposition Determination

1. Rehabilitation

- a. The Participant shall comply with laws, regulations, policies, and/or guidelines applicable to or promulgated by NMFS that apply to activities under this Agreement. The Participant must also have all applicable Federal, state, and local permits for rehabilitation facilities, and must comply with all Federal, state, and municipal laws related to operations of the facility.
- b. The Participant shall be responsible for the custody of any living marine mammal taken pursuant to this Article using standards for humane care and for practicing accepted medical evaluation and treatment as described in the *NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release – Standard for Rehabilitation Facilities* (Attachment D).
- c. The Participant shall not exceed their maximum holding capacity for cetaceans and pinnipeds based on the minimum standard space requirements, the number of animals housed in each holding area, and the availability of qualified personnel as described in the *NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release – Standard*

for Rehabilitation Facilities (Attachment D) unless a written waiver is first received from the NMFS Regional Administrator. The NMFS Regional Stranding Coordinator may offer assistance for relocating animals to another rehabilitation facility and in supporting decisions to euthanize when necessary. Other considerations for determining maximum holding capacity include:

- (1) On-site veterinary care, volunteer support, and experienced staff;
 - (2) Adequate food and medical supplies and medical test capabilities;
 - (3) Isolation for marine mammals;
 - (4) Adequate water quality;
 - (5) Limited public access; and
 - (6) Ability to maintain current, accurate and thorough records.
- d. The Participant shall follow contingency plans approved by NMFS for the care of marine mammals in rehabilitation during planned events (e.g., construction) or unexpected events such as mass strandings, UMEs, natural disasters (e.g., hurricanes, harmful algal blooms, El Niño), and/or hazardous waste spills.
- e. The Participant shall isolate rehabilitating marine mammals from other wild or domestic animals and from any animal in permanent captivity.
- f. The Participant shall prohibit the public display and training for performance of stranded rehabilitating marine mammals as required by 50 CFR 216.27(c)(5). This includes any aspect of a program involving interaction with the public.
- g. The Participant shall follow any additional requirements for rehabilitation (e.g. isolation) and release prescribed by NMFS in consultation with the Working Group for Marine Mammal Unusual Mortality Events during a marine mammal UME, as recommended in the *National Contingency Plan for Response to Unusual Marine Mammal Mortality Events*; D.W. Wilkinson, NOAA Technical Memorandum NMFS-OPR-9, September 1996.
- h. The Participant must temporarily refuse admittance of new cases of stranded marine mammals due to the severity of a disease outbreak when instructed by the NMFS Regional Stranding Coordinator, in consultation with the UME Working Group or other experts, if diseases of concern have been reported (e.g. diseases associated with a UME, or any emerging or zoonotic diseases).
- i. The Participant shall not transfer a marine mammal being rehabilitated

under this Agreement to another facility without prior approval from the NMFS Regional Stranding Coordinator.

- j. If a marine mammal dies while in rehabilitation, Article III applies.

2. Release

- a. Release Recommendation. The Participant shall make a final written recommendation for each animal in rehabilitation as early as possible, and no more than six months after its date of rescue, for release or non-release determination to the NMFS Regional Administrator according to any applicable NMFS release guidelines and regulations including 50 CFR 216.27 (release, non-releasable, and disposition under special exception permits for rehabilitated marine mammals). This final recommendation shall include a release recommendation signed by the Participant's attending veterinarian, attesting that the marine mammal is medically and behaviorally suitable for release in accordance with the NMFS Standards for Release, and a concurrence signature from the Participant's Authorized Representative or Signatory of the Stranding Agreement (see Attachment D, *NMFS /FWS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release – Standards for Release*).
- b. Release Plan. If the Participant recommends release, a release plan must also be included with the final recommendation letter. This information must be submitted to and approved by the NMFS Regional Administrator at least 15 days prior to the release, unless advanced notice is waived by the NMFS Regional Administrator, as required by 50 CFR 216.27(a).

3. Data Collection and Reporting

- a. Diseases of Concern Reporting. The Participant shall notify immediately the NMFS Regional Stranding Coordinator upon learning of any diseases of concern (e.g., emerging, reportable, and/or zoonotic diseases) that are detected and/or confirmed that could be a potential hazard for public health or animal health (NMFS will provide guidance on Reportable Diseases);
- b. Disposition Reports. Upon release or other disposition of any marine mammal under this Article, the Participant shall complete the NOAA Form 89878, OMB # 0648-0178 (the Marine Mammal Rehabilitation Disposition Report Form). Completed forms shall be sent to the NMFS Regional Stranding Coordinator via the NMFS National Marine Mammal Stranding Database or in writing (see Attachment B), no later than 30 days after final disposition of the marine mammal. If requested by the NMFS Regional Stranding Coordinator and if feasible, the Participant shall provide preliminary data (verbal or written) from the Marine Mammal Rehabilitation Disposition Report within 24 hours.

- c. Annual Summary Reports. The Participant shall submit an annual report (due January 31 each year) summarizing the Participant's rehabilitation activities for the past calendar year. NMFS will not reproduce, modify, distribute, or publish the data without consent of the Participant unless required to release the data under Federal law or order (such as the Freedom of Information Act). The reports shall include the following for each animal in rehabilitation:
- i. Species and field number
 - ii. If the animal was released:
 - a. Date, location of release (latitude and longitude).
 - b. Type and specifics of post-release monitoring (roto-tag, satellite, etc.) and any roto-tag or freeze brand numbers used.
 - c. Photos if possible.
 - d. Duration of post-release monitoring.
 - e. Status of post-release monitoring.
 - f. Indications from monitoring relative to the success of the rehabilitation effort.
 - g. Disposition of tracking data if applicable.
 - iii. If the animal was transferred to permanent care:
 - a. Date of physical transport (if applicable).
 - b. Location of permanent care.
 - iv. If the animal was euthanized, provide the date of euthanasia.
 - v. If the animal died, provide the date of death.

Article VI: Good Standing Agreement

Northeast Region Marine Mammal Stranding Network Good Standing Agreement

To be considered in “good standing” the Northeast Marine Mammal Stranding Network Member (Network Member) must meet all of the following criteria:

General Criteria

- (1) If the Network Member is a designated Principal Investigator of an MMPA or Endangered Species Act (ESA) scientific research or enhancement permit holder, the applicant must have fulfilled all permit requirements, including but not limited to submission of all reports, and must have no pending or outstanding enforcement actions under the MMPA or ESA.
- (2) The Network Member must comply with the terms and responsibilities of its Stranding Agreement (SA), MMPA Section 109(h) authorization, or researcher authorization letter. This includes, but is not limited to, the following response and reporting requirements:
 - a. Timely (within 24 hours) response to all stranding reports in Network Member’s area of responsibility in accordance with SA;
 - b. Respond to stranding in an effective manner that protects both the health and safety of the responders and the stranded animals;
 - c. Timely (immediate) notification to NMFS regarding any unusual stranding circumstances (UME, out of habitat, large cetacean stranding, etc) according to the timelines as specified in the SA;
 - d. Adhere to the *Policies and Best Practices for Marine Mammal Stranding Response, Rehabilitation and Release*;
 - e. Reporting of stranding events to NMFS as specified in SA;
 - f. Submission of complete reports on basic or Level A data to the Regional Coordinator (includes investigator’s name, species, stranding location, number of animals, date and time of stranding and recovery, length and condition, and sex; marine mammal parts retention or transfer; annual reports) as specified in SA;
 - g. Collecting information or samples as necessary and as requested; and
 - h. Prompt notification to NMFS for any article of SA (or points above) with which the Network member cannot comply.
- (3) The Network Member must cooperate with NMFS in collecting and submitting Level B (supplementary information regarding sample collection related to life history and to the stranding event) and Level C (necropsy results) data and samples, when requested and within the requested timeframe.
- (4) The Network Member must have no current enforcement investigation for the ‘take’ of marine mammals in violation of the Marine Mammal Protection Act and Endangered Species Act.

- (5) The Network Member must have no record of a pending NMFS notice of violation(s) regarding the policies governing the goals and operations of the Stranding Network and Stranding Agreement, if applicable (e.g., probation, suspension, or termination).

Coordination and Cooperation Criteria

The following coordination/cooperation requirements must be satisfied:

- (1) Cooperation with state, local, and Federal officials;
- (2) Cooperation with state and local officials in the disposition of stranded marine mammals; and
- (3) Cooperation with other stranding network participants.

If the Network Member feels they are in danger of not being in “good standing”, please refer to *Communication Agreement*.

If NMFS determines a Network Member is in danger of not being in “good standing”:

1. The Network Member will receive a written warning from the Regional Administrator
2. The Network Member must reply to this warning within 30 days
3. The reply must include remediation efforts with a proposed timeline
4. Efforts and timeline must be agreed to by the Regional Administrator

If the Network Member fails to meet the timeline, and no further remediation letter is received from the Network Member, the Network Member will no longer be considered in “good standing”.

AGREEMENT

I have read and understand the conditions above for participating as a member of the Northeast Region Stranding Network. I agree to abide by all applicable provisions of the Good Standing Criteria established by National Marine Fisheries Service Northeast Region. By signing this agreement I understand and acknowledge the consequences of not complying with The Good Standing Criteria will lead to ineligibility for Prescott Grant funding and suspension or termination of the Stranding Network Member’s SA.

Article VII: Communications Agreement

Northeast Region Marine Mammal Stranding Program Communication Agreement

If the Northeast Marine Mammal Stranding Network Member (Network Member) foresees a problem or potential for non-compliance with their Stranding Agreement (SA), the Network Member will notify NOAA's National Marine Fisheries Service (NMFS) regional stranding staff immediately, no matter how small the problem. Should a Network Member foresee a problem or potential for non-compliance with their SA, the Network Member must:

1. Contact Marine Mammal Stranding Coordinator, or if not available;
 2. Contact Assistant Stranding Coordinator, or if not available;
 3. Contact Marine Mammal Stranding Data Assistant Coordinator.
- * If an emergency situation; call the Stranding HOTLINE: 866-755-6622**

If NMFS foresees a problem or potential for non-compliance with a Network Members SA, NMFS will provide a written warning to the Network Member (see Good Standing Criteria) and will work with the Network Member to identify the deficiency as:

1. Minor
2. Intermediate
3. Major

Minor Deficiency : a deficiency that will likely require little or no time to correct. Minor deficiencies have little impact on the operational capability of the Network Member and do not directly affect the rescue or care of live animals or the collection of data from live and dead animals.

Intermediate Deficiency : a deficiency that may require a short period of time to correct (less than 6 months) and require a small amount of resources (expense) to address. Intermediate deficiencies may cause the Network Member to become non-compliant with the NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release and may impact the operational capability of the Network Member. These deficiencies may also affect the rescue and care of live animals and data collection capabilities from live and dead stranded animals.

Major Deficiency : a deficiency that will require a prolonged period of time to correct (greater than 6 months) and require significant resources (expense) to address. Major deficiencies will cause the Network Member to become non-compliant with Federal, state and local laws and regulations as well as the NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release and will impact the operational capability of the Network Member. These deficiencies will likely be controversial and affect the

rescue and care of live animals and data collection capabilities from live and dead stranded animals.

The roles and responsibilities for each level of deficiency is as follows:

Minor Deficiency

Network Member responsibilities

1. Notify NMFS Regional Stranding Staff immediately
2. Submit remediation efforts within timeframe specified by NMFS
3. Work with NMFS on correcting the problem
4. Keep NMFS informed of progress on meeting deadline (if applicable)
5. Notify NMFS immediately if problem progresses or new issues develop
6. Submit report verifying steps taken to correct deficiency and future steps to prevent deficiency from reoccurring

NMFS responsibilities

1. NMFS staff will provide consultation to help correct problem if applicable
2. NMFS staff will develop timeline for corrective measures and consider an extension if requested

Intermediate Deficiency

Network Member responsibilities

1. Notify NMFS Regional Stranding Staff immediately
2. Develop an Action Plan to correct the problem, in consultation with NMFS
3. Keep NMFS informed of progress on meeting deadlines (if applicable)
4. Notify NMFS immediately if problem progresses or new issues develop
5. Seek guidance from NMFS staff or external experts
6. Submit report verifying steps taken to correct deficiency and future steps to prevent deficiency from reoccurring

NMFS responsibilities

1. NMFS staff will provide consultation to help correct problem if applicable
2. NMFS will develop a timeline for corrective measures and consider an extension if requested
3. NMFS staff will work with Network Member to identify cause of problem and identify solutions
4. Seek guidance from additional NMFS staff or external experts

Major Deficiency

Network Member responsibilities

1. Notify NMFS Regional Stranding Staff immediately
2. Develop an Action Plan to correct the problem, in consultation with NMFS
3. Keep NMFS informed of progress on meeting deadlines (if applicable)
4. Notify NMFS immediately if problem progresses or new issues develop
5. Seek guidance from NMFS staff or external experts
6. Convene other staff members to meet with NMFS to address problems: such as board members, attending veterinarians and veterinary technicians, upon request.
7. Provide requested data and files to NMFS as requested.
8. Submit report verifying steps taken to correct deficiency and future steps to prevent deficiency from reoccurring

NMFS responsibilities

1. NMFS staff will provide consultation to help correct problem if applicable
2. NMFS will develop a timeline for corrective measures and consider an extension if requested
3. NMFS staff will work with Network Member to identify cause of problem and identify solutions
4. Outside consultation from experts in the field may be sought to help address solutions to deficiencies
5. If applicable, NMFS staff will seek consultation of NOAA Office of Law Enforcement and General Council

If deadlines are disregarded without correction of deficiency, the Network member will be subject to disciplinary action: probation, suspension and/or termination (as outlined in the SA). NMFS will make every effort to notify the Network Member in writing of failure to comply with agreed upon remedies for deficiency. In cases of willfulness, or those in which public health, interest, or safety requires immediate attention, NMFS, Northeast Regional Administrator reserves the right to immediately suspend or terminate the Network Member's stranding agreement (as outlined in the SA).

AGREEMENT

I have read and understand the conditions above for participating as a member of the Northeast Region Stranding Network. I agree to abide by all applicable provisions of the Communication Agreement established by National Marine Fisheries Service Northeast Region.

Article VIII: Participant's Authorized Personnel

A. Personnel and Volunteers

Takings of marine mammals authorized in this Agreement may only be directed by the Participant's personnel and trained volunteers identified by the Participant in writing to the NMFS Regional Administrator. The Participant may use other (i.e., not previously identified to NMFS) volunteers to carry out activities in this Agreement only if they are under the close direction of previously identified trained personnel or volunteers. The Participant may not delegate authority to take marine mammals to another person except as provided in this article.

In the event of changes in key personnel, the prospective Participant shall notify the NMFS Regional Administrator in writing (see Attachment B) within 30 days and provide a description of the experience of new key personnel for review and approval by NMFS. New key personnel must meet the qualification terms identified in the *NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release - Evaluation Criteria for a Marine Mammal Stranding Agreement* (Attachment D).

B. Untrained Citizens

If the Participant requests the assistance of untrained citizens (e.g., during a mass stranding), the Participant is responsible for the actions of those citizens during the response; must take precautions against injury or disease to those volunteer citizens; and must ensure that the citizens' actions do not cause unnecessary harassment of marine mammals.

Article IX: Rights of States and Local Governments

Rights of States and Local Governments

Nothing in this Agreement shall be construed to affect the rights or responsibilities of other Federal, state, or local government officials or employees acting in the course of their official duties with respect to taking of marine mammals in a humane manner (including euthanasia) for protection or welfare of the marine mammal, protection of public health and welfare or non-lethal removal of nuisance animals (MMPA section 109(h)).

Article X: Effective Dates, Renewal and Application Procedures

A. Effective Date

The terms of this Agreement shall become effective upon the signature by both VAQS and the NMFS Northeast Regional Administrator.

B. Period of Agreement

1. **Duration:** Unless terminated as provided in this Agreement, this Agreement shall expire at the end of the following applicable period:
 - 1 year for new Stranding Network Participants
 - 1 year for a Stranding Network Participant on probation
 - 3 years for a live animal responder and rehabilitator (Articles IV and V)
 - 6 years for a dead animal only responder (Article III only)
2. **Stranding Agreement Renewals:** No later than 90 days prior to the expiration date of this Agreement, NMFS will provide the Participant with a written notice of expiration, and prescribe information needed from the Participant for renewal (see *NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release - Evaluation Criteria for a Marine Mammal Stranding Agreement*, Attachment D). No later than 60 days prior to the expiration date, the Participant shall indicate in writing to NMFS (see Contacts, Attachment B.) that a renewal of this Agreement is requested and shall provide the prescribed information. Following NMFS review of the submitted information to determine if Participant meets applicable requirements, the Agreement may be renewed if agreed to in writing by both parties.

If no written renewal request is received from the Participant, this Agreement becomes null and void upon the above expiration date.

3. **Denial of Stranding Agreement Renewal:** The decision to renew or deny a Stranding Agreement is solely at the discretion of the NMFS Regional Administrator and is not compelled by the Participant's adherence to the Stranding Agreement criteria. If the NMFS Regional Administrator denies a renewal request, the denial will be issued in writing by certified mail from the NMFS Regional Administrator to the Participant within 30 days of the Participant's submission of a completed application, and will be based upon the Regional Administrator's judgment of:
 - a. Past performance of the Participant;
 - b. Existing capabilities of the Participant; and
 - c. Geographic and programmatic needs of NMFS' stranding program.

A Stranding Agreement for which renewal is denied by the NMFS Regional Administrator becomes null and void upon the expiration date listed above.

Article XI: Review, Modification and Termination

A. Review

The NMFS Northeast Region ARA for Protected Resources shall review this Agreement from time to time for performance adequacy and effectiveness.

B. Modification

The Participant or the Northeast Regional Administrator may request a modification to the Stranding Agreement, including, but not limited to, procedural or administrative changes, such as a change in contact information, and a request for expansion or reduction of activities authorized by this Agreement. A request for authority for additional activities may require submission of information identified in Attachment D, *NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release - Evaluation Criteria for a Marine Mammal Stranding Agreement*. Modifications and reductions in authority, as well as notice of issuance or denial of a request for increased authorizations, will be given in writing within 30 days of receipt of a completed request. The Participant and the NMFS Regional Administrator may determine that a new Stranding Agreement is warranted.

C. Suspension or Termination request by Participant

The Participant may request suspension of all or part of this Stranding Agreement for a stated period of time, or may terminate this Agreement, upon 30 days written notice to the NMFS Regional Administrator. Suspension of the authorization of activities at the request of the Participant may be given without prejudice to the reinstatement of authorization or renewal of a Stranding Agreement.

D. Non-Compliance with Stranding Agreement or Violations of Law by Participant

Except in cases of willfulness, or those in which public health, interest, or safety requires immediate suspension, or termination of this Agreement, NMFS shall provide the Participant with notice and an opportunity to correct any deficiencies within a time period specified by NMFS, in writing, if the Participant fails to satisfy the terms and condition of this Agreement or violates any laws, regulations, or guidelines applicable to this Agreement, or Federal, state or municipal laws related to stranding network operations. The NMFS Region may take the following actions based on the circumstances:

1. **Probation.** The Participant may be put on probation for up to three years if deficiencies are not corrected. The NMFS Regional Stranding Coordinator and the Participant will develop a timetable with reasonable and measurable milestones that must be achieved to correct deficiencies during the probation period. Probation requires annual reviews of the Participant's activities for up to three years.

A participant on probation may not be in “good standing” with the Stranding Network.

2. **Suspension.** The NMFS Regional Administrator may suspend the Participant’s authority, or any portion of their authority, as appropriate (e.g., suspend rehabilitation authority, but not live or dead animal response), with 30 days written notice, for up to 1 year or until NMFS is satisfied that all deficiencies and violations have been adequately addressed. A notice of suspension listing deficiencies and a timetable with reasonable and measurable milestones required to correct those deficiencies will be issued in writing, delivered in person or by certified mail, from the NMFS Regional Administrator if, in the judgment of the Regional Administrator, the Participant has:
 - a. Submitted false information or statements in applications or reports;
 - b. Not satisfied the terms and conditions of the Stranding Agreement;
 - c. Failed to correct deficiencies in a timely manner; or
 - d. Violated applicable Federal, state, or municipal laws, regulations, guidelines, or other requirements.

A participant on suspension is not in “good standing” with the Stranding Network.

3. **Immediate suspension.** The NMFS Regional Administrator may require immediate suspension of authorization under a Stranding Agreement, or any part of the Agreement, without prior notice if, in the judgment of the Regional Administrator, suspension is needed to protect marine resources, in cases of willfulness, or as otherwise required to protect public health, welfare, interest, or safety, (which includes interest in the welfare of marine mammals). During the suspension period, the NMFS Regional Stranding Coordinator may ask other Stranding Network participants to respond in the Participant’s area of geographic coverage. If the Participant’s Stranding Agreement is suspended while animals are in rehabilitation, NMFS reserves the right to either confiscate the animals or to arrange for another participant to take over rehabilitation or take custody of the animals. A written notice of immediate suspension will be issued in person or by certified mail.

A participant on immediate suspension is not in “good standing” with the Stranding Network.

4. **Termination.** The NMFS Regional Administrator may terminate this Agreement, or any part thereof, upon at least 30 days written notice to the Participant, delivered in person or by certified mail. The Agreement may be terminated for any reason, including the Participant’s:
 - a. Submission of false information or statements in applications or reports;

- b. Failure to satisfy the terms and conditions of the Stranding Agreement;
- c. Failure to correct deficiencies in a timely manner; or
- d. Violation of applicable Federal, state, or municipal laws, regulations, guidelines, or other requirements.

The NMFS Regional Stranding Coordinator may ask another Stranding Network participant to respond in the Participant's area of geographic coverage. If the Participant's Stranding Agreement is terminated while animals are in rehabilitation, NMFS reserves the right to either confiscate the animals or to arrange for another participant to take over rehabilitation of or to take custody of the animals.

Termination of the Agreement for any reason shall automatically terminate any designations by the Participant to any designee organizations under this Agreement.

Acceptance of Agreement

Pursuant to the terms and conditions described above in this Stranding Agreement between the Northeast Region and Virginia Aquarium & Marine Science Center the Participant is authorized:

- Under Article III to response to strandings of dead marine mammals (Order Cetacea and Order Pinnipedia);
- Under Article IV to provide first response to live stranded marine mammals;
- Under Article V to rehabilitate and release live stranded marine mammals (Order Pinnipedia).

THIS STRANDING AGREEMENT IS ENTERED INTO AND MADE EFFECTIVE THIS

Date 12/20/12

Date 01-14-13

APPROVED:

NMFS Northeast Region
55 Great Republic Drive
Gloucester, MA 01930

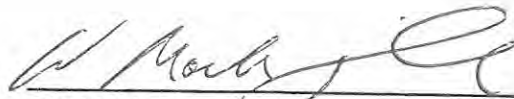
Virginia Aquarium & Marine
Science Center
Stranding Response Program
717 General Booth Blvd
Virginia Beach, VA 23451

Signature of Regional Administrator

Signature of Authorized Representative



John K. Bullard
NMFS Regional Administrator



W. Mark Swingle
Director of Research and Conservation

THIS STRANDING AGREEMENT REMAINS IN EFFECT UNTIL:

Expiration Date: January 1, 2016

Attachment List

Attachment A. List of Terms and Definitions under 50 CFR 216.3, Glossary of Terms, etc.

Attachment B. Regional contact information, 24 hour numbers, etc.

Attachment C: Euthanasia guidance

Attachment D: NOAA National Marine Fisheries Service *Best Practices* for Marine Mammal Stranding Response, Rehabilitation, and Release Documents:

- Evaluation Criteria for a Marine Mammal Stranding Agreement (New Applicants and Renewals of Existing Participants)
- Standards for Release
- Standards for Rehabilitation Facilities
- Level A Forms (Marine Mammal Stranding Report and Marine Mammal Rehabilitation Disposition Report)

Attachment E: NMFS Northeast Region Disposition of Live Stranded Cetaceans Guidance.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 Westgate Center Drive
Hadley, MA 01035-9589



In Reply Refer To:
FWS/Region 5/ES-TE

DEC 06 2013

Mr. John K. Bullard
Regional Administrator
National Marine Fisheries Service
1 Blackburn Drive
Gloucester, Massachusetts 01930

Dear Mr. Bullard:

This is in response to your application dated May 31, 2013, requesting renewal of your existing valid U.S. Fish and Wildlife Service (Service) endangered species recovery subpermit, which was issued on May 22, 2008 (enclosed). The subpermit was issued to the Northeast Region Sea Turtle Stranding and Salvage Network (STSSN) under the Service's Regional Endangered Species Recovery Permit #TE-697823 (Permit #TE-697823). The subpermit authorizes the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), in its role as administrative coordinator for the Northeast Region STSSN, to continue scientific research activities and recovery activities to enhance the propagation and survival of endangered and threatened sea turtles as provided for in section 10(a)(1)(a) of the Endangered Species Act of 1973, as amended.

Your request is hereby approved, and your subpermit is renewed.

I. Covered Species

Green sea turtle (*Chelonia mydas*)
Kemp's ridley sea turtle (*Lepidochelys kempi*)
Hawksbill sea turtle (*Eretmochelys imbricate*)
Leatherback sea turtle (*Dermochelys coriacea*)
Loggerhead sea turtle (*Caretta caretta*)

II. Conditions

All of the terms and conditions remain the same except the following:

1. Additional Stranding Response Organization

Pursuant to Permit #TE-697823 and in response to NMFS' request, one additional organization is being added to the list of authorized Response Organizations contained in the May 22, 2008, letter of authorization. We understand that the Marine Mammals of Maine (MMoME) is a

DEC 10 2013

nonprofit marine animal stranding response organization located in Portland, Maine, and is well-situated geographically to provide sea turtle stranding response coverage along the Maine coast from Rockland south to the Maine-New Hampshire border, an area which is currently lacking a dedicated response organization. As a subpermittee to the Northeast Region STSSN, the MMoME is authorized to aid and/or possess any live stranded or injured sea turtles, to salvage any dead specimens or parts, and to conduct the other authorized activities contained in the May 22, 2008, letter of authorization, provided all necessary State permits are obtained.

2. Service Contacts

For the purpose of general compliance with the terms and conditions of this subpermit, the current Service contacts, mailing addresses, and telephone numbers are:

Chief, Division of Endangered Species
Attention: Permits Coordinator
Ecological Services
U.S. Fish and Wildlife Services
300 Westgate Center Drive
Hadley, Massachusetts 01035

Field Supervisor
New England Field Office
U. S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301

The Chief, Division of Endangered Species, is Martin Miller. His contact information is: telephone 413-253-8615, electronic mail martin_miller@fws.gov

The New England Field Office Supervisor is Tom Chapman. His contact information is: telephone 603-223-2541, electronic mail tom_chapman@fws.gov

The Endangered Species Recovery Permit Coordinator is Deb Carter. Her contact information is: telephone 703-358-2402, electronic mail deb_carter@fws.gov

3. Reporting Requirements

In the event that it becomes necessary to euthanize a sea turtle, the subpermittee must contact Ms. Carter, the Service's Recovery Permits Coordinator prior to the procedure. If Ms. Carter cannot be reached, the subpermittee should provide Federal notification by leaving a message, including contact information, at the phone number or electronic mail address for Ms. Carter, provided above.

4. Reservation of Authority

The Service reserves its authority to amend the conditions of the subpermit, including the expiration date.

5. Expiration

In accordance with 50 Code of Federal Regulations 13.22(a), the expiration date of this subpermit is indefinite pending renewal of the Service's Regional Endangered Species Recovery Permit #TE-697823. After Permit #TE-697823 is renewed, we will provide a copy of it and an expiration date for this subpermit.

If you have any questions, please contact Tom Chapman, Supervisor, New England Field Office, at 603-223-2541, or Deb Carter, Regional Endangered Species Recovery Permits Coordinator, at 703-358-2402.

Sincerely,



Martin Miller
Chief, Division of Endangered Species
Ecological Services

Enclosures

cc: Kate Sampson, NOAA-National Marine Fisheries Service
Tom Chapman, Supervisor, New England Field Office
Genevieve Larouche, Supervisor, Chesapeake Bay Field Office
Eric Schradling, Supervisor, New Jersey Field Office
Cindy Schulz, Supervisor, Virginia Field Office
David Stilwell, Supervisor, New York Field Office
Laury Zicari, Supervisor, Chesapeake Bay Field Office



DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

3-201
(1/97)

FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

FISH & WILDLIFE SERVICE, REGION 5
300 WESTGATE CENTER DRIVE
HADLEY, MA 01035-9589
U.S.A.

2. AUTHORITY-STATUTES

16 USC 1539(a)
16 USC 1533(d)

REGULATIONS (Attached)

50 CFR 17.22
50 CFR 17.32
50 CFR 17.62 & 17.72
50 CFR 13

3. NUMBER

TE697823-4 AMENDMENT

4. RENEWABLE

YES
 NO

5. MAY COPY

YES
 NO

6. EFFECTIVE

06/13/2008

7. EXPIRES

06/13/2013

8. NAME AND TITLE OF PRINCIPAL OFFICER (if #1 is a business)

REGIONAL DIRECTOR, ES
ASSISTANT

9. TYPE OF PERMIT

THREATENED AND ENDANGERED SPECIES

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

Region 5 - Including the States of: Maine, New Hampshire, Vermont, New York, Massachusetts, Connecticut, Rhode Island, New Jersey, Delaware, Pennsylvania, Maryland, Virginia, West Virginia, and the District of Columbia.

11. CONDITIONS AND AUTHORIZATIONS:

- A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.
- B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.
- C. VALID FOR USE BY PERMITTEE NAMED ABOVE.
- D. Further conditions of authorization are contained in the attached Special Terms and Conditions.

ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS

ANNUAL REPORT DUE: 01/31

ISSUED BY

TITLE
REGIONAL DIRECTOR

Acting

DATE
06/13/2008

- E. Acceptance of this permit serves as evidence that the permittee understands and agrees to abide by the 'Special Conditions for Native Endangered and Threatened Species' (copy attached).
- F. Authorized to take listed species identified on the attached sheets for scientific purposes or the enhancement of propagation or survival for approved recovery activities and as conditioned below.
- G. Prior to conducting any activities not excluded under the Service's NEPA categorical exclusions (516 DM 6, Appendix I the permittee must ensure that all NEPA requirements have been satisfied).
- H. Permittee must monitor each action taken under this permit to assure that the limits specified in each subpermit are not exceeded, that research efforts and handling of individual species is not duplicated by overlapping research.
- I. This permit is conditioned upon all applicable policy and guidance.
- J. Subpermittee's may be designated in writing.
- K. Subpermittee's must be required to hold and transport living specimens captured in the wild according to the provisions and procedures outlined in professionally established protocols for the handling and transport of the affected species.
- L. Procedures must be instituted to ensure that disease transmission does not occur during tissue sampling or other invasive procedures and that such activities are only performed by persons skilled in the techniques of handling the affected species.
- M. The permittee must ensure that all appropriate section 7 consultation requirements have been completed prior to initiating any otherwise permitted activities and that no action taken under this permit will violate subsection 7(a)(2) of the Endangered Species Act.



Virginia Department of Game and Inland Fisheries

4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-1000 (V/TDD)

Under Authority of § 29.1-412, § 29.1-417, & § 29.1-568 of the Code of Virginia & DGIF Policy E-1-90



Threatened/Endangered Species Permit

Permit Type: **Renewal**

Fee Paid: **\$20.00**

VADGIF Permit No. **052977**

Permittee: **Ms. Rachel Metz**
Address: **717 General Booth Blvd.**
Virginia Beach, VA 23451

Office: **(757) 385-7777**
City/County: **Virginia Beach**

Business: **Virginia Aquarium & Marine Science Center**

Sea Turtle Rescue, Collection, Possession, Exhibit, and Research

Authorized Collection Methods: Species are collected as a result of the stranding network activities or received from other public aquaria and research institutions. Canebrake Rattlesnake/Barking Tree Frogs/Wood Turtles must be obtained from other public aquaria/museums/research institutions. By Hand/Dip Nets/Gill Nets/Trawl Nets/Tangle Net/Pound Net/Dredge Mitigation Trawl/Hand Nets (Butterfly/Reptile)

Authorized Waterbodies: All within authorized cities/counties

Authorized Marking Techniques: marking of stranding turtles as needed for identification

Additional authorizations under this permit:

Authorized Project/Research: Satellite tracking of young Loggerhead Sea Turtles released into ocean waters off of Virginia-North Carolina to characterize the behavior, movement patterns and survivorship of captive-reared yearling sea turtles.

ngle Net/Pound Net/Dredge Mitigation Trawl

Permittee MUST notify VDGIF a minimum of 4 days prior to any sampling activity (per the standard conditions which accompany this permit). Notification must be made via email to: collectionpermits@dgif.virginia.gov

Report Due: 31 January 2016

ALL PERMIT REPORTS MUST CONTAIN COORDINATES; PERMITTEE CAN USE THE VIRGINIA FISH AND WILDLIFE INFORMATION SERVICE (VAFWIS) TO OBTAIN COORDINATES BY VISITING: [HTTP://VAFWIS.ORG/FWIS](http://VAFWIS.ORG/FWIS)

STANDARD CONDITIONS ATTACHED APPLY TO THIS PERMIT.

Authorized Counties / Cities:

- Accomack
- Arlington
- Caroline
- Charles City
- Chesterfield
- Essex
- Fairfax
- Gloucester
- Hanover
- Henrico
- Isle of Wight
- James City
- King and Queen
- King George
- King William
- Lancaster
- Mathews
- Middlesex
- New Kent
- Northampton
- Northumberland
- Prince George
- Prince William
- Richmond
- Spotsylvania
- Stafford
- Surry
- Westmoreland
- York
- Alexandria
- Chesapeake
- Colonial Heights
- Fredericksburg
- Hampton
- Hopewell
- Newport News
- Norfolk
- Petersburg
- Poquoson



Virginia Department of Game and Inland Fisheries

4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104

(804) 367-1000 (V/TDD)

Under Authority of § 29.1-412, § 29.1-417, & § 29.1-568 of the Code of Virginia & DGIF Policy E-1-90



Threatened/Endangered Species Permit

Permit Type: **Renewal**

Fee Paid: **\$20.00**

VADGIF Permit No. **052977**

**Portsmouth
Richmond City
Suffolk
Virginia Beach**

Authorized Species:

See Attached Sheet for List of Species

Authorized Sub-Permittees:

See Attached Sheet

Approved by:

Applicants may appeal permit decisions within 60 days of issuance. The appeal must be in writing to the Director, Department of Game and Inland Fisheries.

Title: **James E. Husband - Permits Manager**

Date: **12/12/2014**

20

Permit Effective

1/1/2015

through

12/31/2015

15



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Threatened/Endangered Species Permit

Permit Type: **Renewal**

FeePaid: **\$20.00**

VADGIF Permit No.

052977

Authorized Sub-Permittees:

**W. Mark Swingle, Virginia Aquarium & Marine Science Center
717 General Booth Boulevard, Virginia Beach, VA 23451**

William G. Harshaw, Virginia Aquarium & Marine Science Center

Elizabeth A Firchau, Virginia Aquarium & Marine Science Center

Cecilia L Hatton, Virginia Aquarium & Marine Science Center

Jeffrey W Thompson, Virginia Aquarium & Marine Science Center/Stranding Center

Susan G Barco, Virginia Aquarium & Marine Science Center/Stranding Center

Crystal D Matthews, Virginia Aquarium & Marine Science Center/CCB

Dr. Soraya Bartol, Virginia Wesleyan College

Sarah Mallette, Virginia Aquarium & Marine Science Center/Stranding Center

Maureen A Fender, Virginia Aquarium & Marine Science Center/Stranding Center

Gwendolyn Lockhart, Virginia Aquarium & Marine Science Center/Stranding Center

Dr. Ian Bartol, Old Dominion University

Crystal I Equels, Virginia Aquarium & Marine Science Center

Mary A McCarthy, Virginia Aquarium & Marine Science Center

Lori Semple, Virginia Aquarium & Marine Science Center

Margaret L Lynott, Virginia Aquarium & Marine Science Center/Stranding Center

Dr. Katherine L Mansfield, University of Central Florida

Justin G Fuller, Virginia Aquarium & Marine Science Center

Julie Levans, Virginia Aquarium & Marine Science Center

Katie Glanton, Virginia Aquarium & Marine Science Center/Stranding Center

Erin B Bates, Virginia Aquarium & Marine Science Center

Jennifer Richardson, Virginia Aquarium & Marine Science Center

Colin Walker, Virginia Aquarium & Marine Science Center

Stephen Knoop, Virginia Aquarium & Marine Science Center

Sarah Dawson, Virginia Aquarium & Marine Science Center

April Adams, Virginia Aquarium & Marine Science Center

Jon Nichols, Virginia Aquarium & Marine Science Center

Lori Lawson, Virginia Aquarium & Marine Science Center

Rhoderick Alejo, Virginia Aquarium & Marine Science Center

Kristen Phillips, Virginia Aquarium & Marine Science Center/Stranding Center

Sarah Rose, Virginia Aquarium & Marine Science Center/Stranding Center

Michelle Coley, Virginia Aquarium & Marine Science Center

Jordon Salyers, Virginia Aquarium & Marine Science Center/Stranding Center

Michael "Evan" Culbertson, Virginia Aquarium & Marine Science Center/Stranding Center

Krystle Rodrique, Virginia Aquarium & Marine Science Center/Stranding Center

Raegan Reints, Virginia Aquarium & Marine Science Center/Stranding Center

Katherine A Stines, Virginia Aquarium & Marine Science Center

Rebecca Gangler, Virginia Aquarium & Marine Science Center

Sam Poulin, Virginia Aquarium & Marine Science Center



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\$20.00

VADGIF Permit No.

052977

Alex Isbell, Virginia Aquarium & Marine Science Center
Holly Blackwood, Virginia Aquarium & Marine Science Center
Betty Alexander, Virginia Aquarium & Marine Science Center
Nick Allen, Virginia Aquarium & Marine Science Center
Kristine Williams, Virginia Aquarium & Marine Science Center/Stranding Center
Alex Balke, Virginia Aquarium & Marine Science Center/Stranding Center
Anthony Bosnengo, Virginia Aquarium & Marine Science Center/Stranding Center
Nick Sundin, Virginia Aquarium & Marine Science Center
Rebecca Maxey, Virginia Aquarium & Marine Science Center
Jackie Rushley, Virginia Aquarium & Marine Science Center
Sarah Gray, Virginia Aquarium & Marine Science Center



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Description

Scientific Name

Atlantic Sturgeon	1 <i>Acipenser oxyrhynchus</i>
Barking Treefrog	1 <i>Hyla gratiosa</i>
Blackbanded Sunfish	12 <i>Enneacanthus chaetodon</i>
Blackside Dace	6 <i>Phoxinus cumberlandensis</i>
Canebrake Rattlesnake	2 <i>Crotalus horridus</i>
Carolina Darter	6 <i>Etheostoma collis</i>
Duskytail Darter	6 <i>Etheostoma percnurum</i>
Eastern Tiger Salamander	1 <i>Ambystoma tigrinum tigrinum</i>
Fin Whale	6 <i>Balaenoptera physalus</i>
Green Sea Turtle*	1 <i>Chelonia mydas</i>
Greenfin Darter	<i>Etheostoma chlorbranchium</i>
Hawksbill Sea Turtle*	<i>Eretmochelys imbricata</i>
Humpback Whale	<i>Megaptera novaeangliae</i>
Kemp's Ridley Sea Turtle *	1 <i>Lepidochelys kempii</i>
Leatherback Sea Turtle*	<i>Dermochelys coriacea</i>
Loggerhead Sea Turtle *	6 <i>Caretta caretta caretta</i>
Northern Right Whale	<i>Eubalaena glacialis</i>
Sei Whale	<i>Balaenoptera borealis</i>
West Indian Manatee	<i>Trichechus manatus</i>
Western Sand Darter	12 <i>Ammocrypta clara</i>
Wood Turtle	1 <i>Glyptemys insculpta</i>
Yellowfin Madtom	6 <i>Noturus flavipinnis</i>



Virginia Department of Game and Inland Fisheries
4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-6913 FAX (804) 367-2427



Under Authority of § 29.1-412, § 29.1-417, & § 29.1-568 of the Code of Virginia and Policy E-1-90

Threatened/Endangered Species Permit -- Standard Conditions

- **This permit, or a copy, must be carried by the above named individuals during collection activities.**
- **The permittee is required to submit to this Department a report of all specimens collected under this permit by the report due date. Report form may be found at <http://www.dgif.virginia.gov/permits/guide.asp>. FAILURE TO RETURN THIS REPORT WILL RESULT IN NON-ISSUANCE OF FUTURE PERMITS. If no activity occurs under this permit, an email should be sent to collectionpermits@dgif.virginia.gov containing the following statement: No activity occurred under Permit #insert permitID during insert year (i.e. 2006). Permit reports are due by January 31.**
- Permittee **MUST** notify VDGI within the seven (7) day period prior to EACH sampling event. Notification must be made via email to: collectionpermits@dgif.virginia.gov.
- This permit does not support any activities outside of those associated with the application and proposal submitted to and approved by DGIF.
- If incidental death or injury of threatened or endangered species occurs, the permittee is required to notify this Department at collectionpermits@dgif.virginia.gov within twenty-four (24) hours of occurrence.
- If incidental *collection and live release* of threatened or endangered species occurs *for species other than those authorized under this permit*, the permittee is required to notify this Department at collectionpermits@dgif.virginia.gov within four (4) working days. The following information must be reported: collector, date, species, location (county, quad, waterbody, and specific location, either in latitude and longitude to nearest second, or by way of a photocopied 7.5' topographic map), general habitat associations, and number collected.
- No species may be retained unless specifically authorized by this permit.
- All traps must be marked with the name and address of the trapper or an identification number issued by the Department (Code of Virginia §29.1-521.7). Steel foothold traps, Conibear-style body gripping traps, and snares must be marked with a nonferrous metal tag bearing this information (Virginia Administrative Code 4 VAC 15-40-170).
- All traps must be checked at least once a day and all captured animals removed, except completely submerged body-gripping traps which must be checked at least once every 72 hours (Code of Virginia §29.1-521.9).
- The permittee is required to report any incidences of wildlife deaths or diseases observed during the course of collection activities. Reports should be made to: collectionpermits@dgif.virginia.gov within seven (7) days.
- This permit satisfies only the Department's requirement for collection permits and is issued with the understanding that no collections will be made on federal, state, or private property without the prior approval and necessary permits from the landowners involved. The permittee is responsible for obtaining any additional permits required for collection.
- Sampling gear, boats, or trailers which have been used in states harboring zebra mussels must be cleaned and prepared following the guidelines specified in the attached summary prior to use in waters in the Commonwealth.
- For safety reasons, it is recommended that all permittees display at least 100 square inches of solid blaze orange material at shoulder level within body reach and visible from 360 degrees, especially during hunting season.

Appendix H

Nest & Crawl Datasheet

Nest# _____
Crawl# _____

DATA SHEET FOR CRAWLS & NEST RELOCATIONS

I. General Information (weather, time, tide level, wind speed, location, etc.)

Date: _____ Tide height: _____ Estimated air temperature: _____
General weather conditions (ie. % cloud cover, rainfall): _____

Wind speed & direction _____
Location of crawl (~, include markers): _____

Latitude of Crawl: _____ Longitude of Crawl: _____

Notes: _____

II. Parties Involved

Refuge: _____

Navy: _____

III. Data to be collected for Each Set of Tracks

Crawl # (ie. 1,2, 3,...): _____ Time crawl detected: _____ Date: _____

Track measurements: (from where first visible near surf to nest site or end of crawl)

Length of incoming tracks (m): _____ Width of incoming tracks (cm): _____

Length of outgoing tracks (m): _____ Width of outgoing tracks (cm): _____

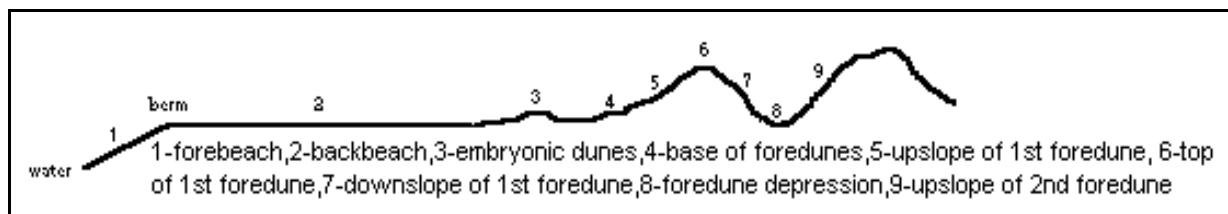
Flipper impressions alternate or opposite: _____ Were tracks prominent?: _____

Distance from center of disturbed nesting area to toe of dunes: _____

Topographical feature at end of tracks (CIRCLE area on diagram): _____

Was a nest found?: _____ False nest?: _____ False crawl only?: _____

Notes: _____

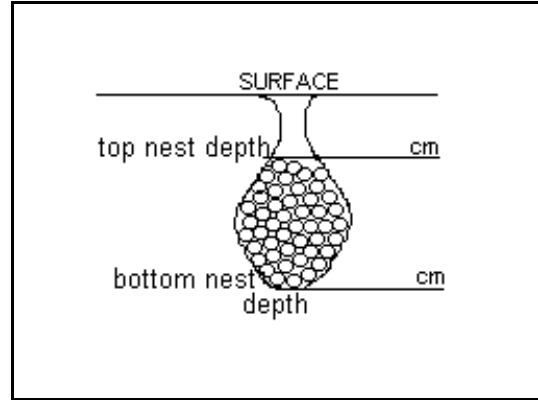


IV. Data to be collected for Each Nest (measurements of nest, egg #, etc.)

Original Nest Data:

NEST CAVITY

Nest # (ie. 1, 2, 3 ...): _____ Crawl# : _____
Time nest excavated: _____ until _____
Width of disturbed nesting area: _____ cm
Length of disturbed nesting area: _____ cm
Nest cavity width at widest pt.: _____
Nest cavity length at longest pt.: _____
Total # eggs: _____
 #damaged eggs: _____
 # broken or predated eggs: _____
Temperature of soil in nest cavity: _____

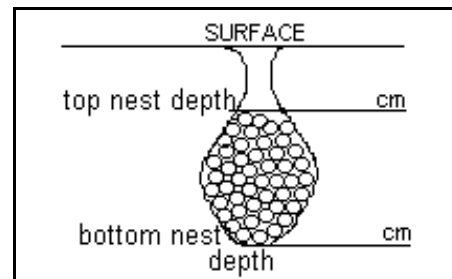


Notes: _____

Relocated Nest Data: _____

NEST CAVITY

Time nest reburied: _____ until _____
Temperature of soil in nest cavity: _____
Air temperature (C): _____
Estimated hatch date: _____



Notes: _____

V. Data to be Collected on Hatchlings/Hatch:

Turtle nest #(ie. 1,2, 3...): _____ Time hatch detected: _____

Hatch Period: _____ Estimated hatch date: _____

Incubation period (days): _____

Total # hatchlings counted: _____ (See table below if hatch is extended.)

Location of Nursery (estimate, include markers): _____

Latitude of Nursery: _____ Longitude of Nursery: _____

Date of relocated nest's excavation: _____

#unhatched eggs: _____ # dead hatchlings: _____

unhatched eggs hatched later at Visitor's Center: _____

Storage location of dead hatchlings (if not disposed of): _____

Notes: _____

Date	Time Hatchlings discovered	# of Hatchlings	AirTemp/ Soil Temp	Weather Conditions	Time of Hatchling Release	# of Hatchlings Released	Status of Hatchlings	Weather Conditions and Type of Tide (incoming or outgoing)
Total # of Hatchlings		<input type="text"/>		Total # of Hatchlings Released		<input type="text"/>		

VI. Additional Comments and Observations (diagram of tracks and nest, opinions, etc.)

Attach photos or slides and brief narrative for each nest/ hatch.

Appendix I

Nest Monitoring SOP

**STANDARD OPERATING PROCEDURES
FOR SEA TURTLES**

(Subsection for Nest Monitoring)

Naval Air Station Oceana, Dam Neck Annex

VIRGINIA BEACH, VIRGINIA

Revised May 2013

Prepared by: Michael F. Wright
Natural Resources Specialist

Date: July 2012

Revised by: Michael F. Wright
Natural Resources Specialist

Date: May 2013

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Acknowledgements

Thanks to the many people who make the sea turtle nesting program at NASO DNA a success no matter how many nests we have. Thanks to the morning patrollers, to the interns, student hires, and bio-techs who respond to strandings, keep up the ATVs, and do a million other things, and to the dedicated corps of nest-sitters who brave insects, sand and sleeplessness to safely escort vulnerable sea turtle hatchlings into the ocean and start them on their adventurous lives.

Introduction

Naval Air Station Oceana (NASO) and United States Fish & Wildlife Service Back Bay National Wildlife Refuge (BBNWR) work cooperatively to manage the sea turtle program at NASO Dam Neck Annex (NASO DNA). The guiding documents associated with this cooperative working partnership are the NASO DNA Integrated Natural Resources Management Plan (INRMP) mandated by the Sikes Act, the BBNWR Biological Opinion as amended on 25 May 2012, and the 2008 NASO & BBNWR nest relocation agreement.

NASO Natural Resources staff and authorized associates perform daily sea turtle patrols to locate nests, crawls, and strandings at NASO DNA and Virginia Army National Guard-Camp Pendleton (VAARNG-CP). For nests located on NASO DNA, NASO and BBNWR biologists collaboratively determine if a nest should be left in place (in situ) or relocated. Then the nest is either surrounded by an in situ predator enclosure or relocated within a buried cylindrical predator enclosure at the BBNWR designated nursery area. Hatchlings can self-release from in situ predator enclosures, and must be aided in releasing from relocation predator enclosures. In either case, nests are monitored when the estimated hatching date approaches.

Nests located on VAARNG-CP property will be collaboratively managed between BBNWR and VAARNG-CP biologists. NASO staff will notify both BBNWR and VAANG-CP biologists if a crawl is located on their property.

All turtle strandings on NASO DNA and VAARNG-CP will be reported to the VA Aquarium Stranding Team (VAST).

Nest Monitoring

After an appropriate length of incubation (40 days for Kemps Ridley and 50 days for Loggerhead and Green sea turtle nests), nests will be monitored via 2 daytime nest checks and overnight “nest sitting.” Day time checks will be made once in the morning and once in the afternoon. Nest sitting will occur from 8PM to 5AM. Day and night checks are looking to initially identify a cone shaped depression in the center of the nest and for evidence of prior/undocumented emergence. The time a depression is first seen is recorded on the Nest Sitting Log, as well as on the original Nest Data Sheet.

The majority of nests hatch out at night. Nest sitters prepare the path to the surf, count the hatchlings and protect the hatchlings from predators such as gulls, raccoons and foxes.

Nest-Sitting Guidelines

- **Tents:** A tent is provided as part of the nest-sitting kit. The tent should only be used in inclement weather and/or when mosquitoes are overly abundant. Please take down the tent and pack it with the other nest sitting supplies when you leave each morning.
- **Flashlights:** No white lights on beach after dark. Use flashlights with red filters/lens/light-bulbs or cover white light flashlights with red acetate, provided.
- **Radios/ MP3 players:** No open/public music. Please use headphones.
- **No cameras during or following hatching that utilize Flashes.** The flash is a big no-no, and if the turtles hatch, you will be really busy. Once any signs of emergence begin, please put cameras away. We can e-mail pictures of emerging turtles to you for a memento, if you like. **No pictures should be taken of any buildings or military training at any time.**
- **UNDER NO CIRCUMSTANCES IS ALCOHOL ALLOWED.**
- **NO** Unauthorized Guests. All nest-sitters **MUST** be signed up to provide this service with the Navy.
- Campfires are **NOT** permitted.
- If you smoke, make sure you pick up all cigarette butts.
- **Do not handle the hatchlings**, unless directed to do so by Michael Wright, Geralyn Mireles, or John Gallegos.
- If there is lightning, please get off the beach **IMMEDIATELY**. Sitting in a vehicle is much safer than sitting on the beach.
- Remember- **SAFETY ALWAYS COMES FIRST!** Be smart and safe out there. If you ever feel uncomfortable while nest-sitting because of weather, presence of unauthorized people, or for whatever reason, do what you need to do to feel safe (i.e., leave the nest site). If you cannot check the nest(s) every half hour at a minimum, please contact Michael Wright. If there is an **EMERGENCY**, especially if you feel like you are in danger, you may contact the Base Emergency Line 757-433-9111.
- These nests are in remote locations and access to restroom facilities is not immediately available. One person should remain at the nest site at all times. Nest sitters may access the dunes **ONLY** to relieve themselves. Be aware while working on NASO DNA even in the dunes, you may be being watched. If you enter the dune you must: bury your deposit; and cover/smooth out your tracks on the way out to discourage unauthorized dune access. There are restroom facilities available at the MWR Sea Mist Camp Ground. Depending on the nest location you may be able to walk to the camp ground via walking or you may need to walk to your/the vehicle and drive to the restroom. An access code to these restrooms will be provided.

Nest-Sitting Procedures

- 1) Drive your personal vehicle or government work vehicle, as appropriate to the NASO DNA Building 127 Natural Resources storage facility (prefabricated “stone” building), located in the North East corner adjacent to the dunes of the Building 127 parking lot, north of the Building 127 beach access, and pick up appropriate supplies. Storage facility key is located in a lockbox attached to the storage facility door. An access code will be provided to authorized individuals.
- 2) Ensure that you have all the required items before you leave to attend to the nest (cell phone, rake, data log, personal items, etc.)
- 3) Read the update in the front of the binder. Reread nest-sitting procedures, if necessary.
- 4) Drive to the closest beach access point (see attached map) to the nesting site and park your vehicle. **Ensure you place the Vehicle Parking Permit on the dashboard of your vehicle before you park and leave you vehicle to go nest sit.**
- 5) Carry all items to the nest-sitting area.
- 6) Nest is marked with reflectors, signs identifying the site as a sea turtle nest, and flagging tape placed in the immediate vicinity of the nest to help prevent nests from being run over by vehicles or inadvertently disturbed. A predator guard, constructed of galvanized fence wire with a rectangular mesh size of approximately 2 inches by 4 inches covers the nest.
- 7) **If you see a depression, or if hatchlings start to emerge**
 - a. Initiate calling the individuals on the phone list. 1st call Michael Wright, then Geralyn Mireles, then John Gallegos, and then Ruth Boettcher. Since this will be after normal business hours utilize cell phone numbers. Ensure that you speak with Michael Wright directly. If you cannot reach her: leave a voice message with date, time, brief message, and phone numbers to call you back on; continue contacting the other individuals; attempt to contact Ms. Wright again; upon second attempt to contact Ms. Wright if you still cannot reach her contact the Conservation Law-enforcement Officer “Mac” McGrogan.
 - b. Note time of first emergence, and time of main emergence (“boil”, if there is one), number, etc. (binder, data sheets, pencils, watch) Err on the side of too many notes, rather than too few
 - c. Rake out tire ruts (rake, board) to make pathway to the ocean from the high tide line. (Recommend, conducting this action each night as the 1st duty of the night once on site.)
 - d. Ascertain that the hatchlings make it into water. If a hatchling turns upside down you may turn it back over. If it gets stuck in a rut for more than a few minutes, you can help it out. If one starts crawling parallel to the ocean for more than a few meters, you can redirect it, if a turtle gets snatched by a ghost crab you may attempt to retrieve it. Outside of these conditions, the hatchlings may not be handled without further approval from Navy or USFWS biologist.

- e. Patrol beach for $\frac{1}{4}$ mile to either side of release area after all have made it into water to make sure none were washed back in
- 8) Be sure to fill out the Sea-Turtle Nest Sitting Log
 - 9) **When you are ready to go home:**
 - a. Drive back to the NASO DNA Natural Resources Storage Facility.
 - b. Place all equipment back in the shed in their designated locations. Ensure you have returned the vehicle parking permit to the nest sitting toolbox for the next user.
 - c. If you have used up anything, make a note of it in the Nest Sitting binder so that a staff member can replace it for the next night.
 - d. Place the key back in the lock box, and ensure that the box is locked.
 - e. Drive safely, and get some well-deserved sleep!!!

Supplies

- **Navy provides:**
 1. Latex gloves of several sizes
 2. Flashlights covered with red acetate (or flashlight with other red lighting filter) and extra batteries
 3. Rake (leave in truck, sharp side down)
 4. Cell phone with numbers programmed into it
 5. List of phone numbers
 6. Binder with data sheets and log book
 7. Pencils, pens
 8. First aid kit
 9. Red acetate and tape
 10. Tent
 11. Vehicle Parking Permit
 12. Handheld Radios
- **Nest-sitter provides:**
 1. Watch
 2. Flashlight/headlamp for personal use
 3. Water & Snacks/Food
 4. Personal Protective Equipment (PPE): insect repellent, raincoat, hacket/warm clothing, etc.
 5. Chair, reading material, etc.
 6. Personal cell phone (optional and highly recommended in the event the Navy provided cell phone malfunctions)

Cell Phone Instructions

1. Push and Hold the End/Power button, located on the right side of the phone. The lettering on the button is red.
2. Select the contacts button, located on the top right side of the phone.
3. Utilize the up and down arrows to scroll through and highlight/shade the list of names in the contact list. Nesting sitting Points of Contacts will be preceded by

“#NS” and then the person’s last name (example: in the contacts list Michael Wright will show up as “#NS Wright”).

4. Select the appropriate highlighted/shaded name utilizing the OK button.
5. If the phone number is not highlighted, utilize the up and down arrows to scroll to and highlight/shade the phone number.
6. Select the send button located on the left side of the phone. The lettering on the button is green.
7. For Reference the phone number for this cell phone is 757-613-0320.

Important Phone Numbers

ON BASE EMERGENCIES/REPORTING ILLEGAL ACTIVITIES

- Call = 757-433-9111.

Navy Natural Resources:

- Natural Resources Specialist (NRS), Michael Wright = 757-433-3461(o); 757-373-8531(c)...contact regarding any hatching activity, if there are any emergencies, and if there are any signs of illegal nest tampering by humans, or if it appears the nest has been predated by wildlife.
- Conservation Law-Enforcement Officer (CLEO), Lawrence McGrogan = 757-433-2151(o); 757-635-5436(c)... contact regarding access issues and if there are any signs of illegal nest tampering by human and if you cannot get a hold of the NRS.
- Biological Science Technician (BST), Mark L. Edwards = 757-433-2151(o); 757-406-3764 (pc)...contact if you cannot get a hold of the NRS or the CLEO.
- Installation Environmental Program Director (IEPD), Terry Chamberlain, = 757-433-3437(o); 757-288-6005(c)...contact in case of an emergency, and if you were unable to get a hold of anyone listed above.

USFWS Back Bay National Wildlife Refuge:

- Main Office = 757-301-7329
- Refuge Biologist, Geralyn Mireles = 757-778-5828(c); 757-301-7329 xt 153 (o) ...contact regarding any hatching activity.
- Refuge Biologist, John Gallegos = 757-493-1870 (c); 757-301-7329 xt154 (o) ...contact regarding any hatching activity.
- Refuge Biologist, Chris Hernandez = 757-301-7329 xt158(o); 757-268-4640(c) ...contact if you cannot get a hold of Ms. Mireles or Mr. Gallegos regarding any hatching activity.

VA Dept. of Game and Inland Fisheries:

- VA State Sea Turtle Coordinator, Ruth Boettcher = 757-787-5911(o); 757-709-0766 (c) ...contact regarding any hatching activity.

Radio Instructions

Radios are for communication between you and the other nest sitter monitoring the nest and hatchlings that have emerged and are making their way to the water. Radios may be needed if someone is patrolling the ¼ mile distance looking for hatchlings, if someone is working near the surf while the other person is at the nest, if someone has taken a break and is not immediately available when hatching activity is observed, etc.

1. Turn the radio on by turning the volume knob.

2. Ensure the radios are on the same frequency. To adjust and check the frequency, push the menu button and scroll down to frequency.
3. To talk to one another, hold in the button on the left side of the radio and TALK into the radio. Do not put your mouth right on the radio or you will be difficult to hear.
4. When you finish talking, you must let go of the button in order to hear the other person.

Datasheets

(Current examples provided from 2012 season, datasheets will be updated with current season's data, when and if needed.)

USFWS Data Sheet for Crawls & Nest Relocations:

Nest#3

Nest# 3
Crawl# 3

DATA SHEET FOR CRAWLS & NEST RELOCATIONS

I. General Information (weather, time, tide level, wind speed, location, etc.)

Date 6/15/2012 Tide height 2" MLLW Estimated air temperature 71 F
General weather conditions (ie. % cloud cover, rainfall) No rain
Wind speed & direction 13 mph NE (3:00 pm)
Location of crawl (~, include markers) Dam Neck Naval Air Station, end of Bldg # 127, 30 yards south of South Beach Access.
Latitude of Crawl N 36 degrees 46'28.861" Longitude of Crawl W 75 degrees 57'16.259"

II. Parties Involved

Refuge: John Gallegos, Chris Hernandez, Geralyn Mireles, Camille Sims, Lee Ann Barger, Samantha Smith.
Dam Neck: Michael Wright and Terry Chamberlain

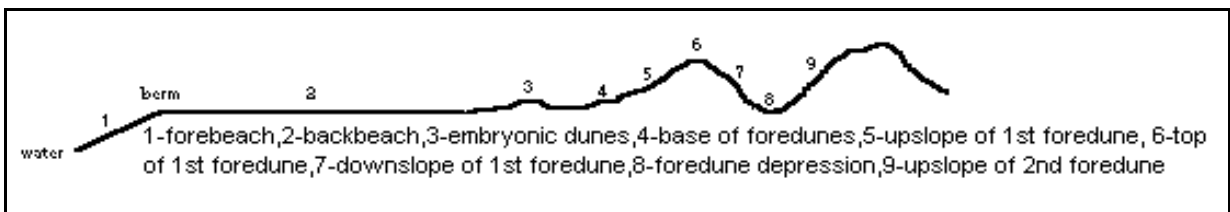
III. Data to be collected for Each Set of Tracks

Crawl # (ie. 1,2, 3,...) 3 Time crawl detected Visitors saw turtle digging nest between 2:30 – 3:00 pm Date 6/15/2012
Track measurements: (from where first visible near surf to nest site or end of crawl)
Length of incoming tracks (m) 23.12 m Width of incoming tracks (cm) 87 cm, 87 cm
Length of outgoing tracks (m) 21.59 m Width of outgoing tracks (cm) 78.5 cm, 87 cm

Flipper impressions alternate or opposite ALT Were tracks prominent? some, footprints throughout tracks

Distance from center of disturbed nesting area to toe of dunes 0 (on toe of dunes)
Topographical feature at end of tracks (CIRCLE area on diagram) Located at # 4 on graph

Was a nest found? Yes false nest? _____ false crawl only? _____

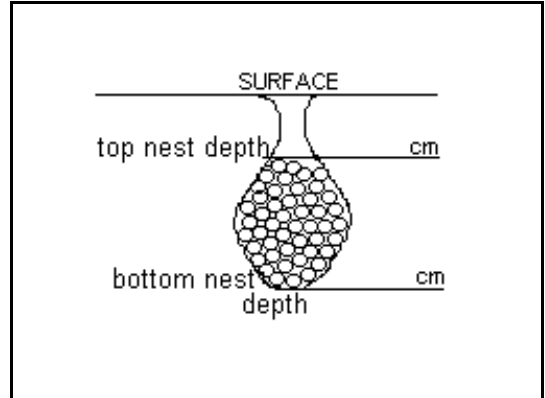


IV. Data to be collected for Each Nest (measurements of nest, egg #, etc.)

Original Nest Data:

NEST CAVITY

Nest # (ie. 1, 2, 3, ...) 3 Crawl# 3
Time nest excavated _____ until _____
Width of disturbed nesting area 122 cm
Length of disturbed nesting area 130.5 cm
Nest cavity width at widest pt. _____
Nest cavity length at longest pt. _____
Total # eggs _____
 #damaged eggs _____
 # broken or predated eggs _____
Temperature of soil in nest cavity _____



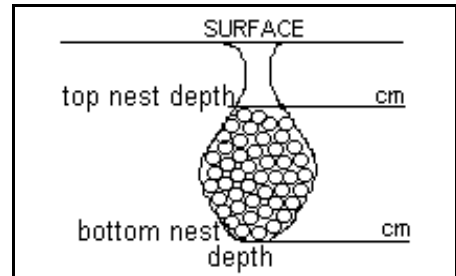
Notes: The distance from the ground surface to top nest depth was 38 cm. Nest was left “in -situ”.

An outer protective cage was placed over nest. One egg was removed from nest for a genetic analysis of parentage of sea turtle nesting. The couple, who saw the turtle digging, took pictures and sent them to the Virginia Aquarium Standing Team, who identified the turtle as a Kemp’s ridley. Refuge staff met Dam Neck personnel at 7:00 pm and finish data collection and placing protective cage at 8:15 pm.

Relocated Nest Data: Nest left “in-situ”

NEST CAVITY

Time nest reburied _____ until _____
Temperature of soil in nest cavity _____
Air temperature (C) _____
Estimated hatch date August 4 -14 (24Jul-23Aug)



V. Data to be Collected on Hatchlings/Hatch:

Turtle nest #(ie. 1,2, 3,...) _____ Time hatch detected _____

Hatch Period _____ Estimated hatch date _____

Incubation period (days) _____

Total # hatchlings counted _____ (See table below if hatch is extended.)

Location of Nursery (estimate, include markers) _____

Latitude of Nursery _____ Longitude of Nursery _____

Date of relocated nest's excavation _____

unhatched eggs _____ # dead hatchlings _____

unhatched eggs hatched later at Visitor's Center _____

storage location of dead hatchlings (if not disposed of) _____

Date	Time Hatchlings discovered	# of Hatchlings	AirTemp/ Soil Temp	Weather Conditions	Time of Hatchling Release	# of Hatchlings Released	Status of Hatchlings	Weather Conditions and Type of Tide (incoming or outgoing)
Total # of Hatchlings				Total # of Hatchlings Released				

VI. Additional Comments and Observations (diagram of tracks and nest, opinions, etc.)

Attach photos or slides and brief narrative for each nest/ hatch.

Two SeaMist Camp Ground campers, Doug and Yvonne Gilbert, saw and reported the nesting sea turtle. They took photos which confirmed that the turtle was a Kemps Ridley (VAST, USFWS, VDGIF, and Navy all concurred). Turtle had a healed damaged carapace. Campers reported that turtle was on beach digging between 1430-1500 and was gone, back in the water, by 1530.

Those Notified:

Base Watch Captain, Lt. Glass.

VA Aquarium Stranding Team

USFWS-BBNWR Biologists

VDGIF-SeaTurtle Coordinator

Base Conservation Law-enforcement Officer

Base Natural Resources Specialist/NRS (rec'd ~1615)

Installation Environmental Program Director/IEPD

NRS on site ~1700. IEPD on site ~ 1800. USFWS on site ~1900.

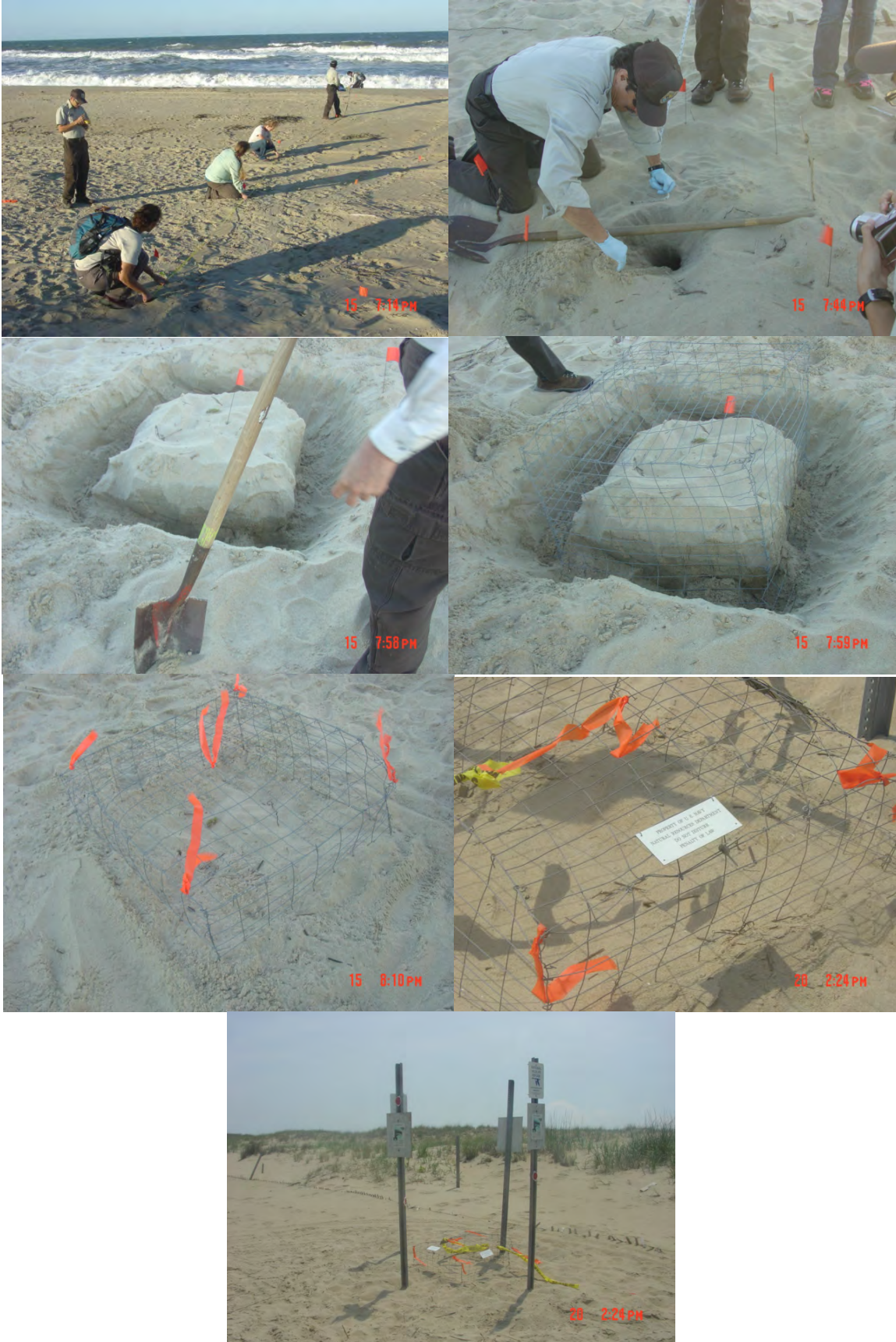
NRS confirmed crawl was not a hoax and notified USFWS so that they would respond and bring all appropriate equipment.



NASO Dam Neck Annex Sea Turtle Nest Monitoring SOP



NASO Dam Neck Annex Sea Turtle Nest Monitoring SOP



VDGIF Data Sheet for Individual Sea Turtle Crawl Record:

INDIVIDUAL SEA TURTLE CRAWL RECORD

CRAWL DATE: _____ (for all crawls discovered *after* midnight, enter the date the crawl was found. For all crawls found/reported *before* midnight, enter the next day's date).

CRAWL TYPE (check one): FALSE CRAWL _____ NEST _____

CRAWL NUMBER: _____

TREATMENT: (circle one): 0 = No treatment 1 = Relocated 2 = Wired in place 3 = Relocated & wired

CRAWL FOUND BY: _____

CRAWL LOCATION: _____

LATITUDE _____ LONGITUDE _____ WAYPOINT # _____

REASON FOR MOVING NEST: _____

OF EGGS IN THE CLUTCH: _____ # OF EGGS RELOCATED: _____ # OF BROKEN EGGS _____

NEST DEPTH _____ in./cm. (circle one) TIME NEST WAS MOVED _____

RELOCATED NEST LOCATION: _____

LATITUDE _____ LONGITUDE _____ WAYPOINT # _____

HATCHLINGS EMERGENCES OBSERVED

	1 st Night	2 nd Night	3 rd Night	4 th Night	5 th Night	6 th Night
Date						
# of Hatchlings Emerged						

TOTAL NUMBER OF OBSERVED HATCHLINGS THAT EMERGED FROM THE NEST: _____

HATCHING/NEST INVENTORY DATA

Date of first hatchling emergence (if first emergence was seen *after* midnight, record that day's date; if first emergence was seen *before* midnight, record the next day's date) _____

Date of last hatchling emergence (if last emergence was seen *after* midnight, record that day's date; if last emergence was seen *before* midnight, record the next day's date) _____

Nest inventory date: _____ Excavated by: _____

Perform the following steps to assist with the determination of the nest's hatch success rate:

- To obtain number of hatched eggs, separate whole eggshells (>50%) from pieces (<50%); only count whole eggshells (each whole eggshell represents one hatched egg):
- Add together the number of unhatched eggs and pipped eggs with dead hatchlings to obtain the total number of unhatched eggs:
- Count the # of dead hatchlings that emerged from eggs but did not leave the nest:
- Count the # of live hatchlings that emerged from eggs but did not leave the nest, irrespective of their condition.

ES = _____

UH = _____

DH = _____

LH = _____

SEE BACK PAGE FOR SPACE TO RECORD ADDITIONAL COMMENTS

Map

(Current example provided from 2012 season, map will be updated with current season's data, when and if needed.)



Appendix J

Lighting Assessment



WHAT ARE LIGHTING INSPECTIONS?

During a lighting inspection, a complete census is made of the number, types, locations, and custodians of artificial light sources that emit light visible from the beach. The goal of lighting inspections is to locate lighting problems and to identify the property owner, manager, caretaker, or tenant who can modify the lighting or turn it off.

WHICH LIGHTS CAUSE PROBLEMS?

Although the attributes that can make a light source harmful to sea turtles are complex, a simple rule has proven to be useful in identifying problem lighting under a variety of conditions:

An artificial light source is likely to cause problems for sea turtles if light from the source can be seen by an observer standing anywhere on the nesting beach.

If light can be seen by an observer on the beach, then the light is reaching the beach and can affect sea turtles. If any glowing portion of a luminaire (including the lamp, globe, or reflector) is directly visible from the beach, then this source is likely to be a problem for sea turtles. But light may also reach the beach indirectly by reflecting off buildings or trees that are visible from the beach. Bright or numerous sources, especially those directed upward, will illuminate sea mist and low clouds, creating a distinct glow visible from the beach. This “urban skyglow” is common over brightly lighted areas. Although some indirect lighting may be perceived as nonpoint-source light pollution, contributing light sources can be readily identified and include sources that are poorly directed or are directed upward. Indirect lighting can originate far from the beach.

Although most of the light that sea turtles can detect can also be seen by humans, observers should realize that some sources, particularly those emitting near-ultraviolet and violet light (e.g., bug-zapper lights, white electric-discharge lighting) will appear brighter to sea turtles than to humans. A human is also considerably taller than a hatchling; however, an observer on the dry beach who crouches to the level of a hatchling may miss some lighting that will affect turtles. Because of the way that some lights are partially hidden by the dune, a standing observer is more likely to see light that is visible to hatchlings and nesting turtles in the swash zone.

HOW SHOULD LIGHTING INSPECTIONS BE CONDUCTED?

Lighting inspections to identify problem light sources may be conducted either under the purview of a lighting ordinance or independently. In either case, goals and methods should be similar.

GATHER BACKGROUND INFORMATION

Before walking the beach in search of lighting, it is important to identify the boundaries of the area to be inspected. For inspections that are part of lighting ordinance enforcement efforts, the jurisdictional boundaries of the sponsoring local government should be determined. It will help to have a list that includes the name, owner, and address of each property within inspection area

so that custodians of problem lighting can be identified. Plat maps or aerial photographs will help surveyors orient themselves on heavily developed beaches.

PRELIMINARY DAYTIME INSPECTIONS

An advantage to conducting lighting inspections during the day is that surveyors will be better able to judge their exact location than they would be able to at night. Preliminary daytime inspections are especially important on beaches that have restricted access at night. Property owners are also more likely to be available during the day than at night to discuss strategies for dealing with problem lighting at their sites.

A disadvantage to daytime inspections is that fixtures that are not directly visible from the beach will be difficult to identify as problems. Moreover, some light sources that can be seen from the beach in daylight may be kept off at night and thus present no problems. For these reasons, daytime inspections are not a substitute for nighttime inspections. Descriptions of light sources identified during daytime inspections should be detailed enough so that anyone can locate the lighting. In addition to a general description of each luminaire (e.g., HPS floodlight directed seaward at top northeast corner of the building at 123 Ocean Street), photographs or sketches of the lighting may be necessary. Descriptions should also include an assessment of how the specific lighting problem can be resolved (e.g., needs turning off; should be redirected 90° to the east). These detailed descriptions will show property owners exactly which luminaires need what remedy.

NIGHTTIME INSPECTIONS

Surveyors orienting themselves on the beach at night will benefit from notes made during daytime surveys. During nighttime lighting inspections, a surveyor walks the length of the nesting beach looking for light from artificial sources. There are two general categories of artificial lighting that observers are likely to detect:

1. **Direct lighting.** A luminaire is considered to be direct lighting if some glowing element of the luminaire (e.g., the globe, lamp [bulb], reflector) is visible to an observer on the beach. A source not visible from one location may be visible from another farther down the beach. When direct lighting is observed, notes should be made of the number, lamp type (discernable by color), style of fixture, mounting (pole, porch, *etc.*), and location (street address, apartment number, or pole identification number) of the luminaire(s). If exact locations of problem sources were not determined during preliminary daytime surveys, this should be done during daylight soon after the nighttime survey. Photographing light sources (using long exposure times) is often helpful.

2. **Indirect lighting.** A luminaire is considered to be indirect lighting if it is not visible from the beach but illuminates an object (e.g., building, wall, tree) that is visible from the beach. Any object on the dune that appears to glow is probably being lighted by an indirect source. When possible, notes should be made of the number, lamp type, fixture style, and mounting of an indirect-lighting source. Minimally, notes should be taken that would allow a surveyor to find the lighting during a follow-up daytime inspection (for instance, which building wall is illuminated

and from what angle?).

WHEN SHOULD LIGHTING INSPECTIONS BE CONDUCTED?

Because problem lighting will be most visible on the darkest nights, lighting inspections are ideally conducted when there is no moon visible. Except for a few nights near the time of the full moon, each night of the month has periods when there is no moon visible. Early-evening lighting inspections (probably the time of night most convenient for inspectors) are best conducted during the period of two to 14 days following the full moon. Although most lighting problems will be visible on moonlit nights, some problems, especially those involving indirect lighting, will be difficult to detect on bright nights.

A set of daytime and nighttime lighting inspections before the nesting season and a minimum of three additional nighttime inspections during the nesting-hatching season are recommended. The first set of day and night inspections should take place just before nesting begins. The hope is that managers, tenants, and owners made aware of lighting problems will alter or replace lights before they can affect sea turtles. A follow-up nighttime lighting inspection should be made approximately two weeks after the first inspection so that remaining problems can be identified. During the nesting-hatching season, lighting problems that seemed to have been remedied may reappear because owners have been forgetful or because ownership has changed. For this reason, two midseason lighting inspections are recommended. The first of these should take place approximately two months after the beginning of the nesting season, which is about when hatchlings begin to emerge from nests. To verify that lighting problems have been resolved, another follow-up inspection should be conducted approximately one week after the first midseason inspection.

WHO SHOULD CONDUCT LIGHTING INSPECTIONS?

Although no specific authority is required to conduct lighting inspections, property managers, tenants, and owners are more likely to be receptive if the individual making recommendations represent a recognized conservation group, research consultant, or government agency. When local ordinances regulate beach lighting, local government code-enforcement agents should conduct lighting inspections and contact the public about resolving problems.

WHAT SHOULD BE DONE WITH INFORMATION FROM LIGHTING INSPECTIONS?

Although lighting surveys serve as a way for conservationists to assess the extent of lighting problems on a particular nesting beach, the principal goal of those conducting lighting inspections should be to ensure that lighting problems are resolved. To resolve lighting problems, property managers, tenants, and owners should be given the information they need to make proper alterations to light sources. This information should include details on the location and description of problem lights, as well as on how the lighting problem can be solved. One should also be prepared to discuss the details of how lighting affects sea turtles. Understanding the nature of the problem will motivate people more than simply being told what to do.

Lighting Survey Form

The lighting survey must be conducted to include a landward view from the seaward most extent of the beach profile. The survey must occur after 9 p.m. The survey must follow standard techniques for such a survey and include the number and type of visible lights, location of lights and photo documentation.

Date: _____

Location (name of beach): _____

Contact information of person conducting the lighting survey: _____

Lighting ordinance or Light Management Plan: _____

Compliance Officer name and contact information: _____

Survey start time: _____

Survey end time: _____

Survey start location (include address or GPS location): _____

Survey end location (include address or GPS location): _____

Date summarizing report sent to mike_drummond@fws.gov: _____

Contact information for follow up meeting with the FWS:

Accident Prevention Plan

Lighting Survey for Sea Turtle Management

Naval Air Station Oceana – Dam Neck Annex and Virginia Army National Guard Camp Pendleton

Contract # N62470-13-D-8017, TO WE04

Submitted to:
Naval Facilities Engineering Command
MIDLANT



Prepared by:

Versar, Inc.



VERSAR

Hampton, Virginia

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1 **2. BACKGROUND INFORMATION**

2 **a. Contractor**

3 GMI-AECOM Joint Venture
4 6850 Versar Center #201
5 Springfield, Virginia 22151

6 **b. Contract Number**

7 N62470-13-D-8017, TO WE04

8 **c. Project Name**

9 Lighting Survey and Biological Assessment for Sea Turtle Nest Management at Joint Expeditionary Base
10 Little Creek Fort Story, Virginia Beach, VA

11 **d. Brief Project Description of Work**

12 The GMI-AECOM JV is subcontracting this task order to Versar, Inc.

13 The purpose of this survey is to conduct artificial lighting surveys along the beaches of Naval Air Station
14 Oceana-Dam Neck Annex (NASO-DNA) and Virginia Army National Guard Camp Pendleton (VAANG-
15 CP) in Virginia Beach, VA. These lighting surveys will document all observable lighting sources from
16 installation beaches.

17 Versar would utilize a group of experienced scientists in performing the tasks specified in the SOW for
18 performing a survey of artificial lighting sources that may impact sea turtle nesting on installation
19 beaches. The project team’s experience includes extensive biological and ecological work throughout the
20 southeast. Versar’s technical approach will be to adhere closely to the SOW as described in the contract.
21 Specifically, we will adhere to all guidance and complete each task as directed in order to successfully
22 complete surveys for each installation. The project areas for NASO-DNA and VAANG-CP are shown in
23 Figures 1 and 2, respectively. A total of five surveys will be conducted at each location. The following
24 steps will be undertaken to perform lighting surveys at each installation:

- 25 1. The plans and maps developed for each installation survey plan will be used by the surveyors to
26 assist in determining potential light sources and identifying survey boundaries.
- 27 2. Each installation survey will begin with a daytime survey. Day time surveys allow surveyors a
28 first look to help with orientation at night and allows for the identification of potential light
29 sources to be sought at night.
- 30 a. Daytime surveys will occur both along the beach face and behind the rear dunes in order
31 to identify potential light source locations that will be sought out during night surveys.
- 32 b. Identification of potential light sources will be sufficiently detailed (location and type) so
33 that they can be easily located during night surveys.
- 34 3. Nighttime surveys will consist of at least two surveyors walking the beach at night along the
35 water line in the swash zone.
- 36 a. Surveys will be conducted 2 to 14 days following a full moon. See Table 1 for the full
37 moon calendar and survey opportunities. The PM will coordinate all visits with the NTR

- 1 and IR at least three weeks in advance to ensure beach access and entry to restricted
2 areas, if necessary, to obtain coordinates.
- 3 b. The first nighttime survey will be conducted prior to the nesting season which begins
4 early summer.
- 5 c. Three subsequent surveys will occur during the nesting (May – September) and hatching
6 season (approximately 55 – 80 days after eggs are laid).
- 7 d. Both direct and indirect light sources will be identified. Identification will consist of the
8 classification of the type of light source with GPS coordinates of the actual light source.
9 Survey forms will also document building number, parking area, or other identifier of the
10 location on the installation. The number of lights, type, color and potential disruption (as
11 reviewed in Witherington and Martin [2003]) will be included in the survey forms.
- 12 4. The windows for surveys is provided in Table 1. Specific dates will be coordinated with the
13 Installation Representatives (IR) and the Naval Technical Representative (NTR).
- 14 Hazards associated with the activities conducted under this scope of work include hazards encountered
15 with exposure from being outdoors; encounters with wildlife; trips and falls; and working in close
16 proximity to the water. Section 10, Risk Management Processes, of this APP discusses the associated
17 hazards involved with each activity and an activity hazard analysis (AHA).

18 **Table 1. Lighting Survey Windows**

Survey	Survey Window
Initial (Pre-nesting) Daytime Survey	30 Mar - 3 Apr
Initial (Pre-nesting) Night Survey (Night Survey 1)	13-17 April
Midseason Nesting/Hatching Survey (Night Survey 2)	4-8 Jun
Midseason Nesting/Hatching Survey (Night Survey 3)	12-16 Jun
Final Nesting/Hatching Survey (Night Survey 4)	31 Aug – 4 Sep

19

20

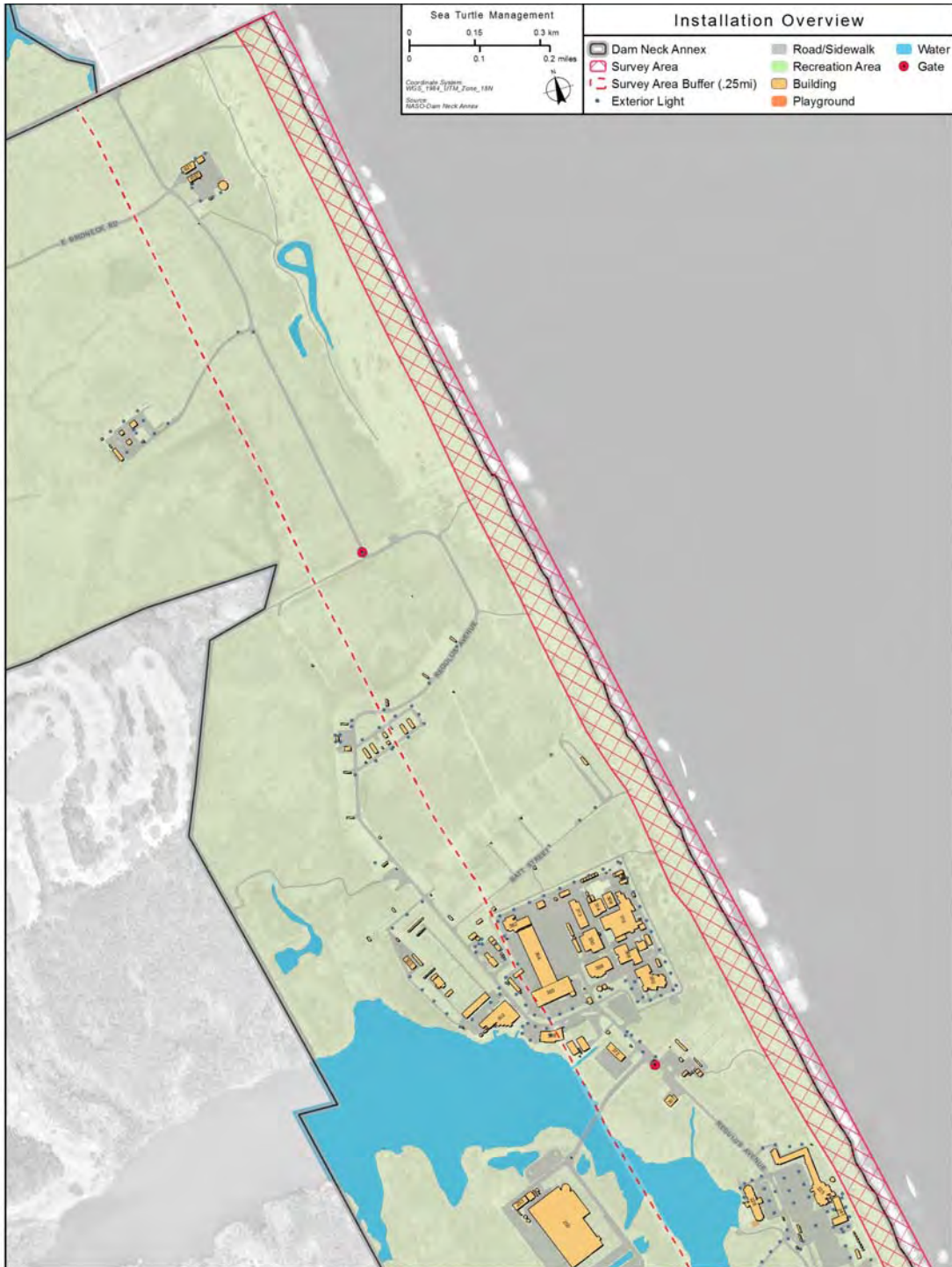


Figure 1. Naval Air Station Oceana – Dam Neck Annex Survey Area (North)

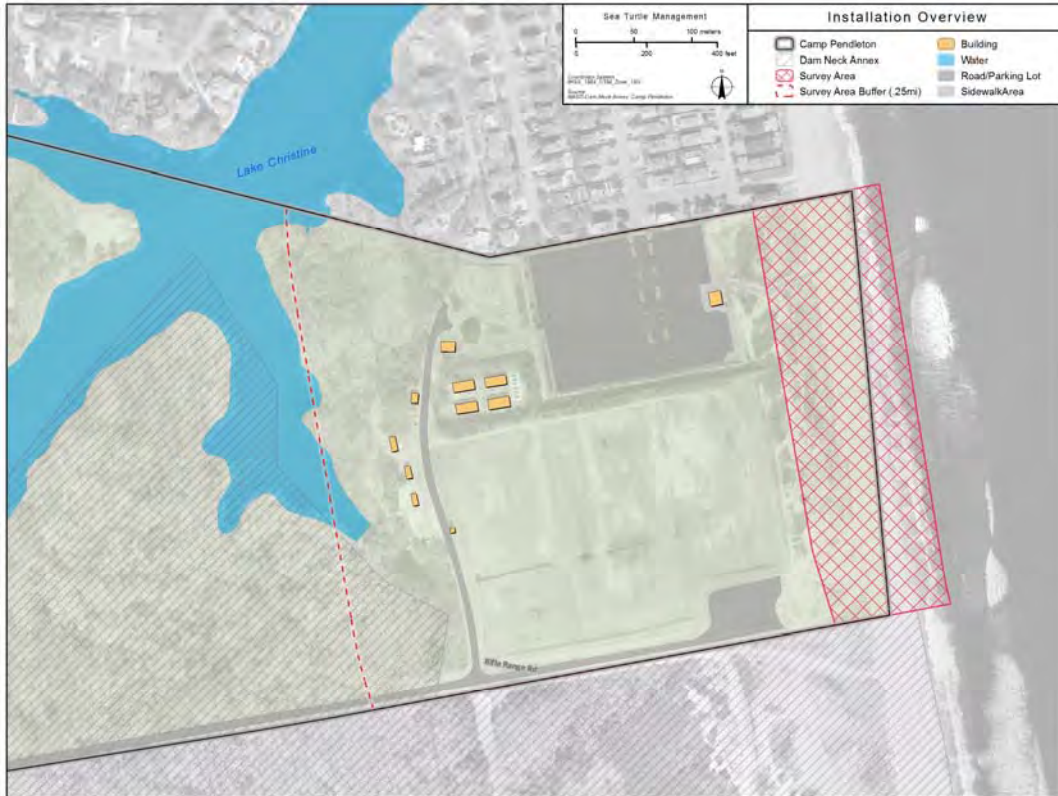


Figure 3. VAANG Camp Pendleton Survey Area

3. STATEMENT OF SAFETY AND HEALTH POLICY

The personal safety and health of each employee of the Versar Team is of primary importance. The prevention of work-induced injuries and illness is of such importance that it will be given precedence over operating productivity whenever necessary. To the greatest degree possible, management will provide all training, mechanical, and physical facilities required for personal safety and health in keeping with the highest standards of the industry.

The Versar Team will maintain a safety and health program conforming to the best practices of organizations within the environmental and construction services. To be successful, such a program must embody the proper attitudes toward injury and illness prevention on the part of both supervisors and employees. It also requires cooperation in all safety and health matters, not only between supervisor and employee, but also between each employee and his or her fellow workers. Only through such a cooperative effort can a safety record in the best interest of all be established and preserved.

The objective is a safety and health program that will reduce the number of disabling injuries and illnesses to an absolute minimum, not merely in keeping with, but surpassing, the best experience of other similar operations.

The Versar Team safety and health program includes:

- Providing mechanical and physical safeguards to the maximum extent possible;

- Conducting a program of safety and health inspections to find and eliminate unsafe working conditions or practices; to control health hazards; and to comply fully with the safety and health standards for every job;
- Training all employees in good safety and health practices;
- Providing necessary personal protective equipment (PPE) and instructions for its use and care;
- Developing and enforcing safety and health rules; and requiring that employees cooperate with these rules as a condition of employment;
- Investigating, promptly and thoroughly, every accident to find out what caused it and to correct the problem so that it will not happen again; and
- Recognizing and awarding outstanding safety service or performance.

The Versar Team recognizes that the responsibilities for safety and health are shared:

- The company is responsible for leadership of the safety and health program, for its effectiveness and improvement, and for providing the safeguards required to ensure safe conditions;
- The person responsible for administration of the company safety program is the Company President. Some items in the safety program may be delegated to others, but the primary responsibility remains with this person.
- Supervisors are responsible for developing the proper attitudes toward safety and health in themselves and in those they supervise and for ensuring that all operations are performed with the utmost regard for the safety and health of all personnel involved, including themselves.

Employees are responsible for cooperation with all aspects of the safety and health program, including compliance with all rules and regulations, and for continuously practicing safety while performing their duties.

4. RESPONSIBILITIES AND LINE OF AUTHORITY

a. Statement of Employer’s Ultimate Responsibility for Implementation of Safety and Occupational Health Program

The provisions of this Accident Prevention Program (APP) along with the applicable regulations issued by governmental entities will be strictly adhered to by site personnel and visitors. Each subcontractor will be held accountable for the safe and healthful performance of work by each of their employees, subcontractors, or support personnel who may enter the site. It is Versar’s policy to ensure that every reasonable precaution is taken to prevent accidents. Always use the safety equipment provided for your protection. Unsafe conditions, unsafe practices, property damage or personal injuries, regardless of how slight, must be reported to your supervisor immediately.

b. Identification and Accountability of Personnel Responsible at Corporate and Project Level

(1) GMI-AECOM JV

John Ouellette, Program Manager

(2) Versar

Mark Housand, Safety Officer
Brian Bishop, Project Manager

c. Requirements that No Work Shall be performed unless a Designated Competent Person is Present of the Job Site

The services outlined in Section 2 require specific skills sets and no services will be rendered without a trained, competent person present. All services are provided with a minimum of two employees present.

d. Requirements of Pre-task Safety and Health Analysis

Every employee is required to go through an on-sight safety briefing outlining daily tasks, equipment needs, and specific hazards that may be encountered during the course of daily activities. Additionally, employees are not allowed to operate any specific equipment without being briefed by the owner and illustrating competency with said item. This includes establishing corporate requirements that each employee discloses any health concerns that would impact their ability to operate equipment and perform assigned tasks.

e. Lines of Authority

(1) Project Manager

In effectively executing their safety responsibilities, project managers will:

- Familiarize themselves with the safety program and ensure its effective implementation.
- Be aware of all safety considerations when introducing a new process, procedure, machine or material to the workplace.
- Give maximum support to all programs and committees whose function is to promote safety and health.
- Actively participate in safety activities as required.
- Review serious accidents to ensure that proper reports are completed, and appropriate action is taken to prevent recurrences.

(2) Foremen (Crew Lead)

In effectively executing their safety responsibilities, foremen will:

- Familiarize themselves with company safety policies, programs and procedures.
- Provide appropriate safety training to employees prior to the assignment of duties.
- Consistently and fairly enforce all company safety rules.
- Investigate injuries to determine cause, and then take action to prevent recurrence.
- See that all injuries, no matter how minor, are treated immediately and referred to the front office to ensure prompt reporting to the insurance carrier.
- Inspect work areas often to detect unsafe conditions and work practices. Use company self-inspection checklists as required.

(3) All Employees

Employee responsibilities for safety include the following:

- Adhere to all safety rules and regulations.
- Wear appropriate safety equipment as required.
- Maintain equipment in good condition, with all safety guards in place when in operation.
- Report all injuries and near misses, no matter how minor, immediately to their supervisor, safety personnel or management.
- Encourage coworkers to work safely.
- Report unsafe acts and conditions to their supervisor, safety personnel, or management.
- Halt site operations in the event of an emergency or to correct unsafe work practices.
- Notifying emergency response personnel in the event of an emergency; and
- Review this APP.

f. Policy Regarding Noncompliance

Employees who fail to comply with safety rules will be subject to disciplinary action up to and including termination. Supervisors will follow the normal disciplinary procedures as follows:

- 1. Verbal counseling - must be documented in the employee's personnel file.
- 2. Written warning - outlining nature of offense and necessary corrective action.
- 3. Suspension without pay - one (1) working day without pay - the third step or a separate disciplinary action resulting from a serious violation.
- 4. Termination - if an employee is to be terminated, specific and documented communication between the supervisor and the employee must occur.

g. Procedures for Holding Managers and Supervisors Accountable to Safety

Supervisors will be subject to disciplinary action for the following reasons:

- Repeated safety rule violation by their department employees.
- Failure to provide adequate training prior to job assignment.
- Failure to report accidents and provide medical attention to employees injured at work.
- Failure to control unsafe conditions or work practices.
- Failure to maintain good housekeeping standards and cleanliness in their departments.

Supervisors who fail to maintain high standards of safety within their departments will be demoted or terminated after three documented warnings have been levied during any calendar year.

5. SUBCONTRACTORS AND SUPPLIERS

a. Identification of Subcontractors

Versar
6850 Versar Center
Springfield, VA 22151
(703) 750-3000

Virginia Aquarium & Marine Science Center
717 General Booth Blvd
Virginia Beach, VA 23451
(757) 385-3474

b. Safety Responsibilities of Subcontractors

Subcontractors and suppliers shall comply with all applicable federal, state, and local laws, rules, regulations, and orders in effect on the date of this order, including, but not limited to the following, as amended: (a) the Fair Labor Standards Act of 1938; (b) the Federal Occupational Safety and Health Act of 1970 (OSHA); (c) the Toxic Substances Control Act of 1976; (d) the Walsh-Healy Public Contracts Act; and (e) any other federal law concerning labor relations, nondiscrimination in employment, minimum wages, overtime compensation, and hours of employment. Seller agrees to indemnify and hold Contractor harmless against any loss or liability due to Seller's violation or noncompliance with such regulations. Upon Contractor's request, Seller shall furnish evidence demonstrating such compliance.

6. TRAINING

a. Requirements for New Employees

Each subcontractor or department manager must employ a program for new employee acclimation and orientation, including current employees who are reassigned and directed towards familiarization with:

- Safety rules, procedures and standards with which compliance is expected
- Inherent hazards of the job and surroundings
- Safe work methods, motions and habits
- Emergency procedures, alarms and telephone numbers related to reporting injury, illness, fire and other catastrophes
- Physical layout of the properties, including exits, emergency signal devices, first-aid facilities, and fire extinguishers and other emergency equipment
- PPE required on the job including its maintenance and proper use
- Safety committees, safety meetings, and safety educational materials.

While on-site, the Project Manager will brief all newly arriving workers and visitors to aid in protecting their safety. The training will familiarize personnel with hazards associated with the site and associated controls, describe work zone boundaries and access and exit procedures, explain emergency procedures, and describe the use of PPE required during activities on the site. The briefing will include a review of the requirements of this APP including the safety checklists in Appendix A.

b. Mandatory Training and Certifications Applicable to this Project

There are no mandatory or certifications required for this project.

c. Procedures for Periodic Safety and Health Training

Annual refresher training is required, even if there has been no change in a worker's job tasks.

d. Emergency Response Training

When a medical facility or physician is not accessible within five minutes of an injury to a group of two or more employees for the treatment of injuries, a minimum of two representatives, on site at all times, will be certified in both first aid and cardiopulmonary resuscitation. Certifications are contained Appendix B.

7. SAFETY AND HEALTH INSPECTIONS

a. Internal Inspections

Inspections should be performed by personnel who have been trained in recognizing hazards that have a tendency to “slip out” of controls designed to reduce employee exposure to them. All inspections should be documented in writing, and where hazards are identified, corrective actions should be developed as soon as possible, based on the severity of the hazard involved.

(1) Mechanical Equipment

The two general classifications are “frequent” and “periodic.”

- Frequent inspection: Daily to monthly intervals.
- Periodic inspection: 1- to 12-month intervals, or as specifically recommended by the manufacturer.

The operator should check the following items daily:

- All control mechanisms for maladjustment interfering with proper operation
- Deterioration or leakage in air or hydraulic systems if applicable
- All safety devices for malfunction

The following items should be checked weekly or monthly, depending on how much the equipment is used:

- All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.
- Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.

Complete inspections of all mechanical equipment must be performed at periodic intervals depending upon its activity, severity of service, and environment or as specifically indicated below. These inspections have to include all “frequent” inspection items and in addition, items such as the following:

- Loose bolts or rivets
- Worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers and locking devices
- Excessive wear on brake and clutch system parts, linings, pawls, and ratchets
- Gasoline, diesel, electric, or other power plants for improper performance or noncompliance with safety requirements
- Excessive wear of chain-drive sprockets and excessive chain stretch
- Travel steering, braking, and locking devices, for malfunction

c. Immediate Notification of Major Events

Immediate (8 hour) reporting to OSHA is required under 29 CFR 1904 if a fatality or catastrophe (3 or more people sent to the hospital with injuries that require an overnight stay) occurs. This reporting is done only by the Versar Safety Officer or Project Manager. All other personal injuries requiring first aid or resulting in lost time will be recorded on an OSHA Form 300 by the manager/project manager.

The following require immediate accident notification:

- A fatal injury
- A permanent total disability
- A permanent partial disability
- The hospitalization of three or more people resulting from a single occurrence
- Property damage of \$200,000 or more.

The investigation and reporting of occupational injuries, illnesses and dangerous occurrences is essential for project management to be able to take the steps necessary to avoid additional injuries or illnesses. A complete investigation will provide information regarding the elements of the incident and the process by which they came together to cause the injury, illness, or dangerous occurrence. By identifying the elements and processes, further incidents can be avoided. Timely reporting also permits project contractors to remain in compliance with OSHA recordkeeping regulations.

9. PLANS REQUIRED BY THE SAFETY MANUAL

a. Emergency Response Plans

(1) Spill Plans

In the event of a chemical spill, the company who caused the spill is responsible for prompt and proper clean-up. It is also their responsibility to have spill control and PPE appropriate for the chemicals being handled readily available.

The following are general guidelines to be followed for a chemical spill.

- Immediately alert area occupants and supervisor, and evacuate the area, if necessary.
- If there is a fire or medical attention is needed, contact the installation SPOC.
- Attend to any people who may be contaminated. Contaminated clothing must be removed immediately and the skin flushed with water for no less than fifteen minutes.
- If a volatile, flammable material is spilled, immediately warn everyone, control sources of ignition and ventilate the area.
- Don PPE, as appropriate to the hazards. Refer to the Material Safety Data Sheet or other references for information.
- Consider the need for respiratory protection. The use of a respirator or self-contained breathing apparatus requires specialized training and medical surveillance. Never enter a contaminated atmosphere without protection or use a respirator without training. If respiratory protection is

used, be sure there is another person outside the spill area in communication, in case of an emergency.

Using the list below, determine the extent and type of spill. If the spill is large, if there has been a release to the environment the company will contact the POC at the installation immediately

<u>Category Size</u>	<u>Response / Treatment Materials</u>
Small up to 300cc	Chemical treatment or absorption neutralization or absorption spill kit
Medium 300 cc - 5 liters	Absorption spill kit
Large more than 5 liters	Call public safety outside help

Loose spill control materials should be distributed over the entire spill area, working from the outside, circling to the inside. This reduces the chance of splash or spread of the spilled chemical. Bulk absorbents and many spill pillows do not work with hydrofluoric acid. POWERSORB (by 3M) products and their equivalent will handle hydrofluoric acid. Specialized hydrofluoric acid kits also are available. Many neutralizers for acids or bases have a color change indicator to show when neutralization is complete.

When spilled materials have been absorbed, use brush and scoop to place materials in an appropriate container. Polyethylene bags may be used for small spills. Five gallon pails or 20 gallon drums with polyethylene liners may be appropriate for larger quantities. Complete a hazardous waste sticker, identifying the material as Spill Debris involving the given chemical, and affix onto the container. Spill control materials will probably need to be disposed of as hazardous waste. Decontaminate the surface where the spill occurred using a mild detergent and water, when appropriate. Report all spills to your supervisor or the manager/principal manager, installation POC, and ESA project manager. A certified hazardous waste disposal company must be contacted to pick up and dispose of the contained material. The installation Environmental Regulated Waste Manager's signature is required the accompanying waster manifest, which is required with every disposal shipment for the base.

(2) Firefighting Plan

MAINTENANCE

The Project Manager will ensure that equipment is maintained according to manufacturers' specifications. The project manager will also comply with requirements of the National Fire Protection Association (NFPA) codes for specific equipment. Only properly trained individuals shall perform maintenance work.

GOOD HOUSEKEEPING

To limit the risk of fires, employees shall take the following precautions:

- Minimize the storage of combustible materials
- Make sure that all exit routes are kept free of obstructions
- Dispose of combustible waste in covered, airtight, metal containers
- Use and store flammable materials in well-ventilated areas away from ignition sources
- Use only nonflammable cleaning products

- Keep incompatible (i.e., chemically reactive) substances away from each other
- Perform “hot work” (i.e., welding or working with an open flame or other ignition sources) in controlled and well-ventilated areas
- Keep equipment in good working order (i.e., inspect electrical wiring and appliances regularly and keep motors and machine tools free of dust and grease)
- Ensure that heating units are safeguarded
- Report all fuel leaks immediately
- Repair and clean up flammable liquid leaks immediately
- Keep work areas free of dust, lint, sawdust, scraps, and similar material.

EXTINGUISHERS

Know the location of the nearest fire extinguisher and how to operate it. Know the type of the fire on which it should be used by checking and reading the label. Be aware that certain toxic gases or vapors may be generated by a fire.

A carbon dioxide, dry chemical or equivalent fire extinguisher is kept in the cab or vicinity of all mechanical equipment.

Fire extinguishers of the proper type and size must be within 30 feet of each open flame operation that is performed. Return all extinguishers for servicing promptly after any use.

COMBUSTIBLE AND FLAMMABLE MATERIALS

The project manager shall regularly evaluate the presence of combustible materials at the job site. Certain types of substances can ignite at relatively low temperatures or pose a risk of catastrophic explosion if ignited. Such substances obviously require special care and handling.

1. Class A combustibles.

These include common combustible materials (wood, paper, cloth, rubber, and plastics) that can act as fuel and are found in non-specialized areas such as offices.

To handle Class A combustibles safely:

- a. Dispose of waste daily.
- b. Keep trash in metal-lined receptacles with tight-fitting covers (metal wastebaskets that are emptied every day do not need to be covered).
- c. Keep work areas clean and free of fuel paths that could allow a fire to spread.
- d. Keep combustibles away from accidental ignition sources, such as hot plates, soldering irons, or other heat- or spark-producing devices.
- e. Store paper stock in metal cabinets.
- f. Store rags in metal bins with self-closing lids.

- g. Do not order excessive amounts of combustibles.
- h. Make frequent inspections to anticipate fires before they start.

Water, multi-purpose dry chemical (ABC), and halon 1211 are approved fire extinguishing agents for Class A combustibles.

2. Class B combustibles.

These include flammable and combustible liquids (oils, greases, tars, oil-based paints, and lacquers), flammable gases, and flammable aerosols.

To handle Class B combustibles safely:

- a. Use only approved pumps, taking suction from the top, to dispense liquids from tanks, drums, barrels, or similar containers (or use approved self-closing valves or faucets).
- b. Do not dispense Class B flammable liquids into containers unless the nozzle and container are electrically interconnected by contact or by a bonding wire. Either the tank or container must be grounded.
- c. Store, handle, and use Class B combustibles only in approved locations where vapors are prevented from reaching ignition sources such as heating or electric equipment, open flames, or mechanical or electric sparks.
- d. Do not use a flammable liquid as a cleaning agent inside a building (the only exception is in a closed machine approved for cleaning with flammable liquids).
- e. Do not use, handle, or store Class B combustibles near exits, stairs, or any other areas normally used as exits.
- f. Do not weld, cut, grind, or use unsafe electrical appliances or equipment near Class B combustibles.
- g. Do not generate heat, allow an open flame, or smoke near Class B combustibles.
- h. Know the location of and how to use the nearest portable fire extinguisher rated for Class B fire.

Water should not be used to extinguish Class B fires caused by flammable liquids. Water can cause the burning liquid to spread, making the fire worse. To extinguish a fire caused by flammable liquids, exclude the air around the burning liquid. The following fire-extinguishing agents are approved for Class B combustibles: carbon dioxide, multi-purpose dry chemical (ABC), halon 1301, and halon 1211. (NOTE: Halon has been determined to be an ozone-depleting substance and is no longer being manufactured. Existing systems using halon can be kept in place.)

SMOKING

Smoking is prohibited in all company buildings, vehicles, and equipment. Certain outdoor areas may also be designated as no smoking areas. The areas in which smoking is prohibited outdoors will be identified by NO SMOKING signs.

STRIKE ANYWHERE matches are not permitted. On certain projects, permits are required for welding, burning, or other types of open flames.

(3) Employees working alone

Employees working alone shall be provided an effective means of emergency communication. This may be cellular phone, two-way radio or other acceptable means. The selected means of communication must be readily available and must be in working condition.

(4) Posting of Emergency Phone Numbers

Emergency telephone numbers and reporting instructions for ambulance, physician, hospital, fire, and police will be conspicuously and clearly posted at the work site.

(5) Medical Support

If the incident is serious/life threatening, the contractor is to **contact the JEBLCFS Emergency Dispatch Center at 757-443-9111 for the installation emergency dispatch**. In the event of an onsite incident that results in a need for first aid care, the closest hospital with acute care facilities to JEB Little Creek is Bon Secours DePaul Medical Center in Norfolk and the closest to JEB Fort Story is Sentara Princess Anna in Virginia Beach. To reach off-site hospitals, follow the driving directions in Appendix D.

Following an accident/injury or near miss, work will immediately stop and the POC will be contacted. Emergency contact information is located in Table 2. The POC will then contact the Safety Office to respond/document the incident. No work shall take place until the Installation Safety Office turns the site back over to the contractors.

Table 2. Emergency Contacts

Contact	Person or Agency	Telephone No.
Dam Neck Annex POC	Michael Wright	Office: (757) 433-3461 Cell: (757) 373-8531
Dam Neck Annex Emergency Dispatch		(757) 492-6911
Camp Pendleton POCs	Ken Oristaglio 1st Sgt Carter	Office: (434) 298-6416 Cell: (434) 264-4929 Cell: (434) 294-2100
Camp Pendleton Emergency Dispatch	Main Gate	911 757-491-5144
Off-base Hospital (Fort Story): Sentara Princess Anna	2025 Glenn Mitchell Dr, Virginia Beach, VA 23456	(757) 507-1000
Poison Control Center	Directs to appropriate state center	(800) 222-1222
NAVFAC MIDLANT NTR	Jessica Bassi	
GMI-AECOM JV Program Manager	John Ouellette	(757) 265-2901
Versar Project Manager	Brian Bishop	(757) 265-2903

Contact	Person or Agency	Telephone No.
Virginia Aquarium	Mark Swingle	(757) 384-3474

The above table shall be posted in a prominent location at the work area.

b. Plan for Prevention of Alcohol and Drug Abuse

While working the site, no personnel assigned to this project may use, possess, distribute, sell, or be under the influence of alcohol or engage in the unlawful manufacture, distribution, dispensation, possession, or use of illegal drugs. Violations of this policy may lead to disciplinary actions, up to and including immediate and permanent prohibition of the individual(s) from performing work on this project.

The policy to be implemented at this project site will involve drug testing for cause or suspicion. This means that any individual assigned to this project, who is observed behaving in such a manner that leads the project manager to suspect he or she is under the influence of alcohol or illegal drugs, will be immediately directed to stop work and report to the project manager. The individual under suspicion will be escorted off of the site and asked to submit to testing for illegal substances and alcohol. Individuals who agree to be tested will be provided transportation to an appropriate medical facility for evaluation. Individuals who decline to be tested will be provided transportation to their nearby residence or lodging and directed not to return to the project. Those who test positive for use of illegal substances may not return to the project until such time as they can demonstrate no further use of the substances.

Individuals with questions or concerns about substance dependency or abuse may wish to discuss these matters with their employer, supervisor, or appropriate resources in the community. The intent of this policy is to offer a helping hand to project personnel who suffer from the illness of addiction and to encourage those personnel to pursue recovery. The clear message is that continued drug use or alcohol abuse is incompatible with continuing work on this project. Any employee under a physician's treatment and taking prescribed narcotics or any medication that may prevent one being ready, willing and able to safely perform position duties shall provide a medical clearance statement to his supervisor.

c. Drinking Water Provisions, Toilet and Washing Facilities

All employees will either bring or Versar will provide an adequate supply of drinking water. The closest restroom and washing facilities on Dam Neck Annex are located behind the dunes in Bldg 153, which is located across the parking lot from the Shifting Sands Beach Club (Appendix E). On Camp Pendleton, portable latrines are located directly behind the dunes.

d. Health Hazard Control Program

Operations, materials, and equipment involving potential exposure to hazardous or toxic agents or environments shall be evaluated by the manager and project manager for each activity. Based on the scope of work outlined in Section 2, neither company anticipates operating equipment or using materials that may construed as health hazards to perform these tasks.

e. Heat/Cold Stress Monitoring plan

The following guidelines will be followed to prevent heat related injury:

1. Drinking water shall be made available to employees and employees encouraged to frequently drink small amounts, e.g., one cup every 15-20 minutes; the water shall be kept reasonably cool.
2. Tool box training in hot environments shall include training on the symptoms of heat related problems, contributing factors to heat related injuries, and prevention techniques.
3. When possible, work should be scheduled for cooler periods during the day.
4. Individuals shall be encouraged to take breaks in a cooler location, and use cooling devices as necessary, such as cooling vests, to prevent heat related injury.
5. A buddy system shall be established to encourage fluid intake and watch for symptoms of heat related injury.
6. The foreman shall monitor those individuals who have had a previous heat-related injury, are known to be on medication, or exhibits signs of possibly having consumed large amounts of alcohol in the previous 24 hours for signs, or indicating symptoms of heat related injuries.
7. Individuals who are not acclimatized shall be allowed additional breaks. The period and number should be determined by the SSHO and provided to the supervisor and employee for implementation.

Cold weather sheltering and clothing requirements include:

1. If wind chill is a factor at a work location, the cooling effect of the wind shall be reduced by shielding the work area or requiring employees to wear an outer windbreak layer garment.
2. An AHA and/or PHA shall be prepared as an attachment to the site-specific, cold-stress monitoring plan and shall identify specific controls to minimize employee exposure to extreme cold.
3. Extremities, ears, toes, and nose shall be protected from extreme cold by proper clothing such as hats, gloves, masks, etc.
4. Employees whose clothing may become wet shall wear an outer layer of clothing that is impermeable to water.
5. Outer garments must provide for ventilation to prevent wetting of inner clothing by sweat.
6. If clothing is wet, the employee shall change into dry clothes before entering a cold environment.
7. Employees shall change socks and removable felt insoles at regular daily intervals or shall use vapor barrier boots.
8. Due to the added danger of cold injury due to evaporative cooling, employees handling evaporative liquid (such as gasoline, alcohol, or cleaning fluids) at air temperatures below 40 °F (4 °C) shall take precautions to avoid soaking of clothing or contact with skin.

f. Contingency Plan for Severe Weather

When there are warnings or indications of impending severe weather (heavy rains, thunderstorms, damaging winds, tornados, hurricanes, floods, lightning, etc.), weather conditions shall be monitored using a weather station that is part of the National Oceanic and Atmospheric Administration (NOAA) weather radio all hazards network or similar notification system. Appropriate precautions shall be taken to protect personnel and property from the effects of the severe weather.

Notification of inclement weather in progress after working hours will be done by phone. Notifying employees at this time can assist management in letting workers know if and when to report to work.

10. RISK MANAGEMENT PROCESS

a. Standard Safe Work Practices

(1) General

The following general safe work practices will be followed:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited in the Work Zone.
- Spillage shall be prevented, to the extent possible. In the event that spillage occurs, the liquid shall be contained, if possible.
- Field crewmembers shall use all their senses to alert themselves to potentially dangerous situations (i.e., presence of strong, irritating, or nauseating odors).
- Field crew members shall be familiar with the physical characteristics of the site, including:
 - Wind direction in relation to the ground Work Zone
 - Accessibility to associates, equipment, and vehicles
 - Communications
 - Site access
 - Nearest water sources
 - Routes and procedures to be used during emergencies.
- All wastes generated during activities at the site must be disposed of as directed by the Project Manager.

(2) Personal Protective Equipment

Personnel Protective Equipment (PPE) is worn to minimize exposure to serious workplace injuries and illnesses. Injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. PPE include items such as gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits. PPE should be of sound design and construction, and well maintained.

- Work clothing - Minimum Requirements.
 - Employees shall wear clothing suitable for the weather however minimum requirements for work shall be short-sleeve shirt, long pants (excessively long or baggy pants are prohibited) and leather work shoes.
 - If analysis determines that safety-toed (or other protective) footwear is necessary (i.e., mowing, weedeating, chain saw use, etc.), they shall be worn. The Navy has requested that safety-toed shoes be worn while performing duties on these installations.
- Eye and Face Protection.
 - Eye and face protection shall be worn as determined by an analysis of the operations being performed
 - However, all involved in chain saw use, chipping, stump grinding, pruning operations, grass mowing, weedeating and blowing operations shall be provided safety eyewear (Z87.1) as a minimum.

- **Hearing Protection.**
 - Hearing protection must be worn by all those exposed to high noise activities (to include grass mowing and trimming, chainsaw operations, tree chipping, stump grinding and pruning). Ear plugs are required when working near operating beach replenishment equipment on Dam Neck Annex.
- **Head Protection.**
 - Hard hats shall comply with ANSI Z89.1 and shall be worn by all workers when a head hazard exists.
 - At a minimum, hard hats shall be worn when performing chain saw use, chipping, stump grinding, pruning operations, grass mowing, weedeating, and blowing operations.
 - Hard hats are required when working within the beach replenishment area on Dam Neck Annex.
- High Visibility Apparel shall comply with ANSI/ISEA 107, Class 2 requirements at a minimum and shall be worn by all workers exposed to vehicular or equipment traffic.
- Protective Leg chaps shall be worn by all chainsaw operators.
- Gloves of the proper type shall be worn by persons involved in activities that expose the hands to cuts, abrasions, punctures, burns and chemical irritants.
- If work is being performed around water and drowning is a hazard, PFDs must be provided and worn as appropriate.

(3) Machine Guards and Safety devices.

- Power tools must have appropriate guards and safety devices in place and operational.

(4) Buddy System

Workers will conduct all site activities with a buddy who is able to:

- Provide his or her partner with assistance.
- Observe his or her partner for signs of heat exposure.
- Notify the project manager if emergency help is needed.

b. Site Hazards and Standard Operation Procedures

(1) Noise

Noise, or unwanted sound, is one of the most pervasive occupational health problems. It is a by-product of many industrial processes.

Hearing protection is required of all field personnel throughout the course of this project when noise generating activities (e.g. saw cutting) are taking place. Exposure to high levels of noise causes hearing loss and may cause other harmful health effects as well. The extent of damage depends primarily on the intensity of the noise and the duration of the exposure.

Noise-induced hearing loss can be temporary or permanent. Temporary hearing loss results from short-term exposures to noise, with normal hearing returning after period of rest. Generally, prolonged exposure to high noise levels over a period of time gradually causes permanent damage.

Hearing protection will be provided to all workers exposed to 8-hour time-weighted average (TWA) noise levels of 85 dB or above. Employees must wear hearing protectors:

- For any period exceeding 6 months from the time they are first exposed to 8-hour TWA noise levels of 85 dB or above, until they receive their baseline audiograms if these tests are delayed due to mobile test van scheduling;
- If they have incurred standard threshold shifts that demonstrate they are susceptible to noise; and
- If they are exposed to noise over the permissible exposure limit of 90 dB over an 8-hour TWA.

(2) Venomous Snakebites

Of the 8,000 people bitten by snakes annually in the United States, fewer than 12 die. Most deaths occur because the victim has an allergic reaction, weakened body systems, or because too much time passes before the victim receives medical care. Reactions from snakebites are aggravated by acute fear and anxiety. Other factors that affect the severity of local and general reactions include: the amount of venom injected and the speed of absorption of venom into the victim's circulation; the size of the victim; protection from clothing including shoes and gloves; quick antivenin therapy; and location of the bite.

Elaborate care for a snakebite is usually unnecessary because in most cases the victim can reach professional medical care within 30 minutes. The most important step in first aid procedures is to transport the victim to the hospital quickly. Meanwhile, take action with the first aid procedures listed below.

First Aid for Snakebite:

- Call EMS (Emergency Medical System) for a victim of snakebite.
- Keep the victim calm. Monitor airway, breathing, and circulation.
- Wash the wound and keep the affected part still. Splint a bitten arm or leg. Keep the affected area lower than the heart to slow down the progress of the venom from the bite site to the heart.
- **Do not apply ice, do not cut the wound, and do not apply a tourniquet.** If in a remote area, contact EMS via radio, then carry the victim or have him or her walk slowly.

Other factors to consider in providing first aid treatment:

- Shock - Keep the victim lying down and comfortable if possible, and maintain his or her body temperature.
- Breathing and Pulse - Constantly monitor airway, breathing, and respiration. Administer artificial resuscitation or CPR if needed.
- Observing the Snake - If feasible without injuring additional persons, observe and take notes of the size, color, and markings of the snake.
- Medications - Do not give the victim alcohol, sedatives, aspirin, or any other medication while transferring to the medical facility.

Other Hazardous Bites

Mosquitoes

West Nile Virus has been spreading quickly throughout the United States, especially in areas with higher mosquito populations. Although this disease has been affecting immuno-compromised individuals, it is best to protect oneself against mosquito bites, which can carry other diseases besides the West Nile Virus.

Repellents containing DEET have been shown to be effective against mosquitoes when applied to exposed skin. Using a repellent with a higher percentage of DEET does not mean that one's protection is better, just that it will last longer. The Federal Centers for Disease Control and Prevention (CDC) has stated that a product containing an approximately 25% concentration lasts an average of five hours, whereas a product with much less DEET will last for one or two hours. Concentrations over 50% do not increase the length of protection.

When using DEET, be cautious against:

- Applying the product indoors. Apply the repellent outdoors and use sparingly.
- Spraying the product directly in one's face. Rather apply to your hands and rub the material on your face, but not on your mouth or around your eyes.
- Do not apply to cuts, irritated skin, or beneath clothing.

Products containing Permethrin, such as Permanone, have been effective when applied directly to clothing. Apply products specified for use on clothing outdoors. Do not apply it to your skin.

The CDC recently announced that products containing two other repellents — the chemical picaridin and natural oil of lemon eucalyptus — are also effective in repelling mosquitoes. In using these for Mosquito control, however, be aware that they are not alternatives to DEET when it comes to battling deer ticks that spread Lyme disease.

If feasible, control the amount of standing water on the site, emptying containers with accumulated water so as not to provide a breeding ground for mosquito larvae. Non-registered pesticides are available to kill larvae in pools of standing water if it is feasible to exercise this level of control over the surroundings.

Be cautious if spraying an insecticide inside a closed space such as in a construction trailer or inside the cab of an excavator or other piece of construction equipment. A toxic environment can quickly be created. Use pesticide sparingly and vacate the space for a short period of time immediately after application to allow the material to settle out of the air.

Spiders

Spiders in the United States are generally harmless, with two notable exceptions: the Black Widow spider (*Latrodectus Mactans*) and the Brown Recluse or violin spider (*Lox Osceles Reclusa*).

The symptoms of such a spider bite are: slight local reaction, severe pain produced by nerve toxin, profuse sweating, nausea, painful cramps in abdominal muscles, and difficulty in breathing and speaking. Victims recover in almost all cases, but an occasional death is reported. The bite of a Black Widow spider is the more painful and often the more deadly of the two.

Field personnel shall exercise caution when lifting covers off manholes or sumps or rummaging through wood, rock, or brush piles, etc. since both the Black Widow and Brown Recluse spiders are typically found in these areas.

(3) General First Aid for Poisonous Insect Bites

1. Minor Bites and Stings

- Cold applications.
- Soothing lotions, such as calamine.

2. Severe Reactions

- Give artificial respiration if indicated.
- Apply a constricting band above the injection site on the victim's arm or leg (between the site and the heart). Do not apply tightly. You should be able to slip your index finger under the band when it is in place.
- Keep the affected part down, below the level of the victim's heart.
- If medical care is readily available, leave the band in place; otherwise, remove it after 30 minutes.
- Apply ice contained in a towel or plastic bag, or cold cloths, to the site of the sting or bite.
- Give home medicine, such as aspirin, for pain.
- If the victim has a history of allergic reactions to insect bites or is subject to attacks of hay fever or asthma, or if he or she is not promptly relieved of symptoms, call a physician or take the victim immediately to the nearest location where medical treatment is available. In a highly sensitive person, do not wait for symptoms to appear, since delay can be fatal.
- In case of a bee sting, remove and discard the stinging apparatus and venom sac.

(4) Tick-borne Diseases

Lyme Disease

Lyme disease is an illness caused by a bacterium, which may be transmitted by the bite of a tick (*Ixodes scapularis*), commonly, referred to as the "Deer Tick." The tick is about the size of a sesame seed, as distinguished from the Dog Tick, which is significantly larger. The Deer Tick is principally found along the Atlantic coast, living in grassy and wooded areas, and feeds on mammals such as mice, shrews, birds, raccoons, opossums, deer, and humans. Not all ticks are infected with the bacterium, however. When an infected tick bites, the bacterium is passed into the bloodstream of the host, where it multiplies. The various stages and symptoms of the disease are well recognized and, if detected early, can be treated with antibiotics.

Removal of ticks is best accomplished using small tweezers. Do not squeeze the tick's body. Grasp it where the mouth parts enter the skin and tug gently, but not firmly, until it releases its hold on the skin. Save the tick in a jar labeled with the date, body location of the bite, and the place where it may have been acquired. Wipe the bite thoroughly with an antiseptic and seek medical attention as soon as possible.

The illness typically occurs in the summer and is characterized by a slowly expanding red rash, which develops a few days to a few weeks after the bite of an infected tick. This may be accompanied by flu-like symptoms along with headache, stiff neck, fever, muscle aches, and/or general malaise. At this stage

treatment by a physician is usually effective; but, if left alone, these early symptoms may disappear and more serious problems may follow. The most common late symptom of the untreated disease is arthritis. Other problems that may occur include meningitis and neurological and cardiac abnormalities. It is important to note that some people do not get the characteristic rash but progress directly to the later manifestations. Treatment of later symptoms is more difficult than early symptoms and is not always successful.

When in an area suspected of harboring ticks (grassy, bushy, or woodland area) the following precautions can minimize the chances of being bitten by a tick:

1. Wear long pants and long-sleeved shirts that fit tightly at the ankles and wrists.
2. Wear light colored clothing so ticks can be easily spotted.
3. Wearing tick repellents may be useful.
4. Inspect clothing frequently while in tick habitat.
5. Inspect your head and body thoroughly when you return from the field.
6. Remove any attached ticks by tugging with tweezers where the tick's mouth parts enter the skin. Do not squeeze or crush it.

Rocky Mountain Spotted Fever

In the United States this tick-borne disease is primarily transmitted by infected Dog Tick (*Dermacentor variabilis*). It is important to note that the Dog Tick is significantly larger than the Deer Tick. Nearly all cases of infection occur in the spring and summer, generally several days after exposure to infected ticks. The onset of illness is abrupt and often accompanied by high fever, headache, chills, and severe weakness. After the fourth day of fever, victims develop a spotted pink rash that usually starts on the hands and feet and gradually extends to most of the body. As with Lyme disease, early detection and treatment significantly reduces the severity of illness. The disease responds to antibiotic therapy with tetracycline or chloramphenicol.

(5) Poisonous Plants

Characteristic Reactions

The majority of skin reactions following contact with offending plants is allergic in nature and characterized by general symptoms of headache and fever, itching, redness, and a rash.

Some of the most common and most severe allergic reactions result from contact with plants of the Poison Ivy group including Poison Oak and Poison Sumac. The most distinctive features of Poison Ivy and Poison Oak are their leaves, which are composed of three leaflets each. Both plants also have greenish-white flowers and berries that grow in clusters. Such plants produce a severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim can also develop a high fever and become very ill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

First Aid Procedure

1. Remove contaminated clothing.
2. Wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol.
3. Apply calamine or other soothing skin lotion if the rash is mild.
4. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.

c. Activity Hazard Analyses

Tabular Activity Hazard Analysis (AHA) is presented here to prescribe hazards and controls associated with the work on the site. The AHAs are prepared based upon a review of the planned work on the site and the recognized physical and biological hazards associated with the work. The AHAs for this project are contained in Appendix F.

Appendix A
Job Safety Checklists

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Pre-Job Hazard Survey

A Tailgate Meeting is required every day before starting work in order to identify and minimize HAZARDS on the job. PLEASE place a check mark in the box next to each of the following HAZARDS that are most relevant to this particular job and DISCUSS them. Keep a copy of the completed form in an office file.

Date ____ Crew Leader _____ Job Location _____
Type of job _____

HAZARD

- day of the week
- extreme weather conditions
- inexperienced personnel
- improper use of PPE
- distance to electrical conductors
- terrain
- noise levels
- new equipment
- obstacles
- traffic control

- moving/lifting heavy objects
- chemicals
- (Other)

DISCUSS

- more accidents on Mon, Fri, & bef/aft holidays & vacation days
- frost bite, heat exhaustion, effect on driving their ability to detect hazardous conditions
- head, eye, hearing, foot, hand, leg injuries
- direct and/or indirect contact
- slips, trips, and falls
- necessity of hand signals
- proper use and maintenance
- overhead and/or ground level
- being struck, protection of the work area, cones & signs
- proper techniques and/or equipment
- contact with or exposure to

Crew members' signatures:

- | | |
|----------|----------|
| 1. _____ | 2. _____ |
| 3. _____ | 4. _____ |
| 5. _____ | 6. _____ |
| 7. _____ | 8. _____ |

Phone number in case of emergency: _____

New Employee Safety Checklist

Employee: _____ Department: _____

Date Hired: _____ Supervisor: _____

Supervisor: Check off each item as you discuss it with the new employee prior to having that employee start work.

1. Employee provided company safety policy statement and safety rule. _____
2. Explained functions of company safety committee. _____
3. Reviewed injury-reporting procedures. _____
4. Issued safety equipment - glasses, ear plugs, respirator, etc., and explained use and care. _____
5. Reviewed lock-out and tag procedures. _____
6. Reviewed safe lifting procedures. _____
7. Will forklift training be required? If yes, when _____ _____
8. Reviewed housekeeping and clean-up procedures. _____
9. Located first aid kits/medical service provider(s)/hospital. _____
10. Reviewed hazard communication program, location of material safety data sheets, and how to read an MSDS _____
11. Reviewed evacuation procedures and any specific duties. _____
12. Does the employee understand the above? _____

I acknowledge that information on the above subjects was furnished to me during my orientation.

Employees Signature _____ Department _____

I have instructed the above named employee in the fundamentals of safety practices.

Supervisor's Signature _____ Date _____

Appendix B
Certification Cards

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This certifies
BRIAN BISHOP
has successfully
completed a
NAUI First Aid / CPR
W/AED + O₂ PROVIDER
training program and
has met NAUI guidelines.

Instructor JAMES COOK
NAUI # 30063
Date 7/22/2014
Course Location UNDERWATER ADVENTURES

 
BRIAN E. BISHOP
Has successfully completed a
NAUI First Aid / CPR
W/AED + O₂ PROVIDER
training program
7/22/2014 J. Cook + J. Cook
Byline / Exam Date / In Instructor / NAUI #



American Red Cross

Christopher Lotts
has successfully completed requirements for
Adult First Aid/CPR/AED: 2 Years

Date Completed: 02/18/2014
conducted by: American Red Cross
Instructor: Alfred Machesney



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Scan code or visit:
redcross.org/online



Appendix C
Accident Report Forms

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Contractor Significant Incident Report (CSIR-1)				Page 1 of 4	
Report Date:		Contracting Activity/ROICC Office			
I. Accident Classification:					
<input type="checkbox"/> Injury <input type="checkbox"/> Illness <input type="checkbox"/> Fatality <input type="checkbox"/> Property Damage <input type="checkbox"/> Procedural Issues <input type="checkbox"/> Environmental					
Involving:					
<input type="checkbox"/> Hazardous Materials		<input type="checkbox"/> Electrical	<input type="checkbox"/> Equip/Motor Vehicle/ Material Handling	<input type="checkbox"/> Diving <input type="checkbox"/> Falls	
<input type="checkbox"/> Confined Space		<input type="checkbox"/> Crane/Rigging	<input type="checkbox"/> Trenching/Entrapment	<input type="checkbox"/> Fire <input type="checkbox"/> Other	
<input type="checkbox"/> Waterfront Operations		<input type="checkbox"/> Demolition/Renovation			
2. Personal Data:					
A. Name (Last, First, M.)		B. Age	C. Sex	D. Social Security Number	
E. Job Description/Title		F. Employed By		G. Supervisor's Name	
3. Witness Data (Attach Witness Summary Statements to Report):					
A. Name (Last, First, M.)			B. Age	C. Sex	
D. Job Description/Title		E. Employed By			
4. General Information:					
A. Date of Accident (Month/Day/Year)		B. Time of Accident	C. Exact Location of Accident		D. Type of Construction Equipment (Make, Model, Serial Number, Vin #)
E. Contract Number/Title		F. Construction Activity SIC		G. Hazardous Material Spill/Release	
H. Type of Contract <input type="checkbox"/> Construction <input type="checkbox"/> A/E <input type="checkbox"/> Service <input type="checkbox"/> RAC <input type="checkbox"/> CLEAN <input type="checkbox"/> JOC <input type="checkbox"/> OTHER		I. Contractor's Name/Address/Phone Number (1) Prime: (2) Sub:			
J. Safety Manager's Name (1) Prime: (2) Sub:		Phone # (1) Prime: (2) Sub:		K. Insurance Carrier (1) Prime: (2) Sub:	

L. Work Activity at Time of Accident

M. Personal Protective Equipment?

- (1) Available & Used
- (2) Not Required
- (3) Available & not used
- (4) Not Related to mishap
- (5) Wrong PPE for job
- (6) List Type(s) used:

5. Injury/Illness/Fatality Information:

A. Severity of Illness/Injury	B. Estimated Days Lost	C. Estimated Days Hospitalized	D. Estimated Days Restricted Duty
E. List Body Part(s) Affected	F. Nature of Illness/Injury	G. Type and Source of Injury/Illness: (1) Type: (2) Source:	

6. A. Accident Description (Describe in your own words) (Use additional paper if necessary)

- B. Who provided first aid and/or cleanup of mishap site?
- C. Any blood borne pathogen exposure by other than EMT's? If so who?
- D. Was site secured and witness interviews taken immediately?
- E. List OSHA and EM 385-1-1 standards/requirements that were violated?

7. Causal Factors (Explain yes answers on a supplementary sheet)	YES	NO
Design - Was design of facility, workplace, or equipment a factor?		
Inspection/Maintenance - Were inspection & maintenance procedures a factor?		
Persons Physical Condition - In your opinion, was the physical condition of the person a factor?		
Operating Procedures - Were operating procedures a factor?		
Job Practices - Were any job safety/health practices not followed when the accident occurred?		
Human Factors - Did any human factors such as size or strength of person etc. contribute to the accident?		

Environmental Factors - Did heat, cold, dust, sun, glare, etc., contribute to the accident?		
Chemical & Physical Agent Factors - Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents such as noise, radiation, etc., contribute to the accident?		
Office Factors - Did office setting such as lifting office furniture, carrying, stopping, etc., contribute to the accident?		
Support Factors - Were inappropriate tools/resources provided to properly perform the activity task?		
Personal Protective Equipment - Did the improper selection, use, or maintenance of personal protective equipment contribute to the accident?		
Drugs/Alcohol - In your opinion, were drugs or alcohol a factor?		
Activity Hazard Analysis - Was the lack of an adequate (IAW EM 385-1-1 Sec 01.A.09) Activity Hazard Analysis a contributing factor? - Was it site specific and address the type of work/operations performed when the mishap occurred?		
Management - Did the lack of adequate supervision contribute to the accident? - Was inadequate information provided at pre-con meeting?		
8. Training:		
A. Was/were person(s) trained to perform activity/task?		
B. Type of training?		
C. Date of most recent formal training? / /		
D. List topics discussed		
9. Fully Explain What Allowed or Caused The Accident, Include Direct and Indirect Causes:		
A. Direct Cause		
B. Indirect Cause		
C. Action(s) taken to prevent re-occurrences or provide on-going corrective actions		
D. Corrective Action Dates		

(1) Beginning (Mo/Da/Yr) _____	(2) Anticipated Completion Date (Mo/Da/Yr) _____	
10. OSHA		
A. Date OSHA was notified _____	C. Date of OSHA Citation _____	
B. Date OSHA Investigated _____	D. \$ Amount of Penalties _____	
11. Report Preparer		
Print Name & Title of Supervisor Completing Report _____		
Signature: _____	Date (Mo/Da/Yr) _____	
12. Management Review (Contracting Officer)		
A. <input type="checkbox"/> Accepted	B. <input type="checkbox"/> Amendments Required	C. <input type="checkbox"/> Comments (include program improvements required for your Command. NAVFACHQ Construction Safety Program and EM 385-1-1)
D. Print Name & Title of Official Completing Report _____		
Signature: _____		Date: (Mo/Da/Yr) _____
13. Safety And Occupational Health Officer Review		
A. <input type="checkbox"/> Concur	B. <input type="checkbox"/> Non Concur	C. <input type="checkbox"/> Additional Actions/Comments
D. Print Name & title of Safety Personnel Reviewing _____		
Signature _____		Date (Mo/Da/Yr) _____

OSHA's Form 301 Injury and Illness Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.



Revised approval OSHA 301 (2)

This *Injury and Illness Incident Report* is one of the forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 304, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____
 Title _____
 Date () - () - ()

Information about the employee

- 1) Full name _____
- 2) Street _____
 City _____ State _____ ZIP _____
- 3) Date of birth _____
- 4) Date hired _____
- 5) Male
 Female

Information about the physician or other health care professional

- 6) Name of physician or other health care professional _____
- 7) If treatment was given away from the workplace, where was it given?
 Facility _____
 Street _____
 City _____ State _____ ZIP _____
- 8) Was employee treated in an emergency room?
 Yes
 No
- 9) Was employee hospitalized overnight as an inpatient?
 Yes
 No

Information about the case

- 10) Case number from the Log _____ (Obtain the case number from the Log after you finish this case.)
- 11) Date of injury or illness () / () / ()
- 12) Time employee began work _____ AM / PM
- 13) Time of exit _____ AM / PM Check if time cannot be determined
- 14) **What was the employee doing just before the incident occurred?** Describe the activity, as well as tools, equipment, or material the employee was using. Be specific. Examples: "climbing a ladder to carry roof materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."
- 15) **What happened?** Tell us how the injury occurred. Examples: "When ladder slipped on wet floor, I fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."
- 16) **What was the injury or illness?** Tell us the part of the body that was affected and how it was affected—more specific than "hurt," "pain," or "sore." Examples: "strained back"; "chemical burn, hand"; "tunnel syndrome."
- 17) **What object or substance directly harmed the employee?** Examples: "concrete floor"; "chlorine (radia) area sign." If this question does not apply to the incident, leave it blank.
- 18) **If the employee died, when did death occur?** Date of death _____

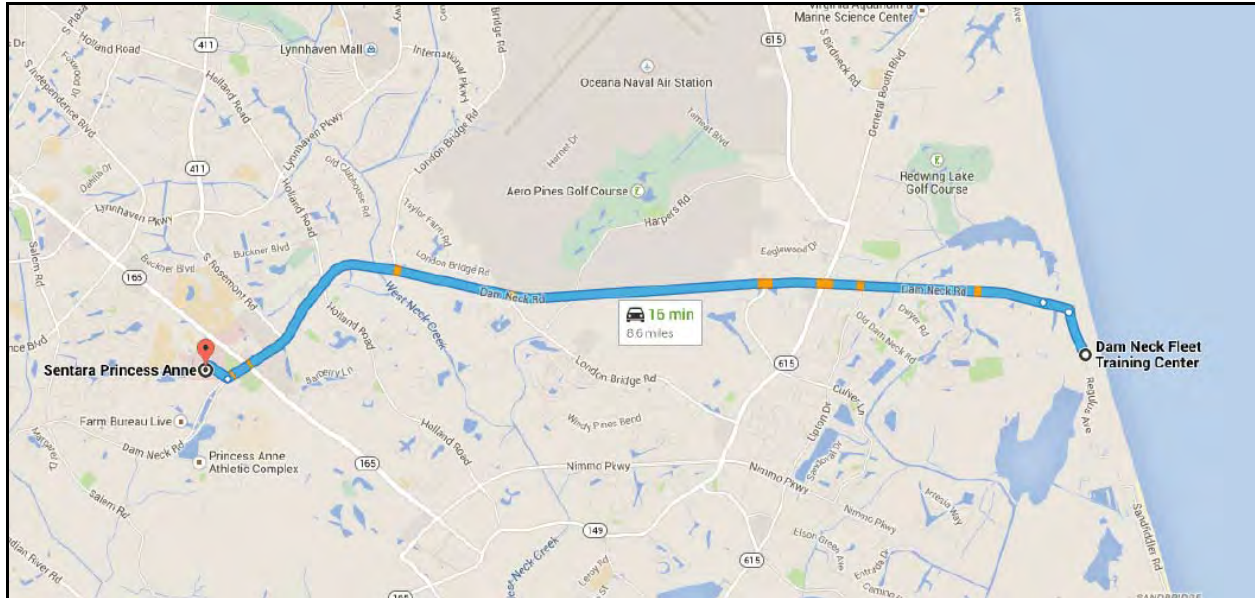
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Appendix D
Maps and Driving Directions to Local Hospitals

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Map and driving directions from Dam Neck Annex to Sentara Princess Anne Hospital



○ Dam Neck Fleet Training Center

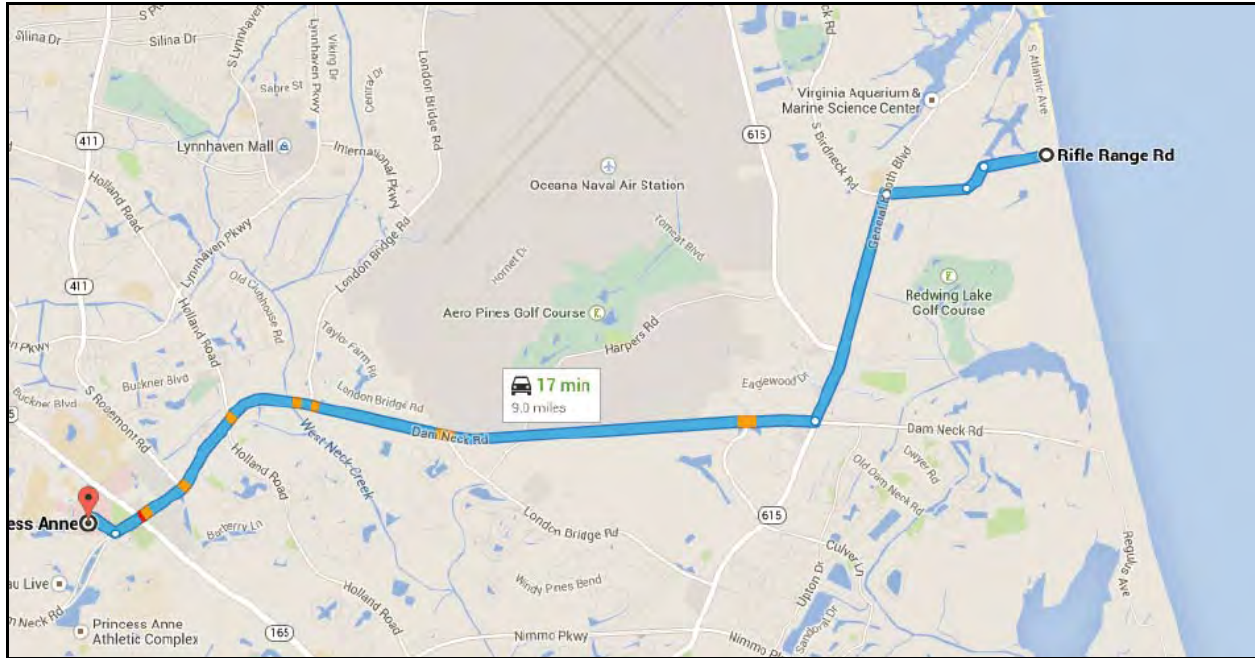
1912 Regulus Avenue, Virginia Beach, VA 23461

- ↑ 1. Head north on Regulus Ave toward Talos St
⚠ Restricted usage road
0.4 mi
- ↙ 2. Turn left onto Vanguard St
⚠ Restricted usage road
0.3 mi
- ↑ 3. Continue onto Dam Neck Rd
7.7 mi
- ↘ 4. Turn right onto Glenn Mitchell Dr
📍 Destination will be on the left
0.2 mi

◎ Sentara Princess Anne

1925 Glenn Mitchell Drive, Virginia Beach, VA 23456

Map and driving directions from Camp Pendleton to Sentara Princess Anne Hospital



Rifle Range Rd

Virginia Beach, VA 23461

1. Head west on Rifle Range Rd toward Regulus Ave
▲ Restricted usage road
0.5 mi
2. Turn left at Jefferson Ave
0.2 mi
3. Slight right onto S Birdneck Rd
0.6 mi
4. Turn left onto General Booth Blvd
1.8 mi
5. Turn right onto Dam Neck Rd
5.7 mi
6. Turn right onto Glenn Mitchell Dr
i Destination will be on the left
0.2 mi

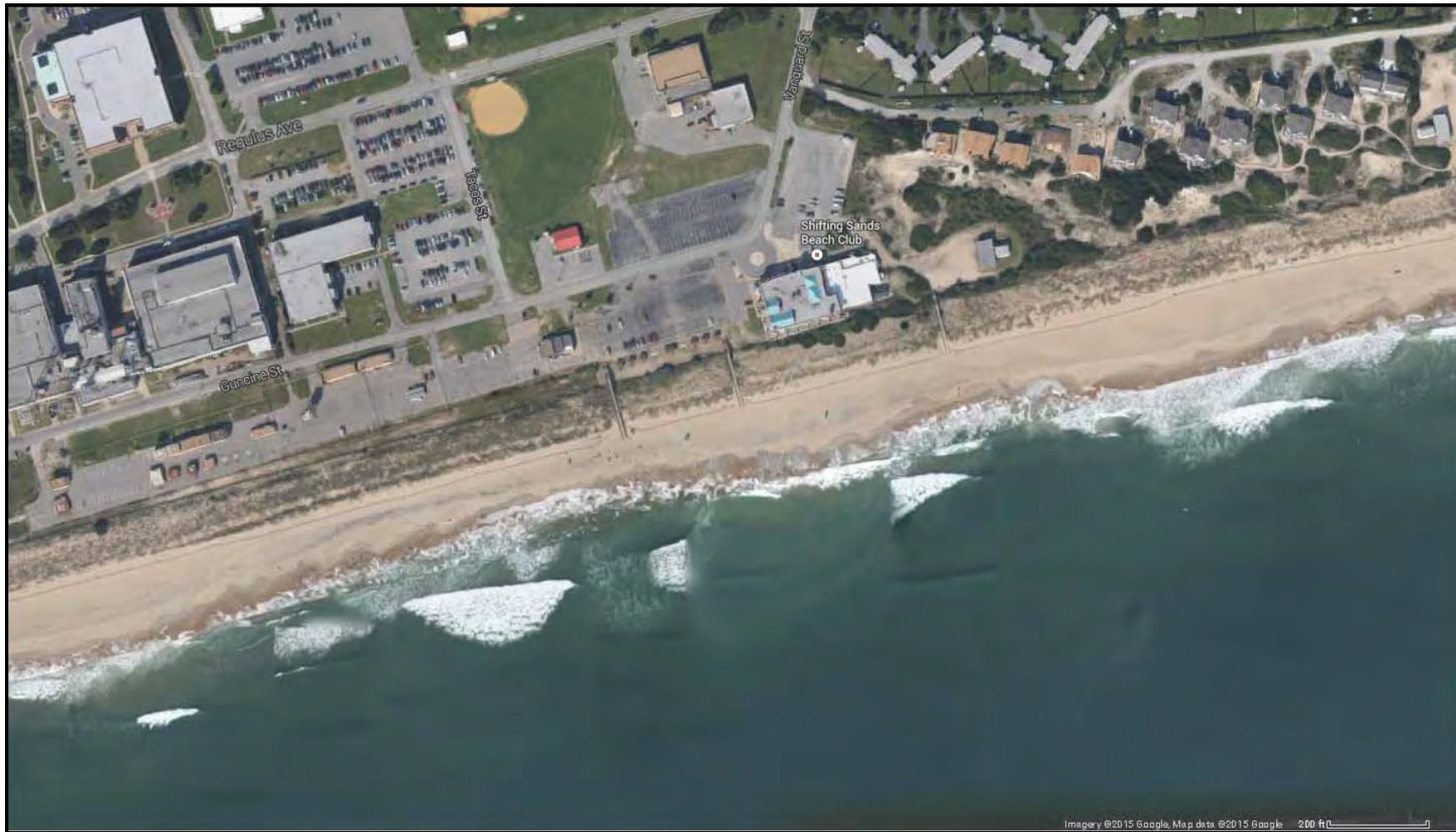
Sentara Princess Anne

1925 Glenn Mitchell Drive, Virginia Beach, VA 23456

Appendix E
Maps and Driving Directions to Fresh Water and Restroom Facilities

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Location of nearest restroom and wash facilities on Dam Neck Annex.



Location of nearest restroom facilities on Camp Pendleton



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Appendix F
Activity Hazards Analysis

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Activity/Work Task: Lighting Survey for Sea Turtle Management		Overall Risk Assessment Code (RAC) (Use highest code)				M	
Project Location: Naval Air Station Oceana-Dam Neck Annex and VA Army National Guard Camp Pendleton		Risk Assessment Code (RAC) Matrix					
Contract Number: N62470-13-D-8017-WE04		Severity	Probability				
Date Prepared: 04/03/2015			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):		Catastrophic	E	E	H	H	M
Brian Bishop / Project Manger		Critical	E	H	H	M	L
Reviewed by (Name/Title):		Marginal	H	M	M	L	L
Mark Housand / Versar, Inc. Safety Manager		Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					
		"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.					
		RAC Chart					
		"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible					
		E = Extremely High Risk					
		H = High Risk					
		M = Moderate Risk					
		L = Low Risk					
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.					
Job Steps		Hazards		Controls		RAC	
General Safety		Slips, Trips and Falls		Use caution and pay particular attention to uneven and rough terrain while working on the site.		M	
		Muscle strain/ Back strain		Stretch muscles prior to working. Use proper methods for digging. Wear gloves. Stop work to rest if feeling strain or fatigue.		M	
		Wildlife		Avoid contact with wildlife. In case of animal bite, perform first aid and seek medical attention for bites from mammals or reptiles (snakes and lizards).		L	
		Insects		Utilize insecticide with DEET to eliminate mosquito bites, West Nile Virus and Lyme Disease. Treat clothing with Permethrin and allow appropriate amount of drying time prior to wearing the clothes.		M	
		Venomous Insect Stings/Bites		For minor stings/bites carefully remove stinger (if necessary) and wash area; apply dressing and cold pack. If the person seems to be having an allergic or anaphylactic reaction call 911 or Installation Emergency Response number.		M	
Walking on uneven ground		Trips, falls, sprains, broken bones, lacerations and contusions		Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles Slopes of 30 degrees or greater will be avoided. Climbing up or down vertical areas will be avoided		L	
Working near water		Stay cognizant of surf zone		Do not enter the water, stay cognizant of tides and surf Stay within eye sight of partner Wear high visibility vests		L	
Working at night		Hit by vehicles		Be observant while walking. Stay clear of oncoming traffic Wear high visibility vests		M	
Weather Hazards		Hypothermia		Watch for shivering, altered mental status. Care for life-threatening problems, get patient to a warm place if possible, remove wet clothing, warm patient slowly.		M	
		Heat Stress		Adjust work schedule to cooler hours of the day; Sufficient fluid intake; Monitor employees for heat related illness.		M	
		Sun Exposure		Besides head protection, use sunscreen of SPF 30 rating or better as protection against UVA and UVB. Reapply sunscreen often. Sunscreen should be no more than one year old. Wear sunglasses to protect eyes from UV exposure.		M	
Construction Areas		Struck by equipment, noise		Be observant Attend specialized orientation training Wear required PPE while inside construction zone		M	
Equipment to be Used		Training Requirements/Competent or Qualified			Inspection Requirements		
Long pants, shirt with sleeves		Only trained and authorized persons will use excavation equipment and power tools.			Pre-operation inspection on front end loader		
Hard hat, steel-toed boots, hearing protection is construction zones							
High visibility vests							
Designated Competent/Qualified Person(s):							
Brian Bishop							
Chris Lotts							
Susan Barco							
Sarah Rose							

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NASO DNA Restricted Access Coordination Area



Survey Area 1

Firing Range

Survey Area 2

Maneuver Training Area

Survey Area 3, with 3 potential subsections (A-north, B-center, C-south)

Firing Range

Firing Range

South of Red Line = Escort Required and must report to Building 301 via the installation main gate off of Dam Neck Blvd. Photo are NOT authorized in this area. Only under VERY special conditions will photos be authorized. DO NOT bring cameras, phones with cameras, iPads or other items with Camera like capabilities into this area. ***If you identify a must photo opportunity (e.g., T&E species) in a no PHOTO zone, take a point location and contact Mike Wright immediately.***

North of Red Line = An escort is NOT required and access to this area may be obtained via the Birdneck Road Gate. Photos are authorized in this area for individuals who obtain a photo authorization letter.

Orange Polygon is a Drone Launch Range. When active the beach will be posted with signs and lookout personnel that will deny access. Individuals can check to see if the range is active or is preparing to be active, before the range goes "hot" sometimes they will let personnel on official business access until they go "hot." There are also red flags posted on the two roads that surround the White Polygon that indicate the range is active.

Survey Area 4

White Polygon is UXO Area. No Access without appropriately trained Explosive Safety Officer on site. Navy does not supply ESOs.

Survey area 5



Attachment 2 Artificial Light Source and Fixture Descriptions

Source: Witherington, B. and R. E. Martin. 2003. Understanding, Assessing, and Resolving Light-Pollution Problem on Sea Turtle Nesting Beaches. FMRI Technical Report TR-2 Third Edition, Revised. Florida Fish and Wildlife Conservation Commission.

APPENDIX A

The following is a list of artificial light sources grouped by the level of disruption they are likely to cause sea turtles. The criteria used to group the sources came from studies of physiological spectral sensitivity (Granda and O'Shea, 1972), hatchling orientation with respect to laboratory light sources (Mrosovsky and Carr, 1967; Mrosovsky and Shettleworth, 1968; Mrosovsky, 1972; Witherington and Bjorndal, 1991a; Witherington, 1992b) and commercial light sources (Dickerson and Nelson, 1988, 1989; Witherington, 1989; Witherington and Bjorndal, 1991b; Ferreira *et al.*, 1992; Nelson, 1992; Witherington, 1992b), and spectral profiles of commonly used lamps (Anonymous, 1983; Rossotti, 1983; Anonymous, 1989; Witherington and Bjorndal, 1991b). Effects are described as being extremely disruptive, highly disruptive, moderately disruptive, or minimally disruptive.

White, broad-spectrum, short-arc lighting (*extremely disruptive*).—These light sources include xenon and mercury arc lamps and are the brightest and highest-energy light sources commonly used. They emit wavelengths rather evenly across the visible spectrum (which is why they appear white) and in the ultraviolet spectrum as well. They are used principally for temporary, intense lighting needs.

White, broad-spectrum, electric-discharge lighting (*extremely disruptive*).—Mercury-vapor, metal-halide, and fluorescent-tube lighting are included in this group. Like sources in the preceding group, these sources emit wavelengths across the visible spectrum. They are used both indoors and outdoors. Fluorescent-tube lighting is becoming more common as an indoor source and is frequently used to light porches and outdoor signs.

Color-phosphor and tinted-fluorescent lighting ("blacklight" ultraviolet, violet, blue, green, and mixtures of these colors) (*extremely disruptive*).—As revealed to some extent by their colors, these electric-discharge tube lamps emit light principally in the short-wavelength end of the visible spectrum. The so-called "blacklight"-type fluorescent tubes, however, emit much of their light in the near-ultraviolet region. These blacklight tubes appear as a dim violet color to humans but are very disruptive to sea turtle hatchlings. Blacklights are often used as insect attractants in insect-electrocuting "bug-zappers." Tubes of other colors are principally used for decorative applications.

White, broad-spectrum, incandescent lighting (*extremely disruptive*).—Light emitted from incandescent sources comes from a glowing filament. This group includes quartz-tungsten-halogen and simple tungsten-filament sources. Without tinting, these sources emit wavelengths throughout the visible spectrum but less so in the short-wavelength end of the spectrum than the sources described above. Incandescent sources are commonly used as outdoor

floodlights, as indoor lighting (*i.e.*, the common light bulb), and as transient lighting (flashlights, lanterns, and electric torches).

Color-tinted incandescent lighting (blue and green) (*extremely disruptive*).—These colored sources are tinted so that they emit principally short-wavelength light; they are often used in decorative applications.

White, pressurized-fuel, glowing-element lanterns (*extremely disruptive*).—These portable lanterns are used for camping, fishing, and other transient nighttime activities.

High-pressure sodium vapor (HPS) lighting (*highly disruptive*).—HPS sources emit light with minor wavelength peaks in the blue and green regions and major peaks in the yellow and orange regions of the visible spectrum. The color of HPS sources is whitish golden to peach. Although less disruptive than the broad-spectrum white sources above, HPS is one of the most commonly used outdoor light sources in the USA and many other countries and is one of the most common causes of hatchling misorientation and mortality.

Open fires (*moderately to highly disruptive*).—Although fires are temporary light sources and emit less short-wavelength light than the sources above, they have been documented as a significant source of hatchling mortality. Unlike other attractive light sources, fires can kill hatchlings quickly (hatchlings are known to crawl into fires and die). The size and temperature of a fire determines how attractive it is to hatchlings.

Yellow-phosphor and amber-tinted fluorescent lighting and red tubes (*moderately disruptive*).—Yellow and amber fluorescent tubes emit principally red, yellow, and green wavelengths but do not exclude light in the blue region of the spectrum as well as yellow incandescent bulbs do. Yellow and amber fluorescent tubes are not generally marketed as "bug lights." Although they are more disruptive to

sea turtles than yellow incandescent bulbs, yellow and amber fluorescents are far better than white or other colored tubes for use near nesting beaches. However, the hue of these yellow fluorescent lamps varies between manufacturers and can have a varied effect on sea-finding in hatchlings. Red tubes are typically used for decoration and can be of two types: red (or reddish), phosphor-fluorescent tubes and red, neon tubes. Reddish or red-purple fluorescent tubes can be very disruptive, depending upon the amount of short-wavelength light that they emit (purplish lights emit both blue and red light). Neon tubes are covered below.

Lamps with yellow or orange dichroic long-pass filters (*minimally to moderately disruptive*).—Because these filters are very good at attenuating short wavelengths, the type of lamp used with them matters little. Consequently, these filters may allow the use of lamps like metal-halide and HPS that have small and easily focused elements. These lamps can be used in more directional fixtures in order to reduce stray light. Dichroic filters are not standard off-the-shelf accessories for commercial fixtures but they have been used in some outdoor applications near nesting beaches.

Color-tinted incandescent lighting (yellow and red) (*minimally to moderately disruptive*).—Yellow or amber incandescent light bulbs (bug lights) are generally only weakly attractive to hatchlings for the same reason that they attract few insects — they emit little short-wavelength light. Although they are minimally disruptive for the most part, bug lights can interfere with sea-finding if they are numerous, of high wattage, or close to the nesting beach. Red-tinted incandescent sources are more variable in color than bug lights. Some red sources can turn purple or pinkish over time (an indication of greater short-wavelength emission) and become more attractive to hatchlings.

Low-pressure sodium vapor (LPS) lighting (*minimally disruptive*).—LPS is by far the least disruptive light source among those commonly used. LPS sources emit a light that is pure (monochromatic) yellow, a region of the spectrum that is only weakly attractive or even aversive (at higher intensities for loggerheads only) to orienting hatchlings. Because

LPS sources have poor color rendition, they are used principally for outdoor applications.

Red light-emitting diode (LED) lighting (*minimally disruptive*).—LEDs are miniature lamps that are not commonly used outdoors. In the future, LEDs may be used to a greater extent as sign lighting and pathway lighting. Red LEDs come close to being ideal for use near sea turtle nesting beaches. Red LEDs emit a pure-red light that does not vary in color over the life of the lamp, and because they are small, they light only a limited area. They are easy to hide from the beach and have a very long life. Green and amber LEDs are marketed but are much less preferred than red.

Neon tubes (*minimally disruptive*).—True neon tubes (not tinted tubes) are a pure-red light source. At present, neon is used almost exclusively for decorative purposes. Neon tubes can be difficult to shield, but their color makes them minimally disruptive. Potential applications include pathway and ground-level lighting.

Transient light sources (flashlights, electric torches, flash photography) (*disruptive characteristics vary*).—This lighting is placed in a separate category because it is generally in use for relatively short time periods. Most of these sources have white incandescent lamps and can be expected to affect sea turtles as the incandescent sources above do. Transient sources are well-known disruptors of sea-finding behavior in hatchlings and adults, but researchers are less certain about how transient sources may affect nesting turtles or those emerging from the ocean to nest. Many workers in the field believe that flashlights and flashes from cameras can turn emerging turtles back to the sea and alter the behavior of nesting turtles. Until additional evidence suggests otherwise, transient light sources should be used sparingly on sea turtle nesting beaches. If handheld lighting is to be used, deep-red filters should be fastened over the lens of the source. Red light appears much brighter to humans than it does to sea turtles and does not degrade the night vision of people using it. People using red light are able to acclimate to the dark, and most are surprised by how well they can see by starlight and moonlight alone.

APPENDIX E

Diagrams of common lighting fixtures showing mounting position, light distribution, and overall suitability for use near sea turtle nesting beaches. For purposes of recommending suitable mounting distances from nesting beaches, the crest of the primary dune is considered to be the landward limit of the beach. Fixtures are assessed for their suitability in minimizing direct and indirect lighting of the beach. For all fixtures, glowing portions of luminaires (including reflectors and globes) should not be visible from the nesting beach.

WALL-MOUNTED AREA LIGHTING

MOUNTING SUITABILITY:

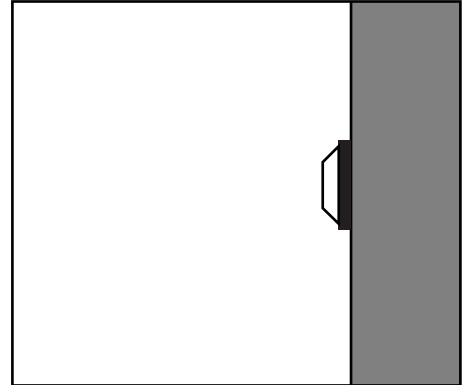
Poor. Very poor when mounted on upper stories.

DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Poor. Not suitable for the beach sides of buildings.



WALL-MOUNTED AREA LIGHTING, "WALL PAK"

MOUNTING SUITABILITY:

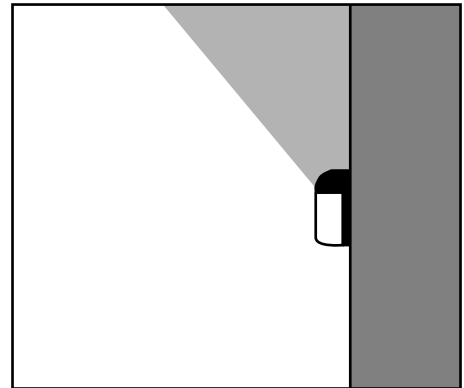
Poor. Very poor when mounted on upper stories.

DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Poor. Not suitable for the beach sides of buildings.



DECORATIVE CUBE LIGHT

MOUNTING SUITABILITY:

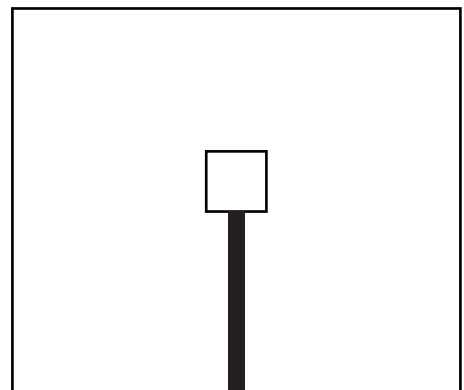
Fair if mounted at heights lower than 2 m. Poor if mounted higher.

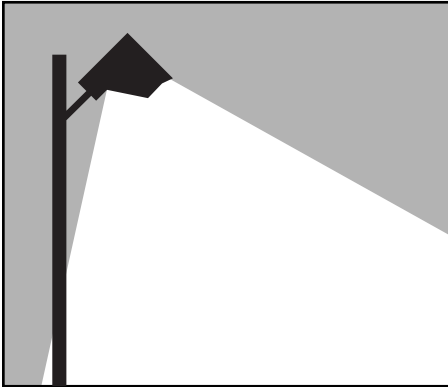
DIRECTIONAL SUITABILITY:

Very poor.

OVERALL SUITABILITY:

Very poor. This fixture is difficult to shield and should not be used near nesting beaches.





POLE-MOUNTED FLOODLIGHTING WITH FULL VISOR

MOUNTING SUITABILITY:

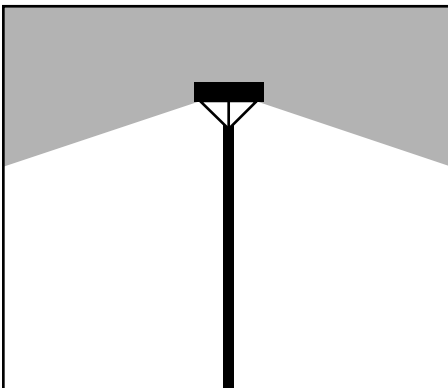
Good if directed downward and away from the beach.

DIRECTIONAL SUITABILITY:

Good.

OVERALL SUITABILITY:

Good if directed downward and away from the nesting beach and if light does not illuminate objects visible from the beach.



POLE-TOP-MOUNTED CUTOFF LIGHTING, "SHOEBOX" FIXTURE

MOUNTING SUITABILITY:

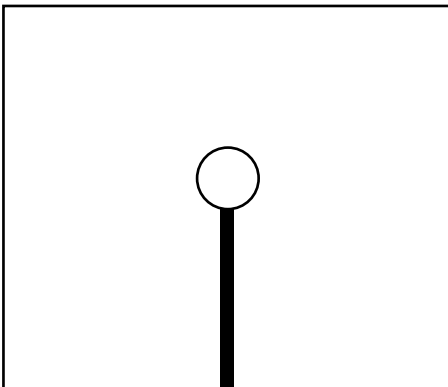
Good to poor, depending on mounting height. Mounting height should be no more than 5 m within 100 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Fair to good, as determined by reflectors.

OVERALL SUITABILITY:

Fair to good when mounting heights are low.



DECORATIVE GLOBE LIGHT

MOUNTING SUITABILITY:

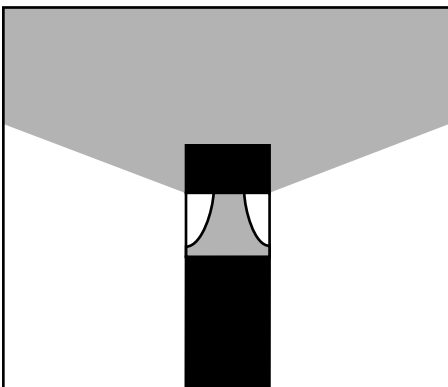
Fair if mounted at heights lower than 2 m. Poor if mounted higher.

DIRECTIONAL SUITABILITY:

Very poor.

OVERALL SUITABILITY:

Very poor. This fixture is difficult to shield and should not be used near nesting beaches.



LIGHTING BOLLARD WITH HIDDEN LAMP

MOUNTING SUITABILITY:

Good if mounting height is near 1 m.

DIRECTIONAL SUITABILITY:

Poor to fair.

OVERALL SUITABILITY:

Fair. Good if additional shields on the beach side of the fixture are used.

LOW-LEVEL “MUSHROOM” LIGHTING

MOUNTING SUITABILITY:

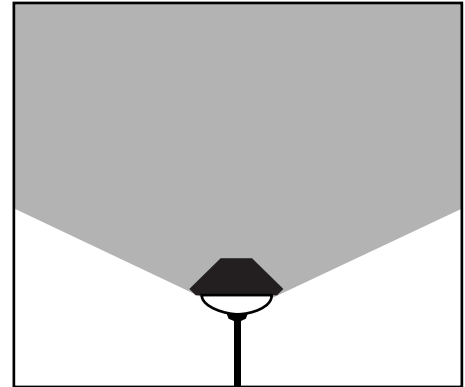
Good if mounted at foot level.

DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Fair. Good to excellent if used so that vegetation and topography block its light from the beach.



LOW-LEVEL “TIER” LIGHTING

MOUNTING SUITABILITY:

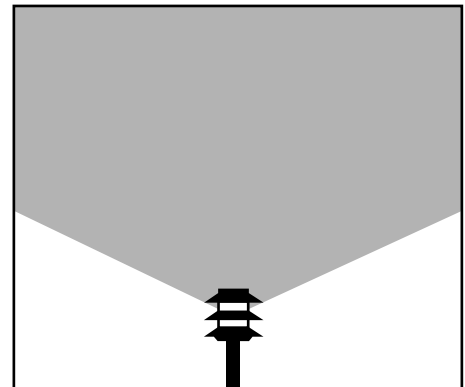
Good if mounted at foot level.

DIRECTIONAL SUITABILITY:

Poor but can be good if the fixture has louvers that eliminate lateral light.

OVERALL SUITABILITY:

Fair. Good to excellent if used so that vegetation and topography block its light from the beach.



LIGHTING BOLLARD WITH LOUVERS

MOUNTING SUITABILITY:

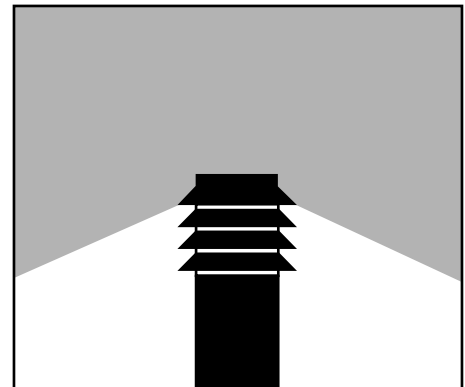
Good if mounting height is near 1 m.

DIRECTIONAL SUITABILITY:

Good.

OVERALL SUITABILITY:

Good.



GROUND-MOUNTED FLOODLIGHTING

MOUNTING SUITABILITY:

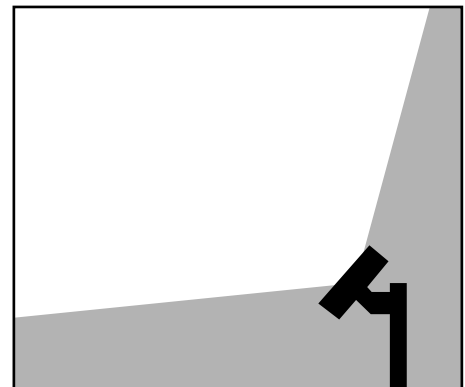
Poor, because of its upward aim.

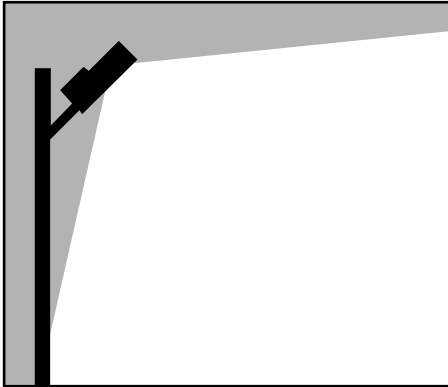
DIRECTIONAL SUITABILITY:

Fair to good.

OVERALL SUITABILITY:

Fair to poor if directed away from the beach. Very poor if directed toward the beach.





POLE-MOUNTED FLOODLIGHTING

MOUNTING SUITABILITY:

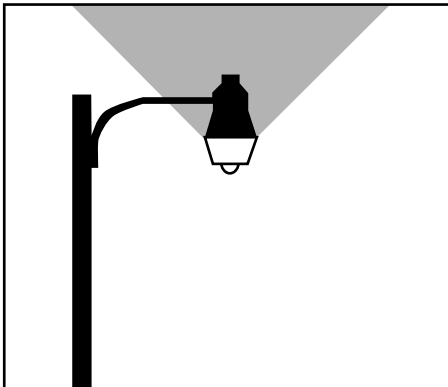
Fair if directed downward and away from the beach.

DIRECTIONAL SUITABILITY:

Fair to good.

OVERALL SUITABILITY:

Fair to good if aimed downward and directly away from the nesting beach and if light does not illuminate objects visible from the beach. Otherwise, poor to very poor.



ARM-MOUNTED AREA LIGHTING, "OPEN-BOTTOM" OR "BARN LIGHT" FIXTURE

MOUNTING SUITABILITY:

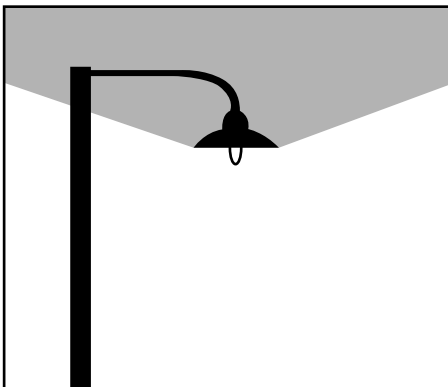
Poor to very poor, depending upon mounting height. Should not be mounted higher than 5 m within 150 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Poor if unshielded. Fair if shielded.

OVERALL SUITABILITY:

Poor.



ARM-MOUNTED AREA LIGHTING, DECORATIVE "PENDANT" FIXTURE

MOUNTING SUITABILITY:

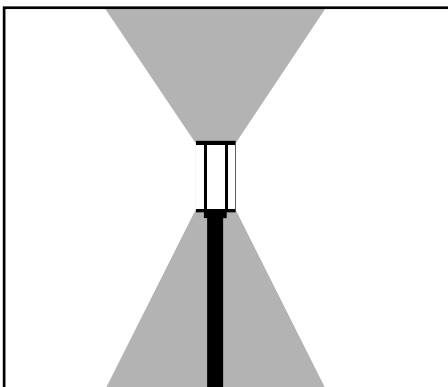
Poor to very poor, depending upon mounting height. Should not be mounted higher than 5 m within 150 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Poor. Difficult to shield properly.

OVERALL SUITABILITY:

Poor.



DECORATIVE "CARRIAGE" LIGHTING

MOUNTING SUITABILITY:

Fair if mounted at heights lower than 2 m. Poor if mounted higher.

DIRECTIONAL SUITABILITY:

Very poor. Fair if properly shielded.

OVERALL SUITABILITY:

Poor.

ARM-MOUNTED CUTOFF LIGHTING, "SHOEBOX" FIXTURE

MOUNTING SUITABILITY:

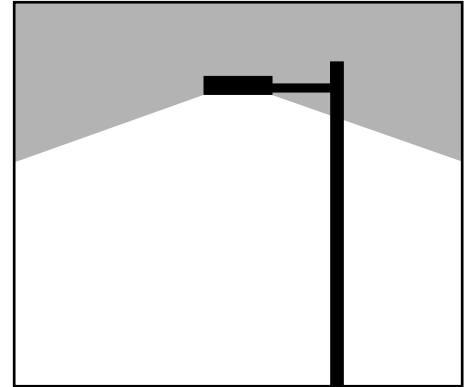
Good to poor, depending on mounting height. Mounting height should be no more than 5 m within 100 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Fair to good, as determined by reflectors.

OVERALL SUITABILITY:

Fair to good when mounting heights are low and fixtures are aimed directly downward.



ARM-MOUNTED AREA LIGHTING, "COBRAHEAD" FIXTURE

MOUNTING SUITABILITY:

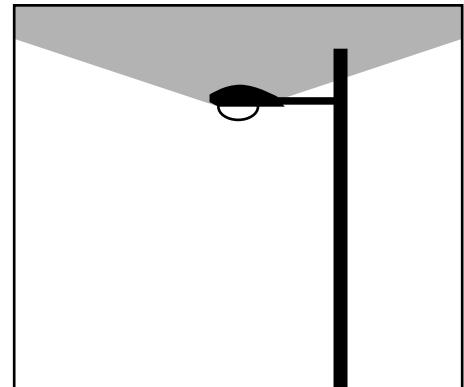
Poor to very poor, depending on mounting height. Mounting height should be no more than 5 m within 150 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Poor. Difficult to shield properly.

OVERALL SUITABILITY:

Poor.



ARM-MOUNTED AREA LIGHTING, "FLAT-FACE" CUTOFF FIXTURE

MOUNTING SUITABILITY:

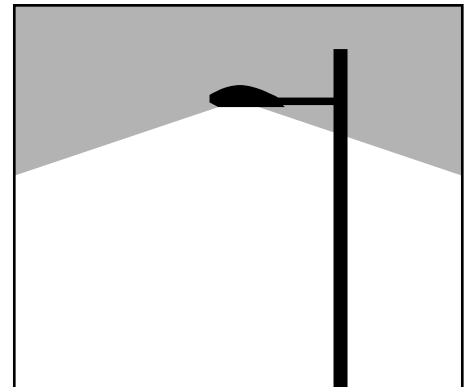
Good to poor, depending on pole height. Mounting height should be no more than 5 m within 100 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Fair to good, as determined by reflectors.

OVERALL SUITABILITY:

Fair to good when mounting heights are low.



SIGN LIGHTING, BOTTOM-UP STYLE

MOUNTING SUITABILITY:

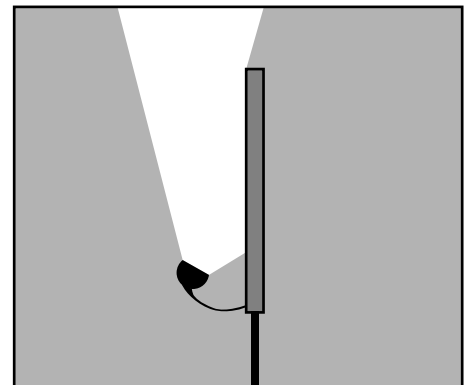
Poor, because of its potential for producing uplight scatter.

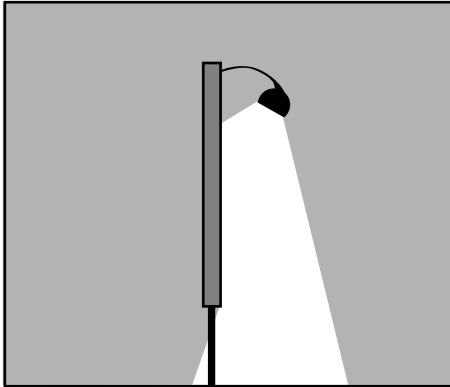
DIRECTIONAL SUITABILITY:

Poor to good.

OVERALL SUITABILITY:

Poor. Signs near nesting beaches should be lighted from the top down. In no case should lighted signs be visible from the beach.





SIGN LIGHTING, TOP-DOWN STYLE

MOUNTING SUITABILITY:

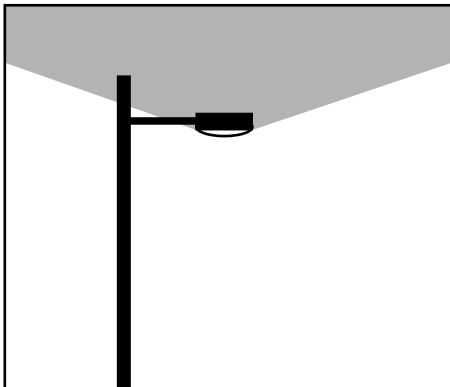
Good.

DIRECTIONAL SUITABILITY:

Poor to good.

OVERALL SUITABILITY:

Generally good if the sign is not visible from the beach and if the lighting is well aimed.



ARM-MOUNTED AREA LIGHTING, FIXTURES WITH REFRACTING GLOBES OR CONVEX LENSES

MOUNTING SUITABILITY:

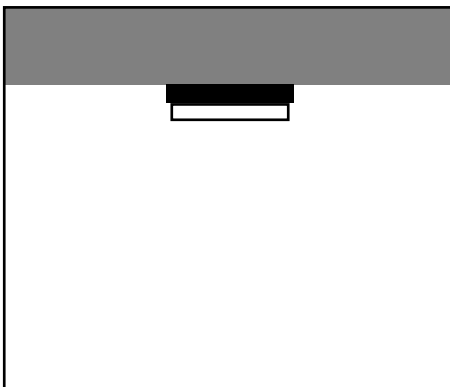
Poor to very poor, depending upon mounting height. Mounting height should be no more than 5 m within 150 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Poor. Fair to good if shielded properly.

OVERALL SUITABILITY:

Poor.



CEILING-MOUNTED AREA LIGHTING, FIXTURES WITH REFRACTING GLOBES OR CONVEX LENSES

MOUNTING SUITABILITY:

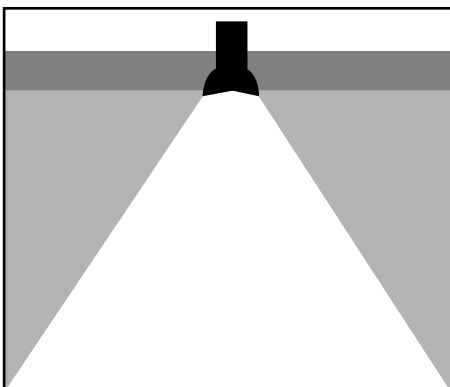
Poor if mounted on the beach sides of buildings or on upper stories. Good if shielded from the beach by buildings.

DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Poor to fair, depending upon mounting location.



CEILING-RECESSED DOWNLIGHTING WITH BAFFLES TO ELIMINATE LATERAL LIGHT

MOUNTING SUITABILITY:

Good to excellent when mounted in lower-story ceilings and soffits.

DIRECTIONAL SUITABILITY:

Excellent.

OVERALL SUITABILITY:

Good to excellent.

**WALL-MOUNTED AREA LIGHTING,
“JELLY-JAR” PORCH LIGHT FIXTURE**

MOUNTING SUITABILITY:

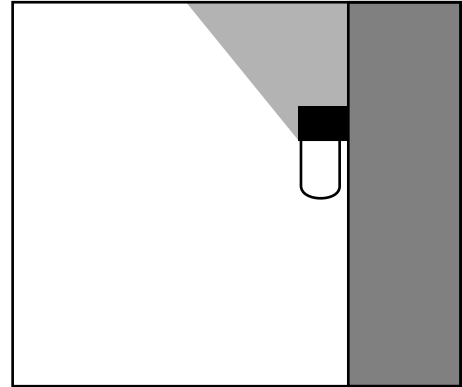
Poor. Very poor when mounted on upper stories.

DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Poor.



LINEAR TUBE LIGHTING

MOUNTING SUITABILITY:

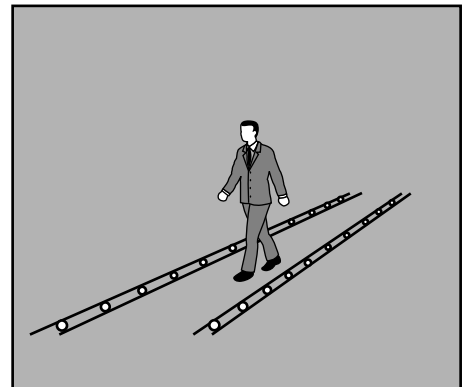
Excellent if mounted at foot level.

DIRECTIONAL SUITABILITY:

Fair to poor, but this lighting is of concern only if mounted high or if large numbers of high-wattage (>3 W) lamps are used.

OVERALL SUITABILITY:

Excellent if low-wattage strips are used sparingly in recessed areas.



LOUVERED STEP LIGHTING

MOUNTING SUITABILITY:

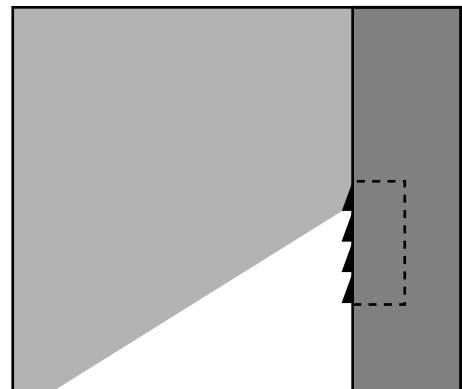
Excellent if mounted at foot level.

DIRECTIONAL SUITABILITY:

Excellent.

OVERALL SUITABILITY:

Excellent.



WALL-MOUNTED DOWNLIGHTING

MOUNTING SUITABILITY:

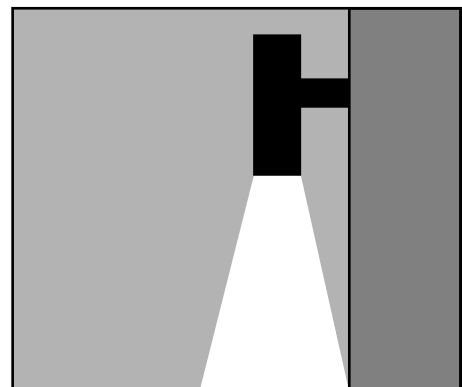
Good to excellent when mounted on lower-story walls.

DIRECTIONAL SUITABILITY:

Excellent.

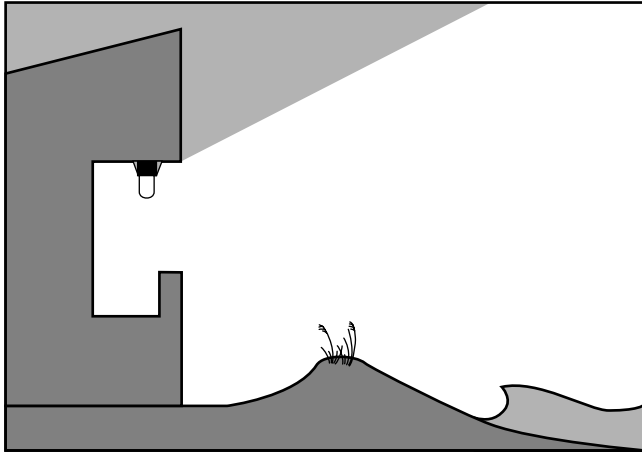
OVERALL SUITABILITY:

Good to excellent.



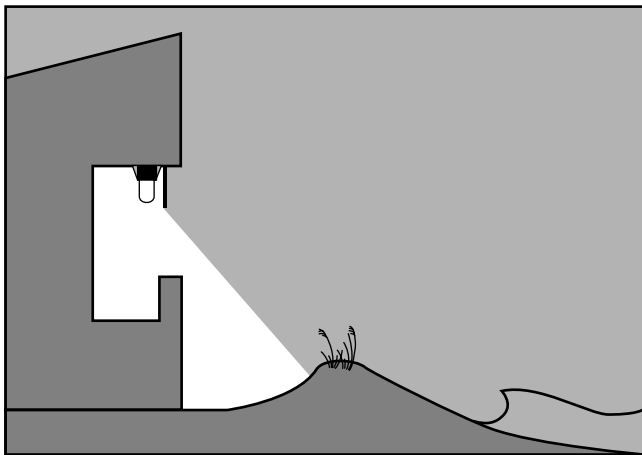
APPENDIX F

Diagrams depicting solutions to two common lighting problems near sea turtle nesting beaches:
balcony or porch lighting and parking-lot lighting.



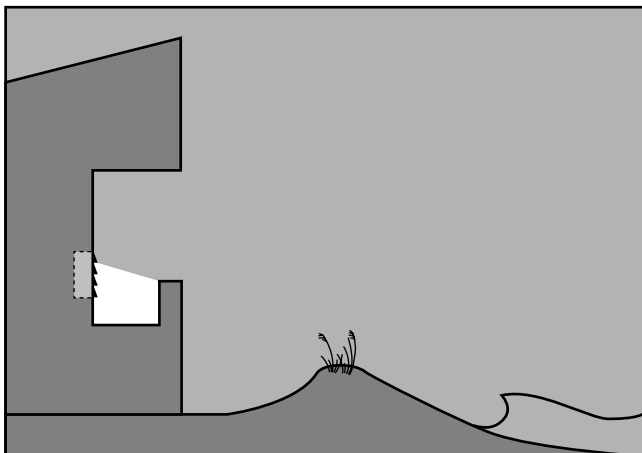
POOR

Poorly directed balcony lighting can cause problems on sea turtle nesting beaches.



BETTER

Completely shielding fixtures with a sheet of metal flashing can reduce stray light reaching the beach.

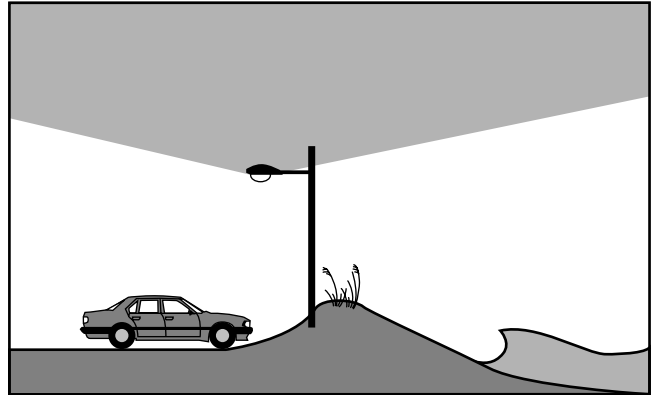


BEST

Louvered step lighting is one of the best ways to light balconies that are visible from nesting beaches.

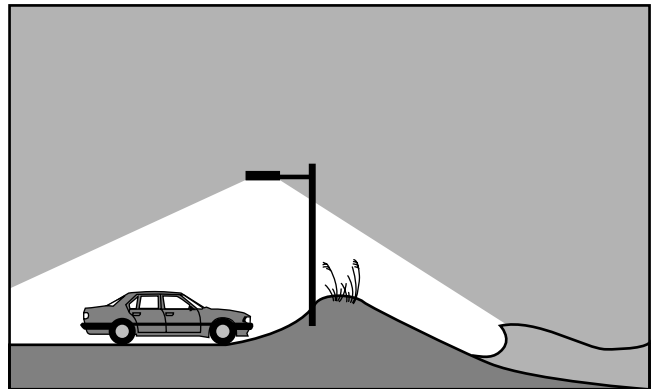
POOR

Poorly directed parking lot lighting can cause problems on sea turtle nesting beaches.



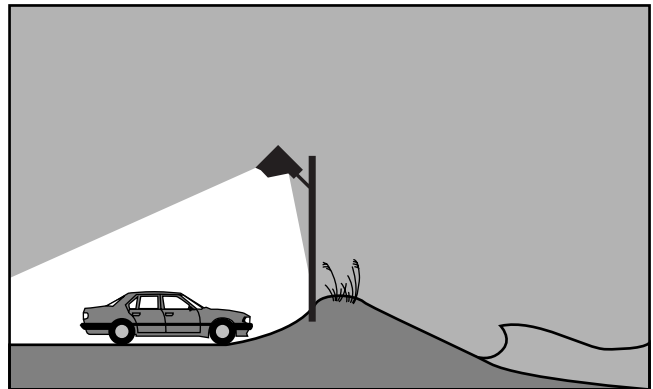
BETTER

Fixtures with 90° cutoff angles can reduce the amount of stray light reaching the beach.



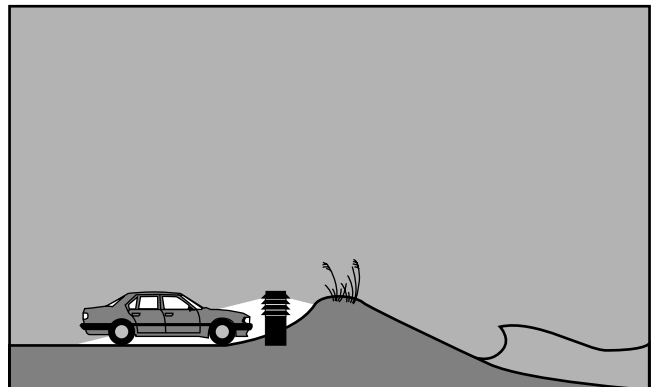
MUCH BETTER

Fully hooded floods can direct light accurately and reduce stray light even more.



BEST

Low-mounted, louvered bollard fixtures are the best way to light parking lots near nesting beaches.




Appendix K


Nest Management Units of NASO Dam Neck Annex

NASO DNA Sea Turtle Nest Management Reference Map (Rev Aug 2015)


Legend


 Installation Boundary Line

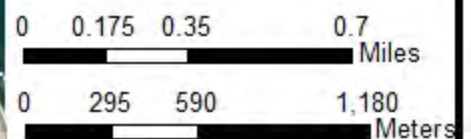
Nest Mngt. Zones

 Training Area. Nests to be Relocated to a Green Zone.

Training Area. Nest Above High-tide Rack-line can be Left in Place with Self-release Cage and Posts on All 4 Sides. Nest Negatively-Inhibiting Training Routes can be Relocated West, Closer to Duneline, with Self-release Cage and Posts on All 4 Sides. If Number of Nests Negatively Inhibit Training, New Nests will be Relocated to Green Nest Mngt. Zones with Self-release Cages and Posts on All 4 Sides. No Nest-sitting.

 Training Area. Nest Above High-tide Rack-line can be Left in Place with Self-release Cage and Posts on All 4 Sides. Nest below High-tide Rack-line will be Relocated Due West of the Original Nest Site, Above the Rack-line with Self-release Cage and Posts on All 4 Sides. Nest-sitting is Authorized.

 Recreational Use Area. Nest Above High-tide Rack-line can be Left in Place with Self-release Cage and Posts on All 4 Sides. Nest below High-tide Rack-line will be Relocated Due West of the Original Nest Site, Above the Rack-line with Self-release Cage and Posts on All 4 Sides. Nest-sitting is Authorized.



Appendix L

Project Review SOP

Review each project proposed in the INRMP or by the installation or tenant of the installation (Env. Checklist Reviews, Site Approval Reviews, Site Work Induction Board Project Reviews, Work Permits, etc.) for potential concerns associated with Sea Turtles.

Federally Listed Threatened and Endangered Sea turtles utilize the beaches and nearshore environment of NASO Dam Neck Annex. These species are influenced/impacted by lights utilized at night. During the months of Apr-Sept no Bright Lights should be utilized at night to avoid conflicts with Nesting or hatching Sea Turtles at night. If light utilization is required at night at this facility, lights should be outfitted with devices to minimize eastwardly shine and direct the glow of the light downwards not outward. Lighting should be kept to a minimum and not exceed the current glow/intensity currently seen from the beach/ocean.

A lighting Assessment is to be awarded in FY15 along with a total Sea Turtle Biological Assessment (BA) for the 4 miles of NASO DNA beach front property. A programmatic USFWS Biological Opinion (BO) is anticipated to be received pending submittal of the BA. The lighting assessment will be inserted into Appendix J of this document (Sea Turtle SOP). The BO will be added to Appendix A of this document (Sea Turtle SOP). The information and materials in Appendix J and A will be utilized as appropriate to advise facilities management of existing facility modifications that need to be made and for advising requirements for future projects on the installation to maintain compliance under the endangered species act.

Training missions and recreational beach utilization during breeding season.

All individuals conducting training in the LCAC training area of the installation should receive training on sea turtle and sea turtle crawl identification. If a turtle or crawl is observed, the activity should stop, the Installation Natural Resources Manager (INRM) should be notified immediately via the Command Duty Officer, and the activity should not resume until the INRM has cleared the site for training to continue.

Nesting sea turtle surveys are conducted on all NASO DNA beaches (4 miles) each day during sea turtle nesting season (15 May - 31 Aug annually). Surveys start 1/2 hour before sunrise and typically end (if nothing is found) 1 to 2 hours later. If a sea turtle nest/crawl is found it must be cordoned off and USFWS (until Navy obtains appropriate permits) must come to collect biological data and relocate the nest if conditions dictate that relocation is warranted; otherwise the nest is caged, marked and left on site (and monitored each day until it has hatched).

These surveys allow us to clear the beaches to allow maximum training opportunities within the constraints of the law.

Daily sand smoothing activities (e.g., MWR beach clean-up) should occur immediately after the NASO Environmental Staff has completed their patrol and cleared the beach for daily use. No smoothing activities are authorized from dusk until morning turtle patrols are completed daily from 15 May - 31 Aug, unless prior coordination and authorizations have been made with the CO's designated INRM.

Fires are not authorized on the beach at Night, from May - October.

Outdoor lighting should be kept to a minimum at Night, from May-October. Use of lighting on the beach should be restricted to red-light conditions (e.g., red lenses, or white lights that have been covered with red film/tape), unless there is an emergency.

Enclosure 2. Marine Resources Stranding Database & Reporting Process



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Enclosure 3. Virginia Aquarium Stranding Response

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STRANDING REPORTING PROCESS

1. Contact the VA Aquarium Stranding Team (757-385-7575, 0830-1630 hours or 757-385-7576 for afterhours live stranding emergencies) for sea turtle, sturgeon, and marine mammal strandings. For fish strandings (such as Sharks, mass non-shark fish strandings, sturgeon, large unusual fish strandings, or any other protected fish species of concern) contact the Virginia Aquarium's Curator of Fishes, Beth Firchau, 757-434-0745.
2. Fill-out the STRANDING REPORT FORM (see below) for on-land or open water identified strandings and Return to your installation Natural Resources Manager (NRM), ASAP.
3. Notify your NRM of the Stranding(s), immediately. If the stranding involves marine mammals or sturgeon provide them the information in the stranding report form. (Michael Wright, 757-373-8531) The NRM will notify the NAVFAC MIDLANT EV22 Subject Matter Expert (SME) and NOAA POCs, as appropriate.
4. The NRM will Call OPNAVINST 3100.6H Reportable Strandings into CNO N45, Washington DC 703-695-5271 (Frank Stone), 703-342-6455 (Bob Gisiner) &/ or the NOC Battalion Watch Captain (703-692-9284); COMLANTFLT 757-836-5221 (Richard "Jene" Nissen); and NAVFAC MIDLANT Core (Jessica Bassi, 757-341-0493).
 - o The following strandings are OPNAVIST reportable events:
 - Any stranding that involves a Northern Right Whale or Beaked Whale.
 - Any stranding that involves a floating whale in open water.
 - Any discovery of a whale stranded ashore.
 - Any mass stranding (two or more animals) of whales, or dolphins that results in coverage by the local or national media.
 - Claims of unusual marine mammal behavior reported in the media, or by National Marine Fisheries Service, a private party or non-governmental entity in which naval operations, exercises or training have been implicated are reportable events.
 - Any other incident involving marine mammals, which have significant media interest and may implicate naval operations at sea are also reportable events. Examples of such marine mammal events might include manatee strandings or mass strandings (two or more) of dolphins, seals, sea lions, otters, etc.
5. If it is determined that an OPREP 3 Navy Blue report is required related to the stranding event the Natural Resources Manager will coordinate with the CDO to complete the initial report.
6. Enter Stranding Report Data into the NASO Natural Resources Access Database.

Note: Regarding Sea turtles, Marine Mammals, Sturgeon and/or other Protected Species, ONLY an individual/organization containing the appropriate Regulatory Issued Permits (e.g., USFWS, NOAA, VAST, VDGIF, VCU, etc.) is legally authorized to relocate/touch these animals. The NASO NRM has obtained a NOAA-NMFS issued permit regarding sturgeon salvage and is inquiring regarding obtaining permits regarding sea turtles with USFWS via VDGIF.

Key Contacts:

- Navy on Scene Coordinator (NOSC) = 757-341-0449(o); 757-636-4378(c)
- Regional Operations Center (ROC) = 757-322-2609(24hrs); 757-322-3093
- NASO Command Duty Officer (CDO) = 757-438-3159 (24hrs)
- NASO Natural Resources Manager (NRM) = 757-433-3461(o); 757-373- 8531(c)
- NASO Conservation Law-enforcement Officer (CLEO) = 757-433-2151(o); 757-635-5436(c)
- NASO Environmental Program Director = 757-433-3437(o)
- NAVFAC MIDLANT Core Marine Animal Media Manager = 757-341-0493(o)
- NAVFAC MIDLANT Core Natural Resources Supervisor = 757-341-0495(o)
- NAVFAC MIDLANT Core Environmental Conservation and Planning Director = 757-341-1988(o)
- NOAA Sturgeon POC = 978-282-8473(o)
- Virginia Aquarium Stranding Team (VAST) = 757-385-7575; 757-385-7576(emergency#)

Note: The ROC and the CDO should be able to assist with locating and getting equipment (if available) for emergency response. Jessica Bassi has developed the NAVFAC MIDLANT Regional Stranding Investigation Assistance Plans (RSIAP), which has received final approvals.

Note: The RSIAP indicates that the CDO will coordinate trying to obtain equipment to assist with marine animal stranding response, when needed. The need would be for large animal (e.g., whales) and mass stranding events (e.g., multiple dolphins stranding at the same time). Heavy equipment that can access and operate on a beach would be needed, primarily fork-lift type vehicles and vehicles that can dig large deep holes for burials.

- MACS-24 has provided emergency assistance previously.
 - Sgt. Leonard Oleson 757-492-6465 x229
 - GySgt Eric Orth 757-492-3878/3891
 - Maj Woodworth 757-492-6465 x234
- NSWDG may be able to assist (CLEO, Lawrence McGrogan may have additional POCs)
 - Keith Crutchfield 757-862-9006(o); 757-619-1145(c)
 - John Puvogel 757-862-9004(o)
 - Ken O'Malley 757-862-9002(o)
 - Sally Torgler 757-862-9001(o)
- VAANG Camp Pendleton CO has indicated that they have a battalion that could assist us upon request with equipment needs
 - SSG Reynaldo Abeng 757-493-3123(o); 757-2024268(c)
 - SFC Randy Carter 434-294-2100(c)
 - LTC Elena M. Scarbrough 757-493-3128(o); 434-480-7465(bb)

STRANDING REPORT FORM

1. Date of incident: _____
2. Time of incident(local vice zulu time): _____
3. Type of incident (turtle, dolphin, whale, seal, shark, sturgeon, other):
-

4. Location of incident(include lat/long; base or property name; and geographical location, floating in Atlantic Ocean nearshore, laying on beach in surf, laying on beach in rack line, laying on beach between the dune and the rack line, etc.) :
_____ / _____

5. Identity of person who discovered event (e.g. military, civilian, other government personnel):

6. Identity of person preparing this report (name, command, job position):

7. Time strandings commenced: _____

8. Time of last stranding: _____

9. Stranded Marine Animal Condition:

Species	Total #	Alive	Dead	Severely Decayed	Necropsy Completed (Yes, No, In Process)

10. Who performed or will be performing the necropsy.

11. Date & Time VA Aquarium Stranding Team was notified:

12. Date & Time VA Aquarium Stranding Team Responded on site:

13. Were Photos Taken, If so by whom, attach photos to report (send digital copies to the installation Natural Resources Manager):

14. Additional Notes:

15. Below Space Left Open for Additional Notes or Drawings:

Attention all boaters and beach-walkers!
Sea Turtle Cold Stunning Season is Here!

With water temperatures dropping quickly, sea turtles, which are cold-blooded reptiles, are finding themselves in trouble all over the east coast. Due to the surrounding cold waters, some of these animals may appear deceased but are actually in a coma, and require IMMEDIATE ATTENTION! If you come across any sea turtle swimming, floating or stranded on the beach, stay with it and please call the

Virginia Aquarium Stranding Response Team

757-437-6159





SEALS IN VIRGINIA

What should you do if you see a seal on the beach?



Each winter the Virginia Aquarium Stranding Response Team handles dozens of calls about seals on the beaches, docks and piers of the Virginia coast. Sightings of seals have increased dramatically in the last ten years and many of the seals we see appear to be healthy and do not need our intervention, but **they do need to be left alone!**

Wild healthy seals regularly rest on land. We call this behavior hauling out. When seals are hauled out, they need rest and should not be disturbed. If a seal is constantly disturbed and must continue going back into the water, it won't get the rest it needs to stay healthy.

Sometimes seals are in need of assistance. Sick and injured animals are candidates for recovery, rehabilitation and eventual release. The Virginia Aquarium Stranding Response Team has a permit and is trained to handle and treat seals and functions as part of the National Marine Mammal Stranding Network operated by NOAA. If a seal is obviously compromised, and it is unlikely to survive on its own, we will intervene and attempt rehabilitation. If we cannot determine whether a seal needs help, we often monitor it for 24 to 48 hours to assess its condition. We try not to intervene until we are certain an animal needs help.

If you see a seal on a beach, please call the Virginia Aquarium Stranding Response Team at **757-437-6159**. We will ask you a series of questions to help us determine whether the seal is in need of help or if it should be left alone to rest undisturbed.

Please follow the following guidelines when you encounter a seal on land:

- **Keep people and pets away from resting seals!** Keep pets on leashes and give seals a wide berth of 150 feet or more so they can rest undisturbed.
- **Do not walk between a resting seal and its access to water.** If you have to walk around a seal, walk on the land side and avoid blocking its exit route.
- **Be quiet around a resting seal!** Loud or sudden noises will disturb them.
- **Never approach closely!** Wild seals can carry diseases and parasites that you or your pet could get.
- **Never offer food to a wild seal!** Seals are wild animals and feeding them not only allows them to lose their natural fear of humans, but is also illegal under the Marine Mammal Protection Act.
- **Report seal sightings to the Virginia Aquarium Stranding Response Team! Call us at 757-437-6159, we are available every day.**
- **Enjoy the view!** Seals are beautiful wild animals. Enjoy them from a distance and respect their need to stay wild.



Enclosure 4. Section 7 Consultation on Repairs to the Shoreline Protection System at Naval Station Oceana, Dam Neck Annex, Virginia Beach (2012); Biological Opinion on the Back Bay National Wildlife Refuge Sea Turtle Management Program, Virginia Beach, Virginia (2011)

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United States Department of the Interior



FISH AND WILDLIFE SERVICE

Ecological Services
6669 Short Lane
Gloucester, Virginia 23061

MAY 25 2012

Mr. W. David Noble
Director, Environmental Planning and Conservation
Department of the Navy
Navy Region Mid-Atlantic
1510 Gilbert Street
Norfolk, Virginia 23511-2737

Attn: Ben McGinnis, Environmental Planning and Conservation

Re: Section 7 Consultation on Repairs to
the Shoreline Protection System at
Naval Station Oceana, Dam Neck
Annex, Virginia Beach

Dear Mr. Noble:

On November 3, 2012, the U.S. Fish and Wildlife Service (Service) delivered our response to the Biological Assessment (BA) prepared by the Navy for the referenced project and its effects on the federally listed endangered roseate tern (*Sterna dougallii dougallii*) and the federally listed threatened Atlantic piping plover (*Charadrius melodus*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and seabeach amaranth (*Amaranthus punilus*) in accordance with section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA). In our November 3, 2012 response, the Service concurred with the Navy's determination of may affect, but is not likely to adversely affect for the roseate tern and seabeach amaranth. The Service requested that the Navy address concerns regarding proposed management for loggerhead sea turtles, green sea turtles, and piping plovers.

In a letter dated April 20, 2012, the Navy requested the Service's concurrence with the determination of may affect, but is not likely to adversely affect for the loggerhead sea turtle, green sea turtle, and piping plover based on modifications made by the Navy to their Integrated Natural Resource Management Plan (INRMP). Additionally, the Navy requested the Service's concurrence with a no effect determination for nesting federally listed endangered leatherback sea turtle (*Dermochelys coriacea*), hawksbill sea turtle (*Eretmochelys imbricate*), and Kemp's ridley sea turtle (*Lepidochelys kempii*). The Service concurs with the Navy's no effect determination for these three species of sea turtle because no records of nesting attempts by these species have been documented in Virginia.

Regarding loggerhead and green sea turtles, the Navy's INRMP includes a Sea Turtle Monitoring Protocol section, which sets criteria for daily monitoring of nesting sea turtles and nests, nest protection, and nest relocations. The Navy has agreed to leave nests in situ rather than

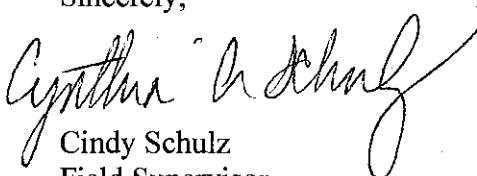
relocating nests, only moving nests when operational uses of the beach would result in the take of a nest. In such cases, the Navy will coordinate with the Service's Back Bay National Wildlife Refuge (NWR). All nest relocations by the Navy will be conducted in accordance with the methods outlined in the July 13, 2011, biological opinion issued to Back Bay NWR (copy enclosed) that provides ESA compliance for such activities at False Cape State Park, Back Bay NWR, Sandbridge Beach, Virginia Beach Resort Area, and Fort Story.

The Service does not concur with the Navy's determination of may affect, but is not likely to adversely affect for nesting loggerhead and green sea turtles, because take of turtles may occur. However, this letter amends the Loggerhead Sea Turtle Nest Monitoring and Management on Back Bay NWR biological opinion issued by the Service on July 13, 2011, to add Naval Station Oceana, Dam Neck Annex. This letter will be appended to that biological opinion and maintained as part of the decision document and administrative record. The biological opinion, this amendment, and the criteria in the INRMP together provide ESA compliance for the Navy related to monitoring of nesting sea turtles and nests, nest protection, and nest relocations for both loggerhead and green sea turtles that may occur at Naval Station Oceana, Dam Neck Annex.

The Navy has included in their INRMP guidelines for migratory bird monitoring and management. The INRMP includes protocols to ensure surveys and daily observations during sea turtle nesting periods will include monitoring for both piping plover and the federal candidate red knot (*Calidris canutus rufa*). There are no records of piping plovers nesting on beaches south of the Chesapeake Bay, where the species is considered to be an uncommon transient. Because it is unlikely that the piping plover will utilize this area and the monitoring protocols will be implemented, the Service concurs with the Navy's determination of may affect, but is not likely to adversely affect for piping plovers.

If you have any questions, please contact Mike Drummond of this office at (804) 693-6694, extension 122, or via email at mike_drummond@fws.gov.

Sincerely,



Cindy Schulz
Field Supervisor
Virginia Ecological Services

Enclosure

cc: Back Bay NWR, Virginia Beach, VA (Attn: Kathy Owen)
VDGIF, Richmond, VA (Attn: Amy Ewing)

Mr. Noble

Page 3

VDGIF, Wachapreague, VA (Attn: Ruth Boettcher)
VDCR, DNH, Richmond, VA (Attn: René Hypes)



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Ecological Services
6669 Short Lane
Gloucester, Virginia 23061

JUL 13 2011

Memorandum

To: Project Leader, Back Bay National Wildlife Refuge
(Attn: Geralyn Mireles, Wildlife Biologist)

From: Supervisor, Virginia Ecological Services *Cynthia A. Schuy*

Subject: Biological Opinion on the Back Bay National Wildlife Refuge Sea Turtle Management Program, Virginia Beach, Virginia

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the subject project and its effects on the federally listed threatened loggerhead sea turtle (*Caretta caretta*) and green sea turtle (*Chelonia mydas*). The Service's Back Bay National Wildlife Refuge (BBNWR) proposes to conduct sea turtle nest management activities on BBNWR and adjacent properties along the Atlantic coast beaches extending from the Virginia/North Carolina border to the mouth of the Chesapeake Bay. This biological opinion is submitted in accordance with section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA). Formal consultation was initiated on January 27, 2011.

This biological opinion is based on the BBNWR Comprehensive Conservation Plan (CCP) (Service 2010), emails, telephone conversations, a sea turtle management meeting, and other information provided by the Service, Virginia Department of Game and Inland Fisheries, and others. A complete administrative record of this consultation is on file in this office.

CONSULTATION HISTORY

- 08-03-10 BBNWR requested section 7 consultation on their revised CCP.
- 08-03-10 to 9-13-10 The Virginia Field Office (VAFO) and BBNWR coordinated on a management plan to review and revise sea turtle and beach management on BBNWR.
- 09-13-10 VAFO and BBNWR completed review of BBNWR CCP and completed informal consultation. BBNWR and VAFO committed to conducting a meeting and evaluation of sea turtle management prior to the 2011 sea turtle nesting season to review and revise sea turtle management and complete formal section 7 consultation, if necessary.

- 01-19-11 VAFO held a sea turtle management meeting which included BBNWR and other agencies conducting sea turtle nest management and beach management in Virginia.
- 02-02-11 VAFO received draft intra-Service section 7 consultation form on BBNWR sea turtle management.
- 02-02-11 VAFO and BBNWR reviewed and revised sea turtle nest management protocol to 06-15-11 and intra-Service consultation form.
- 06-15-11 VAFO received final revisions of the nest management protocol and intra-Service consultation from BBNWR.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed activity is to continue monitoring and managing loggerhead sea turtle nests within all sea turtle nesting areas including the beaches of BBNWR, the Virginia Beach resort area, Fort Story, the City of Sandbridge, and False Cape State Park (FCSP). These management practices will continue until the loggerhead sea turtle is no longer listed. If nests of other sea turtle species are found, including the green sea turtle, the same protocol will be followed. Activities within sea turtle nesting habitat include crawl and nest searches as well as nest relocations.

A limited number of permit holders drive vehicles on the beach at BBNWR. Permits are issued to continue traditional ingress and egress along the BBNWR beach between the permittee's residence and their full-time employment in the Norfolk-Virginia Beach area. These permits are not transferrable and will be terminated when the current permit holder is no longer able to drive, or when alternate access becomes available during the permit period. Permittee access on BBNWR beach is prohibited between 12:00 am and 5:00 am from May 1 – September 30, to reduce negative impacts on sea turtles.

Monitoring Methods -

Turtle crawl and nest searches - Morning patrols for turtle crawls and nests are conducted from about June 1 through August 31. FCSP employees patrol BBNWR and FCSP, while BBNWR staff and volunteers are responsible for the north mile of BBNWR and Sandbridge Beach. A BBNWR volunteer patrols the Fort Story and Virginia Beach resort area beaches. Personnel use ATVs for the surveys, but vehicles may be used on the beaches where permitted beach driving is allowed.

When a turtle crawl is found, BBNWR staff determine whether the crawl resulted in a nest. The presence of a "body pit" in a sea turtle crawl usually indicates the turtle attempted to lay eggs. BBNWR biologists closely examine the body pit for indented impressions and/or mounded areas that indicate the location of the female's front flippers. This dictates her position when the eggs

were deposited. If flipper impressions are found, the area directly to the rear is targeted as the most probable nest location and is carefully excavated by hand first. The fingertips are used to probe the sand for a small, soft spot, unlike the surrounding more densely packed sand. This indicates the nest location. If flipper impressions are not found, the flattened circular area at either end of the tracks is targeted. Eggs are usually a few inches below this soft, 2-3 inch opening, so extreme care is taken. The biologist gently digs by hand into the body pit to locate the egg chamber and determine if eggs are present (Service 2007). The location and date of the crawl will be recorded, whether a nest is found or not.

Nest relocation - The construction of dunes on FCSP and BBNWR beaches in the 1930s resulted in blockage of overwash and dune blowout areas which otherwise would have allowed nesting sea turtles access to higher beach elevations. Current turtle nesting is limited to lower elevation sections of the beach which are susceptible to extensive saltwater inundation, beach erosion and complete nest loss during monthly high tides, "northeaster" storms, and hurricane activity in the mid-Atlantic. Other potential threats including vehicular beach traffic and public use activity also exist on these beaches.

The following risk analysis is performed by BBNWR biologists to determine if a nest needs to be relocated. If the answer to either of the two questions below is affirmative, the nest is relocated:

- Is the nest/body pit located below the estimated mean high tide lines -- as evidenced by the wrack lines and reference to tidal conditions when personnel survey the beach?
- Is the nest in an area where there is a likelihood that vehicles will run over the nest with signage and markers installed, or that there is a likelihood that intense artificial lighting will result in hatchling disorientation?

Once nests are determined to be present, biologists wear nitrile gloves prior to handling any eggs. This minimizes potential harm to the handlers (i.e., salmonella) and to the eggs (human carried bacteria, temperature change, etc.).

Before eggs are removed, the depth from beach surface to the top of eggs is measured. Using excavated sand from the original nest, a 2 inch layer of moist sand is placed in the bottom of a cooler (Sill et al. 2000). Keeping exposed eggs shaded with an umbrella, BBNWR staff remove eggs individually from the nest, being careful not to rotate them in the process. Eggs are placed into the cooler with a 1 inch border of sand between the eggs and the sides of the cooler. The eggs are placed in the cooler in a consistent and methodical manner with note taken of the order. The number of eggs in each layer are counted and recorded. Eggs are packed in such a manner that they are not touching and with 2 inches of sand between each layer of eggs. Usually two coolers are used. After all eggs are removed, the distance from the beach surface to the bottom of the nest depth is measured (Boulon 1999, Service 2007). The length and width of the nest cavity at the widest and longest points is also measured. Once all eggs are placed in the cooler, extra sand from the nest is placed over them and into a separate container. This sand is used to surround the reburied eggs at the nursery site located on BBNWR behind the primary dune. Once all the data has been recorded, the nest cavity is refilled and the crawl brushed out with

rakes and shovels. Eggs are kept out of direct sunlight; jolting or shifting is avoided during the trip to the nursery (Mortimer 1999).

At the designated nursery site a vertical shaft large enough for the predator-proof cage is dug with a spade/shovel. The predator-proof cage is placed in the hole with the middle rib of cage at least an inch above the sand as long as bottom and top nest depths are near the original nest's depths (Service 2007). The same person who removed the eggs from the original nest transfers the eggs from the coolers to the nest cage. The eggs are not rotated or packed tightly (Jones and Musick 1988, Mortimer 1999). Eggs are placed into the nest cage in the reverse order in which they were removed from the original nest (i.e., the first egg put in the cooler will be the last one to go into the cage). The bottom and sides of the cage are filled with sand from the original nest. Dry sand is not allowed to enter the cage through the mesh while the shape and size of the original nest is recreated as closely as possible. The remainder of the relocated nest cavity is filled with the extra sand brought from the original nest. The top of the predator-proof cage is secured with three 6-inch pieces of aluminum wire, and the nest number is written on the top. For any eggs that are broken, the cause of break is recorded on a copy of the nest data sheet. The sheet is then bagged with the specimen and placed in the biology freezer at BBNWR. The Nest and Crawl Data Sheet is completed and filed at BBNWR. Digital photos of the nest and crawl are downloaded and catalogued. This information and more is included in the 2007 "Back Bay NWR Sea Turtle Nest Standard Operating Procedures."

In situ nest management - Nests that are identified and left in situ are marked with reflectors, signs identifying the site as a sea turtle nest, and flagging tape placed in the immediate vicinity of the nest (within 9.8 feet [ft]) to help prevent nests from being run over by vehicles or inadvertently disturbed. A predator guard, constructed of galvanized fence wire with a rectangular mesh size of approximately 2 inches by 4 inches is used. A trench is excavated around the nest, and the fence material is placed over the nest with flaps placed in the trenches and re-buried to prevent excavation by predators. In situ nests are monitored daily near the hatch window to determine if they are successful, and after all hatching is anticipated to be completed, the nests are excavated and the number and condition of hatched eggs, unhatched eggs, and young turtles are counted.

Action Area - The "action area" is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The Service has determined that the action area for this project consists of the beaches of BBNWR, FCSP, the Virginia Beach resort area, Fort Story, and Sandbridge.

STATUS OF THE SPECIES AND CRITICAL HABITAT RANGEWIDE

The loggerhead sea turtle was listed as threatened in the U.S. in 1978 (NMFS and Service 1991a) and the green sea turtle was listed as endangered in 1978 (NMFS and Service 1991b). In March 2010, the Service and NMFS published a proposed rule in the Federal Register to recognize nine distinct populations of loggerhead sea turtles worldwide. Under this proposed rule, the loggerhead sea turtle population that would be affected by the proposed actions is the north

Atlantic population and it is proposed to be listed as endangered (72 FR 12598). There is designated critical habitat outside of Virginia for the green sea turtles, but none has been designated for the loggerhead sea turtle.

Species/Critical Habitat Description and Life History – This account emphasizes loggerhead and green sea turtle nesting and breeding biology, which is the subject of this biological opinion. Additional information about the life history of these sea turtle species and their habitat use, behavior, and survival at sea can be found in other documents, including the loggerhead and green sea turtle recovery plans (National Marine Fisheries Service [NMFS] and Service 1991a, b, respectively), loggerhead and green sea turtle five-year status reviews (NMFS and Service 2007a, b, respectively), and other sources (National Research Council 1990).

The loggerhead is smaller, with a mean carapace length of 3 ft and a mean mass of 293 pounds (NMFS and Service 2008), compared to 3.35 ft and 300 pounds for the green sea turtle (National Research Council 1990). Green sea turtles nest primarily in the tropics and are rarer nesters at higher latitudes, while loggerheads have significant nesting populations outside the tropics (National Research Council 1990).

Life History and Population Dynamics - Loggerhead females are believed to reach sexual maturity at a minimum age of 30 years (Snover 2002). At the start of the breeding season, they migrate from foraging areas on the continental shelf to mating areas in the waters near their nesting beaches (Schroeder et al. 2003). Reproductive females exhibit the desire to return to their birthplace to lay their eggs (Miller et al. 2003). Females may be inseminated by multiple males (Bollmer et al. 1999). After mating, males return to their foraging areas while females remain in the waters near their natal beaches to emerge onto their nesting beaches to lay eggs. The following account of nesting biology is a synopsis of Miller et al. (2003).

Loggerhead females tend to nest on high wave energy, sandy ocean beaches. Gravid females emerge from the wash zone and crawl toward the dune line until they encounter a suitable nest site, typically on open sand at the seaward base of a dune, but sometimes in vegetation. The female clears away surface debris with the front flippers, creating a "body pit," then excavates a flask shaped nest cavity with her hind flippers. Loggerheads lay an average of 112 eggs per nest. After laying, the female covers the nest with sand using all four flippers. Once the nest covering phase is complete, she crawls back into the sea. Individual females may nest 1 to 6 times per nesting season, at intervals of 12-16 days, during the late spring to late summer. Intervals between nesting shorter than 10 days indicate that the previous nest attempt was likely aborted due to disturbance. Mature loggerheads nest every two to three years, on average (Schroeder et al. 2003). Nest incubation period (from laying to hatching) depends on temperature and ranges from 48 to 90 days at the extremes. Emergence of hatchlings from the nest cavity usually occurs within four days of hatch, but may take up to two weeks longer. Hatchling emergence from nests usually occurs at night when temperatures are lower and diurnal predators are inactive. Hatching success typically approaches 80 percent; after hatchlings leave the beaches, they typically fall prey to a variety of predators, including birds, fish, and sharks (National Research Council 1990).

Within the Northwest Atlantic, the majority of loggerhead sea turtle nesting activity occurs from April through September, with a peak in June and July (Williams-Walls et al. 1983, Dodd 1988, Weishampel et al. 2006). Nesting occurs within the Northwest Atlantic along the coasts of North America, Central America, northern South America, the Antilles, Bahamas, and Bermuda, but is concentrated in the southeastern U.S. and on the Yucatán Peninsula in Mexico on open beaches or along narrow bays having suitable sand (Sternberg 1981, Ehrhart 1989, Ehrhart et al. 2003, NMFS and Service 2008).

Sex ratio of hatchlings depends on temperature during incubation. Below 84° Fahrenheit (29° Celsius), more males are produced than females and above that temperature more females are produced (Carthy et al. 2003). Furthermore, fluctuating incubation temperatures often produce more females than stable temperatures, and temperature, hydration, and gas exchange during incubation can determine hatchling size, early swimming behavior, growth rate, and hatchling robustness (Carthy et al. 2003). Newly emerged hatchlings immediately head for the sea, most likely orienting toward the water by moving toward the brightest horizon and away from dark silhouettes (Lohmann and Lohmann 2003). Sea turtles are most negatively sensitive to blue and green light and loggerheads in particular are averse to yellow light (Witherington and Martin 1996). Once in the sea, hatchling loggerheads swim into the waves and eventually enter the open ocean, where they will spend the first 6.5 to 11.5 years of their lives primarily at the top of the water column, until finally moving to foraging areas on the continental shelf (Bolten 2003).

Green sea turtles nest in two, three, or four year intervals, and may lay as many as nine clutches within a nesting season (NMFS and Service 1991b). Clutch size varies from 75-200 eggs, and incubation ranges from about 45-75 days (NMFS and Service 1991b).

Nesting habitat - Less is known about factors that cue nest site selection than about anthropogenic disturbances that discourage nesting (Miller et al. 2003). Typical nesting areas are sandy, wide, open beaches backed by low dunes, with a flat, sandy approach from the sea (Miller et al. 2003). Nesting is nonrandom along the shoreline, but studies of the physical characteristics associated with nests versus random or non-nesting sites on the beach have produced varying results. Some factors found to determine nest selection are beach slope (3 of 3 studies), temperature (2 of 3 studies), distance to ocean (1 of 3 studies), sand type (2 of 2 studies), and moisture (1 of 3 studies), although the results were occasionally contradictory (Miller et al. 2003). Other factors examined but not found to be significant were sand compaction, erosion, pH, and salinity. Although the process of nest site selection is not well understood, a successful nest must be laid in a low salinity, high humidity, and well-ventilated substrate that is not prone to flooding or burying due to tides and storms and where temperature is optimal for development (Miller et al. 2003).

Status and Distribution – Approximately 58,000 loggerhead nests were estimated in the U.S. Atlantic in 1983 (NMFS and Service 1991a) and between 53,000 and 92,000 nests from 1989 to 1998 (Turtle Expert Working Group 2000). Within the northern subpopulation (north Florida to Virginia), studies in South Carolina and Georgia have documented a decline in number of nests

(Ehrhart et al. 2003). Based on genetic evidence, male loggerheads disperse freely among sites within the U.S. Atlantic population, while females are faithful to their natal sites (Bowen et al. 2005). Because sex ratio is determined by temperature during incubation (Miller et al. 2003), the northern part of the U.S. Atlantic population, apparently provides a disproportionate number of males to the larger population (Mrosovsky et al. 1984a, Hanson et al. 1998, Hawkes et al. 2007).

“Analyses of historic and recent abundance information by the Marine Turtle Specialist Group (MTSG) indicate that extensive population declines for the green sea turtle have occurred in all major ocean basins. The MTSG analyzed population trends at 32 index nesting sites around the world and found a 48-65 percent decline in the number of mature females nesting annually over the past 100-150 years. The two largest nesting populations of green turtles are found at Tortuguero, on the Caribbean coast of Costa Rica, and Raine Island, on the Great Barrier Reef in Australia, where an annual average of 22,500 and 18,000 females nest per season, respectively. In the U.S., green turtles nest primarily along the central and southeast coast of Florida; present estimates range from 200 - 1,100 females nesting annually” (NMFS 2008). In the southeast U.S., the majority of green turtle nesting occurs in Florida. The green turtle nesting population of Florida appears to be increasing based on 19 years (1989-2007) of index nesting data from throughout the state (http://research.myfwc.com/features/view_article.asp?id=27537).

Factors Affecting the Species – Numerous factors affect sea turtle growth, survival, and behavior while at sea from when they leave natal beaches as hatchlings until they mature and return to beaches to breed. These factors are discussed in detail in the 5-year status reviews for the two turtle species (NMFS and Service 2007a, b). The discussion herein is limited to factors affecting turtle nesting. Threats to loggerhead sea turtles on the nesting grounds are similar to those faced by green sea turtles. The following threats affect both species, though there may be some differences in susceptibility between the species.

Weather and tides - Storm events may erode beaches and destroy nests or cause nest failure due to flooding or piling of eroded sand on the nest site. Beach erosion due to wave action may also decrease the availability of suitable nesting habitat (Steinetz et al. 1998), leading to a decline in nesting rate on a particular beach. Sea level rise, often in combination with human development along beaches, is contributing to erosion, changes in beach characteristics, and more intensive management of many beaches.

Predation - Predation of eggs and young by mammals, birds, and ghost crabs may eliminate up to 100 percent of the nests and any hatchlings that emerge on beaches where predation is not managed (National Research Council 1990). This is a natural phenomenon that has always affected sea turtle populations, but due to reduced turtle population sizes, reduced turtle habitat availability, and unnatural population increases of nest predators in some areas, predation is a significant threat to remaining breeding populations and is actively controlled through predator exclusion and predator control on most beaches where turtles nest.

Human activities - Crowding of nesting beaches by pedestrians can disturb nesting females and prevent laying (NMFS and Service 2008). Furthermore, the use of flashlights and campfires may

interfere with sea-finding behavior by hatchlings. Beach driving, including pedestrian traffic and vehicle use, and beach cleaning pose a risk of injury to females and live stranded turtles, can leave ruts that trap hatchlings attempting to reach the ocean (Hosier et al. 1981, Cox et al. 1994), can disturb adult females and cause them to abort nesting attempts, and can interfere with sea-finding behavior if headlights are used at night (NMFS and Service 2008). Driving directly over incubating egg clutches can cause sand compaction, which may decrease hatching and emergence success and directly kill pre-emergent hatchlings (NMFS and Service 2007a). Artificial lighting on structures may affect turtle behavior in a similar manner (Witherington and Martin 1996). Beach cleaning can directly destroy nests. Poaching is a problem in some countries and occurs at a low level in the U.S. (NMFS and Service 2007a). An increased human presence may also lead to an increase in the presence of domestic pets that can depredate nests and an increase in litter that may attract wild predators (National Research Council 1990).

The rate of habitat loss due to erosion and escarpment formation may be increased during shoreline stabilization efforts, either through renourishment (Dolan et al. 1973) or placement of hard structures such as sea walls or pilings (Bouchard et al. 1998). Vehicle traffic may alter the beach profile leading to steeper foredunes (Anders and Leatherman 1987), which may be unsuitable for nesting. Improperly placed erosion control structures such as drift fencing can act as a barrier to nesting females. Non-native and/or invasive vegetation may be introduced in conjunction with beach development, which can overrun nesting habitat, make the substrate unsuitable for digging nest cavities, invade nests and desiccate nests, or trap hatchlings.

Reduced nesting success on constructed/augmented beaches could result due to sand compaction, escarpment formation, and changes in the beach profile. Sand compaction has been shown to negatively impact sea turtles, particularly concerning beach nourishment projects. Placement of very fine sand and/or the use of heavy machinery can cause sand compaction on nourished beaches (Nelson et al. 1987, Nelson and Dickerson 1988). Significant reductions in nesting success (i.e., false crawls occurred more frequently) have been documented on severely compacted nourished beaches (Nelson and Dickerson 1987, Nelson et al. 1987), and increased false crawls may result in increased physiological stress to nesting females. Sand compaction may also increase the length of time required to excavate nests and result in increased physiological stress (Nelson and Dickerson 1988).

ENVIRONMENTAL BASELINE

Status of the Species/Habitat Within the Action Area – Sea turtle nesting has regularly occurred within the action area since the 1970s. Since 1970, 93 nests have been recorded, ranging from 0-7 nests per year. The majority of nests have occurred on BBNWR and FCSP (49 and 28, respectively, BBNWR 2011). Up to 8 false crawls have also been recorded among all the sites within a year (2002; BBNWR 2011), and a total of 45 false crawls have been recorded.

Since monitoring began, 9 nests have been left in situ, and most of these occurred from 2003 to 2005, when BBNWR staff tested and evaluated in situ hatch success of nests. The majority of nests left in situ failed to hatch, presumably as a result of tropical storms causing prolonged

inundation and beach erosion, but at least one nest left in situ hatched successfully at a rate comparable to nests placed in the hatchery. Most nests have been relocated to a sea turtle hatchery on BBNWR, located behind the primary dune. Hatch success of the hatchery-produced young is high, generally ranging from 80 to 95 percent.

In 2010, preliminary genetic analysis of 9 sea turtle nests in Virginia was conducted in conjunction with a larger study of the population genetics of the northern recovery unit of loggerhead sea turtles. The 9 nests were laid by 4 different females, 2 of which also nested in North and South Carolina within the same year, as well as individuals that had not been recorded nesting outside of Virginia (Nairn and Shamblin 2011).

At BBNWR there is an artificial dune system that creates a narrow beach with a high primary dune. This combination creates poor quality nesting habitat due to the high probability of erosive washovers, egg exposure to saltwater and air, or entombment. Beaches in Sandbridge, Virginia Beach oceanfront, and other sites are generally larger, but are also subject to high levels of human activity, extensive illumination, and human traffic. Beaches at several sites are periodically renourished to maintain them in a condition to support public recreation.

Factors Affecting Species Environment Within the Action Area – The artificial dunes on BBNWR and FCSP result in narrow beaches that lack the upper beach zones and at high tides water is generally at or near the base of the dunes. The upper beach berm to dune transitional habitat, and all associated plants and animals, are generally lacking.

Beach driving results in ruts, compaction of sand, and disturbance of beach flora and fauna, and further contributes to the degraded condition of upper beach habitat. Vehicle operation on the beach may also reduce beach stability and result in increased levels of sand transport both on and off of the beaches of BBNWR and FCSP.

Human recreational use of the beaches, including grooming of the most heavily used recreational beaches in the City of Virginia Beach, result in highly disturbed beaches that lack natural beach contours, and may be more compacted than natural beaches. These areas also generally lack vegetation, and the beaches lie immediately in front of heavily developed hotel/resort areas. These areas are generally illuminated, and lack most characteristics of suitable sea turtle nesting beaches, with the exception of a broad beach profile that is maintained through periodic beach renourishing. Direct disturbance of sea turtles is also likely to occur on beaches that have high levels of human use or vehicle operation.

Beach renourishment may result in unsuitable beach conditions, including unnatural profiles, beach sand composition that is different from natural beaches in color, density, compaction, drainage, and other characteristics. These beaches may be suitable for sea turtle nesting, but may result in differences in nest success, hatchling gender, and hatchling fitness.

EFFECTS OF THE ACTION

Adverse Effects – The effects to sea turtles from nest relocation are not well studied, and vary depending on the specific practices involved in relocation. Because it is not practical to monitor the long-term survival or success of hatchling turtles, the specific effects of nest management action on BBNWR on hatchling turtles are not known.

Many studies indicate reduced hatch success of relocated sea turtle nests. Handling alone can result in damage to embryos by disrupting membrane attachment and result in reduced hatch success (Limpus et al. 1979, Parmenter 1980). Differences in the moisture regime, temperature regime, and gas exchange between nest sites selected by turtles and sites where nests are relocated also have the potential to affect hatch success (Ackerman 1980, McGehee 1990).

Movement of sea turtle nests to a hatchery site alters sex ratios of sea turtles compared to those that would occur in natural nests as a result of different incubation temperatures (Harvey and Slatkin 1982; Limpus et al. 1982; Mrosovsky et al. 1984a, b; Dalrymple et al. 1985; Dutton et al. 1985; Standora and Spotila 1985). The use of a hatchery site that is more far-removed from the beach likely generally results in warmer incubation temperatures than those which would occur at natural nest sites, and this would tend to increase the proportion of female hatchlings (Mrosovsky et al. 1984a, b). However, because the sex ratios that would naturally occur are expected to vary among years and sites depending on weather conditions, date that the nest is laid, nest depth, soil conditions, and other factors, it is not possible to determine how the sex ratio at the hatchery site would differ from what would occur naturally. Additionally, it is not possible to determine what biological, demographic, or genetic effects to the population may result from altered sex ratios, except that differences should be expected, and we presume that the naturally occurring sex ratios and the variation in those ratios over time, are appropriate to maintain the sea turtle populations.

As a result of the refinement of methods and implementation of a detailed protocol to excavate, transport, and re-bury turtle nests that are relocated by BBNWR personnel, hatch success rates are generally comparable to those that may occur naturally. Similarly, the identification and routine use of a carefully selected hatchery site at BBNWR has apparently reduced the adverse effects to turtle embryos and hatching success.

Emerging research on the homing abilities of sea turtles continues to indicate a strong tendency for sea turtles to return to their natal beaches to nest. However, to date, the cues that sea turtle hatchlings use to allow them to return to natal beaches are unknown. Irwin et al. (2004) have measured distorted magnetic fields within sea turtle egg enclosures similar to those used by BBNWR. Based on evidence that sea turtles navigate at sea using magnetic fields Lohmann et al. (1999) and Irwin et al. (2004) speculate that magnetic fields may be an important mechanism for imprinting on natal beaches, and distortion in magnetic fields may affect homing behavior and the ability to return to natal beaches.

Condition of hatchling turtles may be more important than hatch success in terms of the likelihood of survival and recruitment of young turtles. Hatchling size in some turtle species is related to the water balance of eggs while in the nest, with larger young generally resulting from eggs that occurred in wetter conditions (Janzen et al. 1995). While the relationship of hatchling size to nest environment during development has not been well studied in sea turtles, larger young may be more likely to survive (Janzen et al. 1995).

Manual release of hatchlings from the enclosed egg chamber used at the BBNWR hatchery may result in higher than normal susceptibility to predation. Release of hatchlings during daytime hours can result in higher predation, and release of hatchlings en masse may also increase predation vulnerability by attracting predators to the group of young being released. Under natural conditions, night-time emergence and emergence of relatively small numbers of individuals over time (particularly at more northerly latitudes) may result in reduced risk of loss of all young.

Additionally, holding hatchlings after emergence may result in expenditure of energy attempting to escape, interference with normal behaviors, and elevated levels of stress that may detrimentally affect the physiological condition of hatchlings. After release into the ocean, this may result in reduced likelihood of survival and reduced probability of reaching nursery areas.

While the risk of catastrophic loss of clutches cannot be estimated, relocating turtle nests to a common hatchery area increases the likelihood of catastrophic loss resulting from accidents, adverse environmental conditions, and disease and predation.

It is uncertain whether the effects of intensive nest management discussed above occur, and to what degree they affect hatchling survival. The types of effects may vary depending on the environmental conditions within the specific nesting season, and the specific conditions that each nest is subjected to during management activities and relocation. The combination of these factors results in highly uncertain effects to the sea turtle population. While hatch success has often been used as a proxy to assess reproductive success, the factors discussed above may reduce recruitment, affect population demography, and affect future use of turtle nesting beaches in the action area. For the purposes of this analysis and in the absence of specific information that would allow us to consider the expected magnitude and severity of effects that may result, we make the conservative assumption that all of these factors affect hatchling sea turtles to a degree that cumulatively results in significantly reduced survival and recruitment probability.

Beneficial Effects – Monitoring and in situ nest protection provides good information on the sea turtle nesting effort within the action area. Nest marking and predator protection reduce the potential for anthropogenic impacts including disruption of nests and predation that may result from artificially abundant predators. The educational component of the monitoring aids in improving beach visitor consideration of sea turtle nesting in the vicinity of recreational areas. While unknown, the controlled conditions of the turtle hatchery likely result in higher nest success rates than would occur if turtle nests were left in the wild, but it remains unclear whether the greater productivity results in improved recruitment of juvenile sea turtles.

Interrelated and Interdependent Actions - An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. The Service is not aware of any such actions associated with this project.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Cumulative effects likely to adversely impact nesting sea turtles include management of beaches by private individuals and municipalities, and use of beaches for recreational purposes. Management and use of beaches degrades the habitat quality for nesting sea turtles and minimizes the likelihood of successful nesting and hatching of young. Shoreline development adjacent to beaches, primarily along the developed Virginia Beach oceanfront and Sandbridge, results in disturbance of adult female sea turtles attempting to nest, minimizing the likelihood of successful nesting.

CONCLUSION

After reviewing the status of the loggerhead and green sea turtle, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed BBNWR sea turtle nest management program is not likely to jeopardize the continued existence of the loggerhead and green sea turtles. No critical habitat has been designated for this species within the action area; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by BBNWR so that they become binding conditions of any grant or permit issued to any applicant, as appropriate, for the exemption in action 7(o)(2) to apply. BBNWR has a continuing duty to regulate the activity covered by this incidental take statement. If BBNWR (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, BBNWR must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service anticipates incidental take of all sea turtle nests that are relocated within the action area. While there is potential for some individual hatchlings to survive and recruit into the breeding population, the degree of uncertainty in the expected effects that relocation has on sea turtles requires expectation of loss of all relocated nests. Because the decision to relocate nests is dependent on the specific location, setting of the nest, and determination of BBNWR personnel, all nests that occur in any year may be relocated.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or adverse modification or destruction of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of nesting sea turtles.

- Conduct sea turtle monitoring and management to minimize anthropogenic intervention and maximize protection of nests.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the ESA, BBNWR must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

The proposed action includes appropriate measures to avoid and minimize adverse effects to sea turtles, and no additional terms and conditions are needed to implement the reasonable and prudent measures.

The following relates to reporting requirements:

- Care must be taken in handling any dead specimens of proposed or listed species that are found to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the ESA. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective. Upon locating a dead specimen, notify the Service's Virginia Law Enforcement Office at 804-771-2883, 5721 South Laburnum Avenue, Richmond, Virginia 23231, and the Service's Virginia Field Office at 804-693-6694 at the address provided above.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to further minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

BBNWR should work with other beach owners and managers in the region to implement beach management programs for sea turtles that include efforts to minimize threats to sea turtle nesting such as artificial lighting, beach grooming, and vehicle operation on beaches.

BBNWR should develop a beach management plan that allows for overwash and natural beach processes in at least limited areas of BBNWR that will allow for sea turtle nesting. If sea turtle nest relocation continues, identify an alternate hatchery location on the beach that will allow for natural and unassisted emergence.

For the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the

amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions, please contact Tylan Dean of this office at (804) 693-6694, extension 166, or via email at tylan_dean@fws.gov.

cc: VDGIF, Wachapreague, VA (Attn: Ruth Boettcher)
VDGIF, Richmond, VA (Attn: Amy Ewing)
VDCR, DNH, Richmond, VA (Attn: René Hypes)

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**Enclosure 5. Summary of the Essential Fish Habitat (EFH) and General Habitat
Perimeters for Federally Managed Species**

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Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (EC)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
American plaice	Eggs	GOME, GB and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass. Bay to Cape Cod Bay, MA	<12	(32)	30 - 90	All year in GOME Dec - June on GB Peaks April & May both	Surface waters	
	Larvae	GOME, GB, Southern NE and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass Bay to Cape Cod Bay, MA	<14	(32)	30-130	Between January and August, with peaks in April and May	Surface Waters	
	Juveniles	GOME and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass Bay to Cape Cod Bay, MA	<17	(32)	45-150		Bottom habitats with fine-grained sediments or substrate of sand or gravel	(Strong concentrations inside and around 100m isobath in Western GOME; Major Prey: echinoderms, arthropods, annelids)
	Adults	GOME, GB and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass Bay to Cape Cod Bay, MA	<17	(34-20)	45-175		Bottom habitats with fine-grained sediments or a substrate of sand or gravel	
	Spawning Adults	GOME, GB and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass Bay to Cape Cod Bay, MA	<14	(32)	<90	March through June	Bottom habitats of all substrate types	
Atlantic cod	Eggs	GOME, GB, eastern portion of continental shelf off southern NE and following estuaries: Englishman/ Machias Bay to Blue Hill Bay; Sheepscot R., Casco Bay, Saco Bay, Great Bay, Mass Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	<12	32 - 33 (10 - 35)	<110	Begins in fall, peaks in winter and spring	Surface Waters	
	Larvae	GOME, GB, eastern portion of continental shelf off southern NE and following estuaries: Passamaquoddy Bay to Penobscot Bay; Sheepscot R., Casco Bay, Saco Bay, Great Bay, Mass Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	<10	32 - 33	30-70	Spring	Pelagic waters	
	Juveniles	GOME, GB, eastern portion of continental shelf off southern NE and following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	<20	30 - 35	25 - 75		Bottom habitats with a substrate of cobble or gravel	HAPC - An area approximate of 300sq. nautical miles along the northern edge of GB and the Hague line containing gravel cobble substrate.
	Adults	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	<10	(29 - 34)	10-150		Bottom habitats with a substrate of rocks, pebbles, or gravel	(Major prey: fish crustaceans, decapods, amphipods)

Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (°C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Spawning Adults	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and following estuaries: Englishman/ Machias Bay to Blue Hill Bay; Sheepscot R., Mass Bay, Boston Harbor, Cape Cod Bay, MA	<10	(10 - 35)	10-150	spawn during fall, winter, and early spring	Bottom habitats with a substrate of smooth sand, rocks, pebbles, or gravel	
Atlantic halibut	Eggs	GOME, GB	4 - 7	<35	<700	Between late fall and early spring, peak Nov and Dec.	Pelagic waters to the sea floor	
	Larvae	GOME, GB		30 - 35			Surface waters	
	Juveniles	GOME, GB	>2		20 - 60		Bottom habitats with a substrate of sand, gravel, or clay	
	Adults	GOME, GB	<13.6	30.4-35.3	100-700		Bottom habitats with a substrate of sand, gravel, or clay	(Major prey: crustaceans, fish, cod, squid)
	Spawning Adults	GOME, GB	<7	<35	<700	Between late fall and early spring, peaks in Nov. and Dec.	Bottom habitats with a substrate of soft mud, clay, sand, or gravel; rough or rocky bottom locations along slopes of the outer banks	
Atlantic herring	Eggs	GOME, GB and following estuaries: Englishman/ Machias Bay, Casco Bay, & Cape Cod Bay	<15	32 - 33	20 - 80	July through November	Bottom habitats with a substrate of gravel, sand, cobble, shell fragments & aquatic macrophytes. .	Eggs adhere to bottom forming extensive beds. Eggs most often found in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots (Egg beds can range from 4500 to 10,000 Km ² on GB. Eggs susceptible to suffocation from high densities and siltation)
	Larvae	GOME, GB, Southern NE and following estuaries: Passamaquoddy Bay to Cape Cod Bay, Narragansett Bay, & Hudson R./ Raritan Bay	<16	32	50 - 90	Between August and April, peaks from Sept. - Nov.	Pelagic waters	
	Juveniles	GOME, GB, Southern NE and Middle Atlantic south to Cape Hatteras and following estuaries: Passamaquoddy Bay to Cape Cod Bay; Buzzards Bay to Long Island Sound; Gardiners Bay to Delaware Bay	<10	26 - 32	15-135		Pelagic waters and bottom habitats	
	Adults	GOME, GB, southern NE and middle Atlantic south to Cape Hatteras and following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Cape Cod Bay; Buzzards Bay to Long Island Sound; Gardiners Bay to Delaware Bay; & Chesapeake Bay	<10	>28	20-130		Pelagic waters and bottom habitats	(major prey: zooplankton)
	Spawning Adults	GOME, GB, southern NE and middle Atlantic south to Delaware Bay and Englishman/ Machias Bay Estuary	<15	32 - 33	20 - 80	July through November	Bottom habitats with a substrate of gravel, sand, cobble and shell fragments, also on aquatic macrophytes	Herring eggs are spawned in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots

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Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (EC)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
Atlantic salmon	Eggs	Rivers from CT to Maine: Connecticut, Pawcatuck, Merrimack, Coheco, Saco, Androscoggin, Presumpscot, Kennebec, Sheepscot, Ducktrap, Union, Penobscot, Narraguagus, Machias, East Machias, Pleasant, St. Croix, Denny's, Passagassawaukeag Aroostook, Lamprey, Boyden, Orland Rivers, and the Turk, Hobart & Patten Streams; and the following estuaries for juveniles and adults: Passamaquoddy Bay to Muscongus Bay; Casco Bay to Wells Harbor; Mass Bay, Long Island Sound, Gardiners Bay to Great South Bay. All aquatic habitats in the watersheds of the above listed rivers, including all tributaries to the extent that they are currently or were historically accessible for salmon migration.	<10	Fresh water	30-31 cm	Between October and April	Bottom habitats with a gravel or cobble riffle (redd) above or below a pool in rivers	need clean well-oxygenated freshwater
	Larvae		<10	Fresh water		Between March and June for alevins/fry	Bottom habitats with a gravel or cobble riffle (redd) above or below a pool in rivers	
	Juveniles		<25	Fresh water to Oceanic	10- 61 cm		Bottom habitats of shallow gravel/cobble riffles interspersed with deeper riffles and pools in rivers and estuaries Water velocities between 30 - 92cm/sec	As they grow, parr transform into smolts. Atlantic salmon smolts require access downstream to the ocean. Upon entering the ocean, post-smolts become pelagic and range from Long Island Sound north to the Labrador Sea.
	Adults		<22.8	Fresh water to Oceanic			Oceanic adult Atlantic salmon are primarily pelagic and range from waters of the continental shelf off southern NE north throughout the GOME Dissolved oxygen above 5ppm for migratory pathway.	HAPC - Eleven rivers in Maine includes: St. Croix, Denny's, East Machias, Machias, Pleasant, Turk stream, Narraguagus, Penobscot, Ducktrap, Sheepscot, and Kennebec River.
	Spawning Adults		<10	Fresh water	30- 61 cm	October and November	Bottom habitats with a gravel or cobble riffle (redd) above or below a pool in rivers	Water velocity around 61cm per second
Atlantic sea scallop	Eggs	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Mass Bay, and Cape Cod Bay	<17			May through October Peaks in May and June in middle Atlantic area, and in Sept. and Oct. on GB and GOME	Bottom habitats	Eggs remain on sea floor until they develop into the first free-swimming larval stage.
	Larvae	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Mass Bay, and Cape Cod Bay	<18	16.9 - 30			Pelagic waters and bottom habitats with a substrate of gravelly sand, shell fragments, pebbles, or on various red algae, hydroids, amphipod tubes and bryozoans	
	Juveniles	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Great Bay, Mass Bay, and Cape Cod Bay	<15		18-110		Bottom habitats with a substrate of cobble, shells, and silt	(prey: filter feeders on phytoplankton; preferred substrates are associated with low concentrations of inorganics for optimal feeding)
	Adults	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Great Bay, Mass Bay, and Cape Cod Bay	<21	>16.5	18-110		Bottom habitats with a substrate of cobble, shells, coarse/gravelly sand, and sand	

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Species	Life Stage	Geographic Area	Temp (°C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Spawning Adults	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Mass Bay, and Cape Cod Bay	<16	>16.5	18-110	May through October, peaks in May and June in middle Atlantic area, and in Sept. and Oct. on GB and in GOME	Bottom habitats with a substrate of cobble, shells, coarse/gravelly sand, and sand	
Haddock	Eggs	GB southwest to Nantucket Shoals and coastal areas of GOME and the following estuaries: Great Bay, Mass Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	<10	34 - 36	50 - 90	March to May, peak in April	Surface waters	
	Larvae	GB southwest to the middle Atlantic south to Delaware Bay and the following estuaries: Great Bay, Mass Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay, and Narragansett Bay	<14	34 - 36	30 - 90	January to July, peak in April and May	Surface waters	
	Juveniles	GB, GOME, middle Atlantic south to Delaware Bay	<11	31.5 - 34	35-100		Bottom habitats with a substrate of pebble gravel	
	Adults	GB and eastern side of Nantucket Shoals, throughout GOME, *additional area of Nantucket Shoals, and Great South Channel	<7	31.5 - 35	40-150		Bottom habitats with a substrate of broken ground, pebbles, smooth hard sand, and smooth areas between rocky patches	*additional area more accurately reflects historic patterns of distribution and abundance
	Spawning Adults	GB, Nantucket Shoals, Great South Channel, throughout GOME	<6	31.5 - 34	40-150	January to June	Bottom habitats with a substrate of pebble gravel or gravelly sand	
Monkfish (Goosefish)	Eggs	GOME, GB, southern NE, middle Atlantic south to Cape Hatteras, North Carolina	<18		15- 1000	March to September	Surface waters	(eggs contained in long mucus veils that float near or at the surface)
	Larvae	GOME, GB, southern NE, middle Atlantic south to Cape Hatteras, North Carolina	15		25-1000	March to September	Pelagic waters	
	Juveniles	Outer continental shelf in the middle Atlantic, mid-shelf off southern NE, all areas of GOME	<13	29.9-36.7	25-200		Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud	
	Adults	Outer continental shelf in the middle Atlantic, mid-shelf off southern NE, outer perimeter of GB, all areas of GOME	<15	29.9-36.7	25-200		Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud	(Major prey: fish, shrimp, squid, crustaceans, mollusks)
	Spawning Adults	Outer continental shelf in the middle Atlantic, mid-shelf off southern NE, outer perimeter of GB, all areas of GOME	<13	29.9-36.7	25-200	February to August	Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud	
Ocean pout	Eggs	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay and Cape Cod Bay	<10	32-34	<50	Late fall and winter	Bottom habitats, generally hard bottom sheltered nests, holes, or crevices where they are guarded by parents	(eggs are laid in gelatinous masses and take 2-3 months to develop)

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Species	Life Stage	Geographic Area	Temp (°C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Larvae	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay and Cape Cod Bay	<10	>25	<50	Late fall to spring	Bottom habitats in close proximity to hard bottom nesting areas	
	Juveniles	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay, Boston Harbor and Cape Cod Bay	<14	>25	<80		Bottom habitats, often smooth bottom near rocks or algae	
	Adults	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay, Boston Harbor and Cape Cod Bay	<15	32 - 34	<110		Bottom habitats. (Dig depressions in soft sediments which are then used by other species)	(major prey: mollusks, crustaceans, echinoderms, sand dollars)
	Spawning Adults	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass Bay, and Cape Cod Bay	<10	32 - 34	<50	Late summer to early winter, peaks in Sept. and October	Bottom habitats with a hard bottom substrate, including artificial reefs and shipwrecks	(internal fertilization)
Offshore hake	Eggs	Outer continental shelf of GB and southern NE south to Cape Hatteras, North Carolina	<20		<1250	Observed all year and primarily collected at depths from 110 - 270m	Pelagic waters	
	Larvae	Outer continental shelf of GB and southern NE south to Chesapeake Bay	<19		<1250	Observed all year and primarily collected at depths from 70 - 130m	Pelagic waters	
	Juveniles	Outer continental shelf of GB and southern NE south to Cape Hatteras, NC	<12		170- 350		Bottom habitats	
	Adults	Outer continental shelf of GB and southern NE south to Cape Hatteras, NC	<12		150 - 380		Bottom habitats	(major prey: fish - cannibalistic, shrimp, other crustaceans)
	Spawning Adults	Outer continental shelf of GB and southern NE south to the Middle Atlantic Bight	<12		330 - 550	Spawn all throughout the year	Bottom habitats	
Pollock	Eggs	GOME, GB and the following estuaries: Great Bay to Boston Harbor	<17	32 - 32.8	30-270	October to June, peaks in November to February	Pelagic waters	
	Larvae	GOME, GB and the following estuaries: Passamaquoddy Bay, Sheepscot R., Great Bay to Cape Cod Bay	<17		10-250	September to July, peaks from Dec. to February	Pelagic waters	(migrate inshore as they grow)
	Juveniles	GOME, GB and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay to Waquoit Bay; Long Island Sound, Great South Bay	<18	29 - 32	0 - 250		Bottom habitats with aquatic vegetation or a substrate of sand, mud or rocks	(Intertidal zone may be important nursery area. Juveniles present in shallow intertidal zone at all tide stages throughout summer. Subtidal marsh creeks such as Little Egg Harbor, NJ are also seasonally important as nursery)

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Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (°C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Adults	GOME, GB, southern NE, and middle Atlantic south to New Jersey and the following estuaries: Passamaquoddy Bay, Damariscotta R., Mass Bay, Cape Cod Bay, Long Island Sound	<14	31 - 34	15-365		Hard bottom habitats including artificial reefs	(major prey: crustaceans, fish, mollusks)
	Spawning Adults	GOME, southern NE, and middle Atlantic south to New Jersey includes Mass Bay	<8	32 - 32.8	15-365	September to April, peaks December to February	Bottom habitats with a substrate of hard, stony, or rocky bottom includes artificial reefs	
Red hake	Eggs	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras	<10	< 25		May to November, peaks in June and July	Surface waters of inner continental shelf	
	Larvae	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and following estuaries: Sheepscot R., Mass Bay to Cape Cod Bay; Buzzards Bay, Narragansett Bay & Hudson R./ Raritan Bay	<19	>0.5	<200	May to December, peaks in Sept. and October	Surface waters	(newly settled larvae need shelter, including live sea scallops, also use floating or mid-water objects for shelter)
	Juveniles	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay, Mass Bay to Cape Cod Bay; Buzzards Bay to Conn. R.; Hudson R./ Raritan Bay, & Chesapeake Bay	<16	31 - 33	<100		Bottom habitats with substrate of shell fragments, including areas with an abundance of live scallops	
	Adults	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay, Mass Bay to Cape Cod Bay; Buzzards Bay to Conn. R.; Hudson R./ Raritan, Delaware Bay, & Chesapeake Bay	<12	33 - 34	10-130		Bottom habitats in depressions with a substrate of sand and mud	(major prey: fish and crustaceans)
	Spawning Adults	GOME, southern edge of GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and following estuaries: Sheepscott R., Mass Bay, Cape Cod Bay, Buzzards Bay, & Narragansett Bay	<10	>25	<100	May to November, peaks in June and July	Bottom habitats in depressions with a substrate of sand and mud	
Redfish	Eggs	No EFH identification or description for this life history stage						Redfish are ovoviviparous (live bearers)
	Larvae	GOME, southern GB	<15		50-270	March to October, peak in August	Pelagic waters	
	Juveniles	GOME, southern edge of GB	<13	31 - 34	25-400		Bottom habitats with a substrate of silt, mud, or hard bottom	
	Adults	GOME, southern edge of GB	<13	31 - 34	50-350		Bottom habitats with a substrate of silt, mud, or hard bottom	
	Spawning Adults	GOME, southern edge of GB	<13	31 - 34	5 -350	April to August	Bottom habitats with a substrate of silt, mud, or hard bottom	copulation occurs between Oct-Jan. Fertilization is delayed until Feb-Apr

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White hake	Eggs	GOME, GB, southern NE and the following estuaries: Great Bay to Cape Cod Bay				August to September	Surface waters	
	Larvae	GOME, southern edge of GB, southern NE to middle Atlantic and the following estuaries: Mass Bay, to Cape Cod Bay				May - mid-Atlantic area Aug. & Sept. - GOME, GB area	Pelagic waters	
	Juveniles	GOME, southern edge of GB, southern NE to middle Atlantic and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Cape Cod Bay	<19		5 - 225	May-Sep - pelagic	Pelagic stage - pelagic waters; Dermersal stage - Bottom habitat with seagrass beds or substrate of mud or fine-grained sand	
	Adults	GOME, southern edge of GB, southern NE to middle Atlantic and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Cape Cod Bay	<14		5 - 325		Bottom habitats with substrate of mud or fine-grained sand	(major prey: small fish, shrimp and other crustaceans)
	Spawning Adults	GOME, southern edge of GB, southern NE to middle Atlantic	<14		5 - 325	April to May - southern part of range; August - Sept.- northern part of range	Bottom habitats with substrate of mud or fine-grained sand in deep water.	
Whiting (Silver hake)	Eggs	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Merrimack R. to Cape Cod Bay	<20		50-150	All year, peaks June to October	Surface waters	
	Larvae	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Mass Bay to Cape Cod Bay	<20		50-130	All year, peaks July to September	Surface waters	
	Juveniles	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Casco Bay, Mass Bay to Cape Cod Bay	<21	>20	20-270		Bottom habitats of all substrate types	
	Adults	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Casco Bay, Mass Bay to Cape Cod Bay	<22		30-325		Bottom habitats of all substrate types	
	Spawning Adults	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Mass Bay and Cape Cod Bay	<13		30-325		Bottom habitats of all substrate types	
Window-pane flounder	Eggs	GOME, GB, southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Delaware Inland Bays	<20		<70	February to November, peaks May and October in middle Atlantic July - August on GB	Surface waters	

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Species	Life Stage	Geographic Area	Temp (EC)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Larvae	GOME, GB, southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Delaware Inland Bays	<20		<70	February to November, peaks May and October in middle Atlantic July - August on GB	Pelagic waters	
	Juveniles	GOME, GB, southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Chesapeake Bay	<25	5.5 - 36	1 - 100		Bottom habitats with substrate of mud or fine grained sand	
	Adults	GOME, GB, southern NE, middle Atlantic south to Virginia - NC border and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Chesapeake Bay	<26.8	5.5 - 36	1 - 75		Bottom habitats with substrate of mud or fine grained sand	(major prey: polychaetes, small crustaceans, mysids, small fish)
	Spawning Adults	GOME, GB, southern NE, middle Atlantic south to Virginia -NC border and the following estuaries: Passamaquoddy Bay to Great Bay; Mass Bay to Delaware Inland Bays	<21	5.5 - 36	1 - 75	February - December, peak in May in middle Atlantic	Bottom habitats with substrate of mud or fine grained sand	
Winter flounder	Eggs	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Delaware Inland Bays	<10	10 - 30	<5	February to June, peak in April on GB	Bottom habitats with a substrate of sand, muddy sand, mud, and gravel	* On GB, eggs are generally found in water temp < 8EC, and < 90m deep.
	Larvae	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Delaware Inland Bays	<15	4 - 30	<6	March to July, peaks in April and May on GB	Pelagic and bottom waters	* On GB, larvae are generally found in water temp < 8EC, and < 90m deep.
	Juveniles (age 1+)	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Chincoteague Bay	<25	10 - 30	1 - 50		Bottom habitats with a substrate of mud or fine grained sand	* Young-of-year exist where water temp <28, depths 0.1 - 10m, salinities 5 - 33 (major prey: amphipods, copepods, polychaetes, bivalve siphons)
	Adults	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Chincoteague Bay	<25	15 - 33	1 - 100		Bottom habitats including estuaries with substrate of mud, sand, gravel	(major prey: amphipods, polychaetes, bivalve siphons, crustaceans)
	Spawning Adults	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Delaware Inland Bays	<15	5.5 - 36	<6*	February to June	Bottom habitats including estuaries with substrate of mud, sand, gravel	*except on GB where they spawn as deep as 80m
Witch flounder	Eggs	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras	<13	High	Deep	March to October	Surface waters	
	Larvae	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras	<13	High	Deep	March to November, peaks in May - July	Surface waters to 250m	

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Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (°C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Juveniles	GOME, outer continental shelf from GB south to Cape Hatteras	<13	34 - 36	50-450 to 1500m		Bottom habitats with fine-grained substrate	(the upper slope is nursery area; major prey: crustaceans, polychaetes, mollusks)
	Adults	GOME, outer continental shelf from GB south to Chesapeake Bay	<13	32 - 36	25-300		Bottom habitats with fine-grained substrate	(major prey: polychaetes, echinoderms, crustaceans, mollusks, squid)
	Spawning Adults	GOME, outer continental shelf from GB south to Chesapeake Bay	<15	32 - 36	25-360	March to November, peaks in May-August	Bottom habitats with fine-grained substrate	
Yellowtail flounder	Eggs	GB, Mass Bay, Cape Cod Bay, southern NE continental shelf south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay to Cape Cod Bay	<15	32.4 - 33.5	30 - 90	Mid-March to July, peaks in April to June in southern NE	Surface waters	
	Larvae	GB, Mass Bay, Cape Cod Bay, southern NE continental shelf, middle Atlantic south to Chesapeake Bay and the following estuaries: Passamaquoddy Bay to Cape Cod Bay	<17	32.4 - 33.5	10 - 90	March to April in New York bight; May to July in south NE and southeastern GB	Surface waters	(largely an oceanic nursery)
	Juveniles	GB, GOME, southern NE continental shelf south to Delaware Bay and the following estuaries: Sheepscot R., Casco Bay, Mass Bay to Cape Cod Bay	<15	32.4 - 33.5	20 - 50		Bottom habitats with substrate of sand or sand and mud	
	Adults	GB, GOME, southern NE continental shelf south to Delaware Bay and the following estuaries: Sheepscot R., Casco Bay, Mass Bay to Cape Cod Bay	<15	32.4 - 33.5	20 - 50		Bottom habitats with substrate of sand or sand and mud	(major prey: annelids, arthropods, mollusks)
	Spawning Adults	GB, GOME, southern NE continental shelf south to Delaware Bay and the following estuaries: Mass Bay to Cape Cod Bay	<17	32.4 - 33.5	10-125		Bottom habitats with substrate of sand or sand and mud	
Atlantic mackerel	Eggs	Continental Shelf from Maine through Cape Hatteras, NC also includes estuaries from Great Bay to Cape Cod Bay; Buzzards Bay to Long Island Sound; Gardiners Bay and Great South Bay	5-23	(18 - >30)	0 - 15		Pelagic waters	(peak spawning in salinities >30ppt)
	Larvae	Continental Shelf from GOME through Cape Hatteras, NC also includes estuaries from Great Bay to Cape Cod Bay; Narragansett Bay to Long Island Sound; Gardiners Bay and Great South Bay	6-22	(>30)	10-130		Pelagic waters	
	Juveniles	Continental Shelf from GOME through Cape Hatteras, NC also includes estuaries from Passamaquoddy Bay; Penobscot Bay to Saco Bay; Great Bay; Mass Bay to Cape Cod Bay; Narragansett Bay, Long Island Bay; Gardiners Bay to Hudson R./ Raritan Bay	4 - 22	(>25)	0 - 320		Pelagic waters	

Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (°C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Adults	Continental Shelf from GOME through Cape Hatteras, NC also includes estuaries from Passamaquoddy Bay to Saco Bay; Mass Bay to Long Island Bay; Gardiners Bay to Hudson R./ Raritan Bay	4 - 16	(>25)	0 - 380		Pelagic waters	(opportunistic feeding: can filter feed or select individual prey. Major prey: crustaceans, pelagic mollusks, polychaetes, squid, fish)
Black sea bass	Eggs	Continental Shelf and estuaries from southern NE to North Carolina, also includes Buzzards Bay			0 - 200	May to October	Water column of coastal Mid-Atlantic Bight and Buzzards Bay	
	Larvae	Pelagic waters over Continental Shelf from GOME to Cape Hatteras, NC, also includes Buzzards Bay	(11-26)	(30 - 35)	(<100)	(May - Nov, peak Jun - Jul)	Habitats for transforming (to juveniles) larvae are near coastal areas and into marine parts of estuaries between Virginia and NY. When larvae become demersal, found on structured inshore habitat such as sponge beds.	
	Juveniles	Demersal waters over Continental Shelf from GOME to Cape Hatteras, NC, also includes estuaries from Buzzards Bay to Long Island Sound; Gardiners Bay, Barnegat Bay to Chesapeake Bay; Tangier/ Pocomoke Sound and James River	>6	>18	(1 - 38)	Found in coastal areas (Apr - Dec , peak Jun - Nov) between VA and MA, but winter offshore from NJ and south; Estuaries in summer and spring	Rough bottom, shellfish and eelgrass beds, man-made structures in sandy-shelly areas, offshore clam beds and shell patches may be used during wintering	(YOY use salt marsh edges and channels; high habitat fidelity)
	Adults	Demersal waters over Continental Shelf from GOME to Cape Hatteras, NC, also includes estuaries: Buzzards Bay, Narragansett Bay, Gardiners Bay, Great South Bay, Barnegat Bay to Chesapeake Bay; Tangier/ Pocomoke Sound and James River	>6	(>20)	(20- 50)	Wintering adults (Nov. to April) offshore, south of NY to NC Inshore, estuaries from May to October	Structured habitats (natural & man-made) sand and shell substrates preferred	(spawn in coastal bays but not estuaries; change sex to males with growth; prey: benthic and near bottom inverts, small fish, squid)
Bluefish	Eggs	North of Cape Hatteras, found over Continental Shelf from Montauk Point, NY south to Cape Hatteras, South of Cape Hatteras, found over Continental Shelf through Key West, Florida	>18	>31ppt	Mid-shelf depths	April to August	Pelagic waters	*No EFH designation inshore
	Larvae	North of Cape Hatteras, found over Continental Shelf from Montauk Point, NY south to Cape Hatteras, South of Cape Hatteras, found over Continental Shelf through Key West, Florida, the slope sea and Gulf Stream between latitudes 29N and 40N; includes the following estuaries: Narragansett Bay	>18	>30ppt	>15	April to September	Pelagic waters	No EFH designation inshore for larvae

Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (EC)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Juveniles	North of Cape Hatteras, found over Continental Shelf from Nantucket Island, MA south to Cape Hatteras, South of Cape Hatteras, found over Continental Shelf through Key West, Florida, the slope sea and Gulf Stream between latitudes 29N and 40N also includes estuaries between Penobscot Bay to Great Bay; Mass Bay to James R.; Albemarle Sound to St. Johns River, FL	(19-24)	(23 - 36) freshwater zone in Albemarle Sound		North Atlantic estuaries from June to October Mid-Atlantic estuaries from May to October South Atlantic estuaries from March to December	Pelagic waters	(use estuaries as nursery areas; can intrude into areas with salinities as low as 3 ppt)
	Adults	North of Cape Hatteras, found over Continental Shelf from Cape Cod Bay, MA south to Cape Hatteras, South of Cape Hatteras, found over Continental Shelf through Key West, Florida also includes estuaries between Penobscot Bay to Great Bay; Mass Bay to James R.; Albemarle Sound to Pamlico/ Pungo R., Bougue Sound, Cape Fear R., St. Helena Sound, Broad R., St. Johns R., & Indian R.	(14-16)	>25ppt		North Atlantic estuaries from June to October Mid-Atlantic estuaries from April to October South Atlantic estuaries from May to January	Pelagic waters	Highly migratory (major prey: fish)
Butterfish	Eggs	Over Continental shelf from GOME through Cape Hatteras, NC, also in estuaries from Mass Bay to Long Island Sound; Gardiners Bay, Great South Bay, and Chesapeake Bay	11 - 17	(25 - 33)	0-1829	(spring and summer)	Pelagic waters	
	Larvae	Over Continental shelf from GOME through Cape Hatteras, NC, also in estuaries from Boston Harbor, Waquoit Bay to Long Island Sound; Gardiners Bay to Hudson R./ Raritan Bay; Delaware Bay and Chesapeake Bay	9 - 19	(6.4 - 37)	10-1829	(summer and fall)	Pelagic waters	
	Juveniles	Over Continental shelf from GOME through Cape Hatteras, NC also in estuaries from Mass Bay, Cape Cod Bay to Delaware Inland Bays; Chesapeake Bay, York R. and James R.	3 - 28	(3 - 37)	10-365 (most <120)	(winter - shelf spring to fall - estuaries)	Pelagic waters (larger individuals found over sandy and muddy substrates)	(pelagic schooling - smaller individuals associated with floating objects including jellyfish)
	Adults	Over Continental shelf from GOME through Cape Hatteras, NC, also in estuaries from Mass Bay, Cape Cod Bay to Hudson R./ Raritan Bay; Delaware Bay and Inland Bays; York R. and James R.	3 - 28	(4 - 26)	10-365 (most <120)	(winter - shelf summer to fall - estuaries)	Pelagic waters (schools form over sandy, sandy-silt and muddy substrates)	(common in inshore areas and surf zone; prey: planktonic, thaliacians, squid, copepods)
Illex squid	Juveniles	Over Continental shelf from GOME through Cape Hatteras, NC	2 -23		0 - 182	(carried northward by Gulf Stream)	Pelagic waters	
	Adults	Over Continental shelf from GOME through Cape Hatteras, NC	4 - 19		0 -182	(late fall - offshore, spawn Dec- Mar)	Pelagic waters	(prey: fish, crustaceans, squid; die after spawning)
Loligo	Eggs***	Over Continental shelf from GOME through Cape Hatteras, NC	(>8)	(30 - 32)	(<50)	(May - spawned, hatch in Jul)	(Demersal egg masses are commonly found on sandy/mud bottom, usually attached to rocks/boulders, pilings or algae such as fucus, ulva, laminaria, porphyra)	*** EFH is not currently designated for this life stage (Eggs are demersal, enclosed in gelatinous capsule containing up to 200 eggs. Laid in masses of hundreds of capsules from different females)

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Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (°C)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Juveniles	Over Continental shelf from GOME through Cape Hatteras, NC	4 - 27	(31 - 34)	0 - 213	spring - fall - inshore winter - offshore	Pelagic waters	(inhabit upper 10m at depth of 50 - 100m on continental shelf)
	Adults	Over Continental shelf from GOME through Cape Hatteras, NC	4 - 28		0 - 305	(Mar - Oct - inshore; winter - offshore)	Pelagic waters	(prey: fish, crustaceans)
Ocean quahog	Juveniles	Eastern edge of GB and GOME throughout the Atlantic EEZ	<18	(>25)	8-245		Throughout substrate to a depth of 3ft within federal waters, occurs progressively further offshore between Cape Cod and Cape Hatteras	(medium to fine grained sands, sandy mud, silty sand)
	Adults	Eastern edge of GB and GOME throughout the Atlantic EEZ	<18	(>25)	8 -245	(spawn May-Dec with several peaks)	Throughout substrate to a depth of 3ft within federal waters, occurs progressively further offshore between Cape Cod and Cape Hatteras	(medium to fine grained sands, sandy mud, silty sand; earliest age of maturity 7 yrs, avg 13 yrs; suspension feeders on phytoplankton)
Scup	Eggs	Southern NE to coastal Virginia includes the following estuaries: Waquoit Bay to Long Island Sound; Gardiners Bay, Hudson R./ Raritan Bay	13 - 23	>15	(<30)	May - August	Pelagic waters in estuaries	
	Larvae	Southern NE to coastal Virginia includes the following estuaries: Waquoit Bay to Long Island Sound; Gardiners Bay, Hudson R./ Raritan Bay	13 - 23	>15	(<20)	May - September	Pelagic waters in estuaries	
	Juveniles	The Continental Shelf from GOME to Cape Hatteras, NC includes the following estuaries: Mass Bay, Cape Cod Bay to Long Island Sound; Gardiners Bay to Delaware Inland Bays; & Chesapeake Bay	>7	>15	(0 - 38)	Spring and summer in estuaries and bays	Dermersal waters north of Cape Hatteras and Inshore on various sands, mud, mussel, and eelgrass bed type substrates	
	Adults	The Continental Shelf from GOME to Cape Hatteras, NC includes the following estuaries: Cape Cod Bay to Long Island Sound; Gardiners Bay to Hudson R./ Raritan Bay; Delaware Bay & Inland Bays; & Chesapeake Bay	>7	>15	(2 -185)	Wintering adults (November - April) are usually offshore, south of NY to NC	Dermersal waters north of Cape Hatteras and Inshore estuaries (various substrate types)	(spawn < 30m during inshore migration - May - Aug; prey: small benthic inverts)
Spiny Dogfish	Juveniles	GOME through Cape Hatteras, NC across the Continental Shelf; Continental Shelf waters South of Cape Hatteras, NC through Florida; also includes estuaries from Passamaquaddy Bay to Saco Bay; Mass Bay & Cape Cod Bay	3 - 28		10-390		Continental Shelf waters and estuaries	
	Adults	GOME through Cape Hatteras, NC across the Continental Shelf; Continental Shelf waters South of Cape Hatteras, NC through Florida; also includes estuaries from Passamaquaddy Bay to Saco Bay; Mass Bay & Cape Cod Bay	3 - 28	(30 - 32)	10-450		Continental Shelf waters and estuaries	(major prey: crabs, eels, small fish)

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Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (EC)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
Summer flounder	Eggs	Over Continental Shelf from GOME to Cape Hatteras, NC; South of Cape Hatteras to Florida			30-70 fall; 110 winter; 9-30 spring	October to May	Pelagic waters , heaviest concentrations within 9miles of shore off NJ and NY	
	Larvae	Over Continental Shelf from GOME to Cape Hatteras, NC; South of Cape Hatteras to Florida; also includes estuaries from Waquoit Bay to Narragansett Bay; Hudson River/ Raritan Bay; Barnegat Bay, Chesapeake Bay, Rappahannock R., York R., James R., Albemarie Sound, Pamlico Sound, Neuse R. to Indian R.	(9 - 12)	(23-33) Fresh in Hudson R. Raritan Bay area	10-70	mid-Atlantic Bight from Sept. to Feb.; Southern part from Nov. to May at depths 9-30m	Pelagic waters, larvae most abundant 19 - 83km from shore; Southern areas 12 - 52 miles from shore	(high use of tidal creeks and creek mouths)
	Juveniles	Over Continental Shelf from GOME to Cape Hatteras, NC; South of Cape Hatteras to Florida; also includes estuaries from Waquoit Bay to James R.; Albemarie Sound to Indian R.	>11	10 -30 Fresh in Narrag. Bay, Albem/ Pamlico Sound, & St. Johns R.	(0.5-5) in estuary		Demersal waters, muddy substrate but prefer mostly sand; found in the lower estuaries in flats, channels, salt marsh creeks, and eelgrass beds	HAPC - All native species of macroalgae, seagrasses and freshwater and tidal macrophytes in any size bed as well as loose aggregations, within adult and juvenile EFH. (Major prey: mysid shrimp)
	Adults	Over Continental Shelf from GOME to Cape Hatteras, NC; South of Cape Hatteras to Florida; also includes estuaries from Buzzards Bay, Narragansett Bay, Conn. R. to James R.; Albemarie Sound to Broad R.; St. Johns R., & Indian R.		Fresh in Albemarie Sound, Pamlico Sound, & St. Johns R.	(0 - 25)	Inhabit shallow coastal and estuarine waters during warmer months and move offshore on outer Continental Shelf at depths of 150m in colder months	Demersal waters and estuaries	HAPC - All native species of macroalgae, seagrasses and freshwater and tidal macrophytes in any size bed as well as loose aggregations, within adult and juvenile EFH. (Major prey: fish, shrimp, squid, polychaetes)
Surf clams	Juveniles	Eastern edge of GB and the GOME throughout Atlantic EEZ	(2-30)		0 -60 , low density beyond 38		Throughout substrate to a depth of three feet within federal waters. (Burrow in med. To coarse sand and gravel substrates. Also found in silty to fine sand, not in mud)	
	Adults	Eastern edge of GB and the GOME throughout Atlantic EEZ	(2-30)		0 -60 , low density beyond 38	(spawn-summer to fall at 19 - 30 °C)	Throughout substrate to a depth of three feet within federal waters	
Tilefish	Eggs	US Canadian Boundary to VA/NC boundary (shelf break; GB to Cape Hatteras)	8 - 19	(34 - 36)	76-365	(Serial spawning March - November; peaks April - October)	Water column	
	Larvae	US Canadian Boundary to VA/NC boundary Outer continental shelf; (GB to Cape Hatteras)	8 - 19	(33 - 35)	76-365	(Feb - Oct; peaks July - Oct)	Water column	

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Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species

Species	Life Stage	Geographic Area	Temp (EC)	Salinity (‰)	Depth (m)	Seasonal Occurrence	Habitat Description	Comments
	Juveniles	US Canadian Boundary to VA/NC boundary (shelf break, submarine canyon walls and flanks; GB to Cape Hatteras)	8 - 18	(33 - 36)	76-365	(All year; may leave GB in winter)	Rough bottom, small burrows, and sheltered areas. (Substrate - rocky, stiff clay, human debris)	(Tilefish are shelter-seeking and habitat limited). HAPC is substrate between the 76 and 365m isobath, from U.S. / Canadian Boundary to the Virginia / North Carolina boundary within statistical areas 616 and 537 (intersection of isobaths east of Cape May, NJ and south of Provincetown, MA)
	Adults	US Canadian Boundary to VA/NC boundary (shelf break, submarine canyon walls and flanks; GB to Cape Hatteras)	8 - 18	(33 - 36)	76-365	(All year; may leave GB in winter)	Rough bottom, small burrows, and sheltered areas. (Substrate - rocky exposed ledges, stiff clay)	HAPC is substrate between the 250 and 1200 ft isobath, from U.S. / Canadian Boundary to the Virginia / North Carolina boundary within statistical areas 616 and 537 (intersection of isobaths east of Cape May, NJ and south of Provincetown, MA) (prey: crustaceans, fish, decapods, benthic epifauna)
Red drum	Larvae	Along the Atlantic coast from Virginia through the Florida Keys	2 - 33	Low salinity	<50		Estuarine wetlands especially important Flooded saltmarshes, brackish marsh, tidal creeks, mangrove fringe, seagrasses	Red drum are euryhaline
	Juveniles	Along the Atlantic coast from Virginia through the Florida Keys	2 - 33	20 - 40	<50	Found throughout Chesapeake Bay from Sept. - Nov.	Utilize shallow backwaters of estuaries as nursery areas and remain till they move to deeper water portions of the estuary associated with river mouths, oyster bars and front beaches	Red drum are eurythermal and larger juveniles and Adults more susceptible to effects of winter cold waves than small fish
	Adults	Along the Atlantic coast from Virginia through the Florida Keys	2 - 33	20 - 40	<50	Found in Chesapeake in Spring and Fall and also along Eastern Shore of VA	Concentrate around inlets, shoals, capes along the Atlantic coast - Shallow bay bottoms or oyster reef substrate preferred. Also nearshore artificial reefs.	HAPCs for red drum include all coastal inlets, all state-designated nursery habitats of particular importance to red drum (NC - all Primary and Secondary Nursery Areas), SAV extremely important, barrier islands in NC, SC, GA, FL and passes between barrier islands into estuaries
Spanish mackerel		South Atlantic and Mid-Atlantic Bights	>20	>30			Sandy shoals of capes and offshore bars, high profile rock bottoms and barrier island ocean side waters from surf zone to shelf break but from the Gulf Stream shoreward;	All coastal inlets
Cobia		South Atlantic and Mid-Atlantic Bights	>20	>25			Sandy shoals of capes and offshore bars, high profile rock bottoms and barrier island ocean side waters from surf zone to shelf break but from the Gulf Stream shoreward; high salinity bays, estuaries, seagrass habitat.	All coastal inlets
King mackerel		South Atlantic and Mid-Atlantic Bights	>20	>30			Sandy shoals of capes and offshore bars, high profile rock bottoms and barrier island ocean side waters from surf zone to shelf break but from the Gulf Stream shoreward;	All coastal inlets
Golden crab		Chesapeake Bay to the south through the Florida Straight (and into Gulf of Mexico)			290-570	(Gulf Stream EFH because it helps to disperse golden crab larvae)	Flat foraminifera ooze, distinct mounds of dead coral, ripple habitat, dunes, black pebble habitat, low outcrop, and soft bioturbated habitat	

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Summary of Essential Fish Habitat (EFH) Designations

10 x 10 Square Coordinates:

Boundary	North	East	South	West
Coordinate	36° 50.0' N	75° 50.0' W	36° 40.0' N	76° 00.0' W

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Square Description (i.e. habitat, landmarks, coastline markers): Waters within the Atlantic Ocean within the square affecting North Bay, Shipp's Bay, and southern Virginia Beach. These waters affect the following: Muddy Creek, Porpoise Pt., and northern Long I., and affect Virginia Beach from Rudee Inlet on the north, south past Sandbridge Beach, VA., to east of half way down Long I., just north of the Wash Flats.

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Species	Eggs	Larvae	Juveniles	Adults
Atlantic cod (<i>Gadus morhua</i>)				
haddock (<i>Melanogrammus aeglefinus</i>)				
pollock (<i>Pollachius virens</i>)				
whiting (<i>Merluccius bilinearis</i>)				
red hake (<i>Urophycis chuss</i>)	X	X	X	
witch flounder (<i>Glyptocephalus cynoglossus</i>)	X			
winter flounder (<i>Pseudopleuronectes americanus</i>)				
yellowtail flounder (<i>Limanda ferruginea</i>)				
windowpane flounder (<i>Scophthalmus aquosus</i>)	X		X	
American plaice (<i>Hippoglossoides platessoides</i>)				
ocean pout (<i>Macrozoarces americanus</i>)				
Atlantic halibut (<i>Hippoglossus hippoglossus</i>)				
Atlantic sea scallop (<i>Placopecten magellanicus</i>)				
Atlantic sea herring (<i>Clupea harengus</i>)				X
monkfish (<i>Lophius americanus</i>)				
bluefish (<i>Pomatomus saltatrix</i>)			X	X

Species	Eggs	Larvae	Juveniles	Adults
long finned squid (<i>Loligo pealeii</i>)	n/a	n/a		
short finned squid (<i>Illex illecebrosus</i>)	n/a	n/a		
Atlantic butterfish (<i>Peprilus triacanthus</i>)				
Atlantic mackerel (<i>Scomber scombrus</i>)				
summer flounder (<i>Paralichthys dentatus</i>)			X	X
scup (<i>Stenotomus chrysops</i>)	n/a	n/a	X	X
black sea bass (<i>Centropristis striata</i>)	n/a		X	X
surf clam (<i>Spisula solidissima</i>)	n/a	n/a		
ocean quahog (<i>Artica islandica</i>)	n/a	n/a		
spiny dogfish (<i>Squalus acanthias</i>)	n/a	n/a	X	
tilefish (<i>Lopholatilus chamaeleonticeps</i>)				
king mackerel (<i>Scomberomorus cavalla</i>)	X	X	X	X
Spanish mackerel (<i>Scomberomorus maculatus</i>)	X	X	X	X
cobia (<i>Rachycentron canadum</i>)	X	X	X	X
red drum (<i>Sciaenops ocellatus</i>)	X	X	X	X
sand tiger shark (<i>Carcharias taurus</i>)		X		X
Atl. sharpnose shark (<i>Rhizopriondon terraenovae</i>)				X
dusky shark (<i>Carcharhinus obscurus</i>)		X	X	
sandbar shark (<i>Carcharhinus plumbeus</i>)		X	X	X
sandbar shark (<i>Carcharhinus plumbeus</i>)		HAPC	HAPC	HAPC
scalloped hammerhead shark (<i>Sphyrna lewini</i>)			X	
tiger shark (<i>Galeocerdo cuvieri</i>)		X	X	X

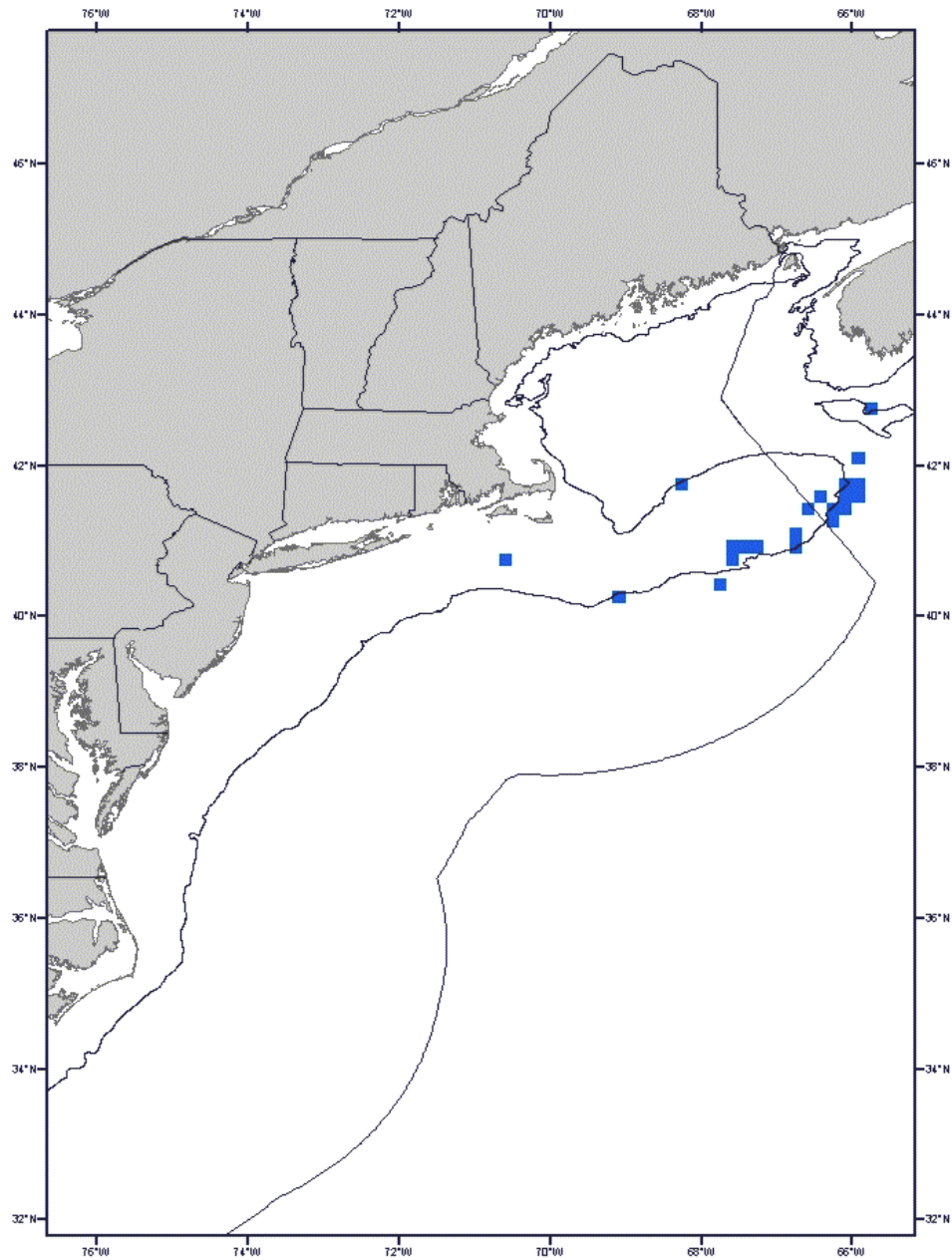
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**ESSENTIAL FISH HABITAT DESIGNATIONS
FOR
NEW ENGLAND SKATE COMPLEX**

Maps of EFH Designations for 7 Skate Species

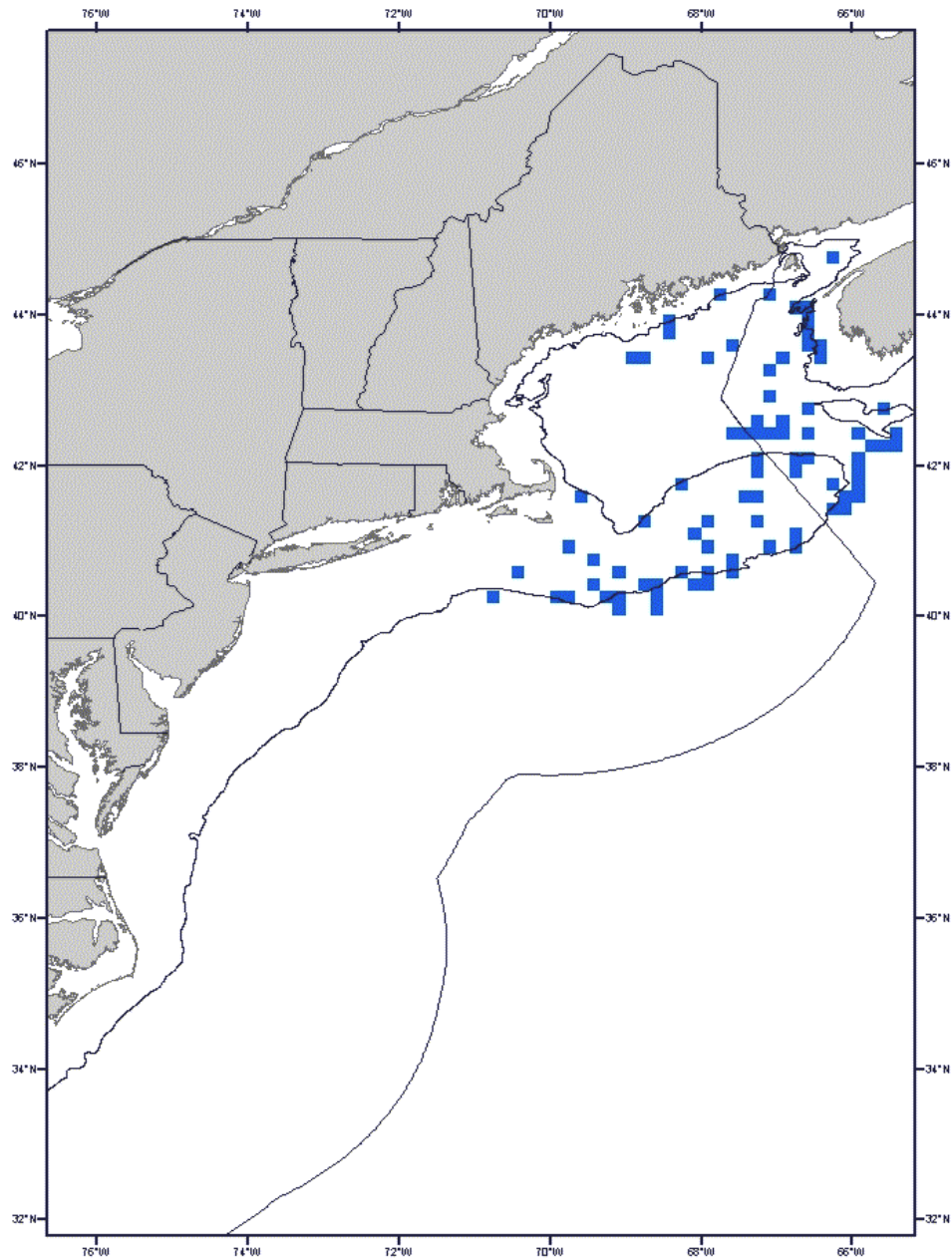
Barndoor Skate	Figures 1 & 2	Offshore
Clearnose Skate	Figures 3 & 4	Coastal Distribution
Little Skate	Figures 5 & 6	Coastal Distribution
Rosette Skate	Figures 7 & 8	Offshore
Smooth Skate	Figures 9 & 10	Offshore
Thorny Skate	Figures 11 & 12	Coastal in Mass Bay
Winter Skate	Figures 13 & 14	Coastal Distribution

Figure 1 Barndoor Skate EFH Juvenile (100%)



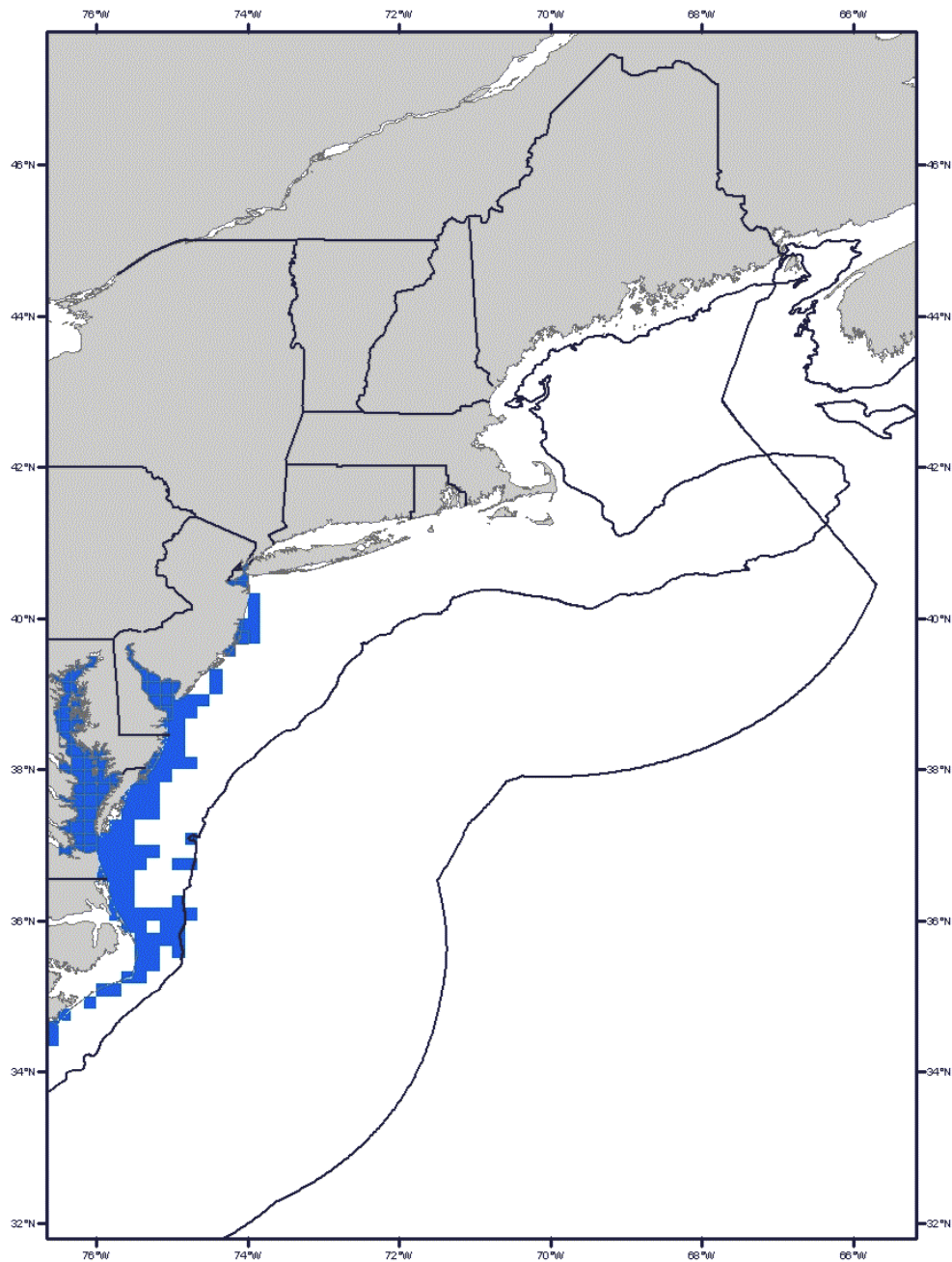
This map represents the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999). **Only the shaded squares in U.S. waters represent the EFH designation.** Only bottom habitats with mud, gravel, and sand substrates that occur within the shaded areas in U.S. waters are designated as EFH. This represents 100% of the observed range of this life stage.

Figure 2 Barndoor Skate EFH Adult (100%)



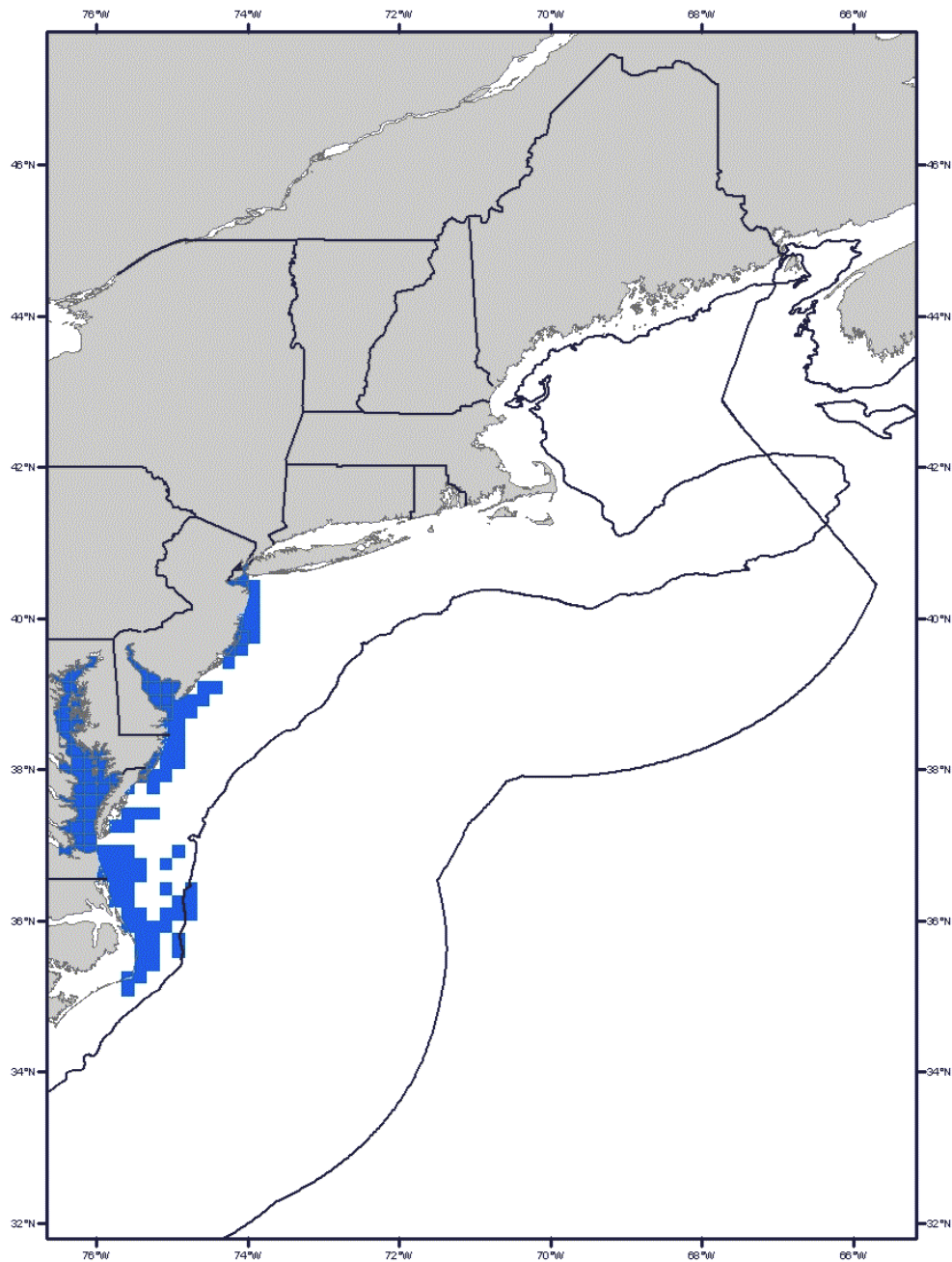
This map represents the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999). **Only the shaded squares in U.S. waters represent the EFH designation.** Only bottom habitats with mud, gravel, and sand substrates that occur within the shaded areas in U.S. waters are designated as EFH. This represents 100% of the observed range of this life stage.

Figure 3 Clearnose Skate EFH Juvenile (90%)



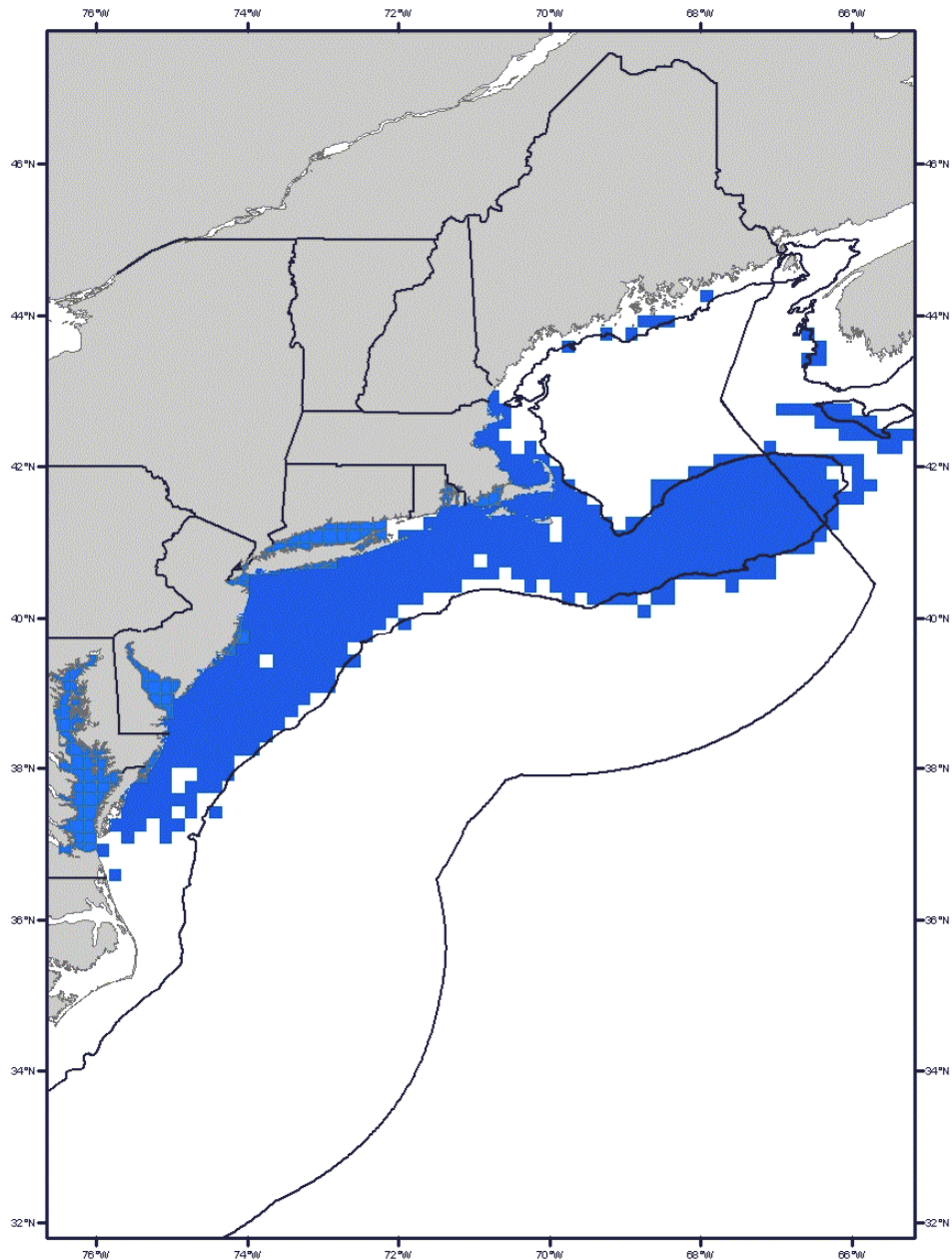
This map represents the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999) and ELMR data presented in Table 5. Only habitats with soft bottom, rocky or gravelly substrates that occur within the shaded areas are designated as EFH. This represents 62% of the observed range of this life stage.

Figure 4 Clearnose Skate EFH Adult (90%)



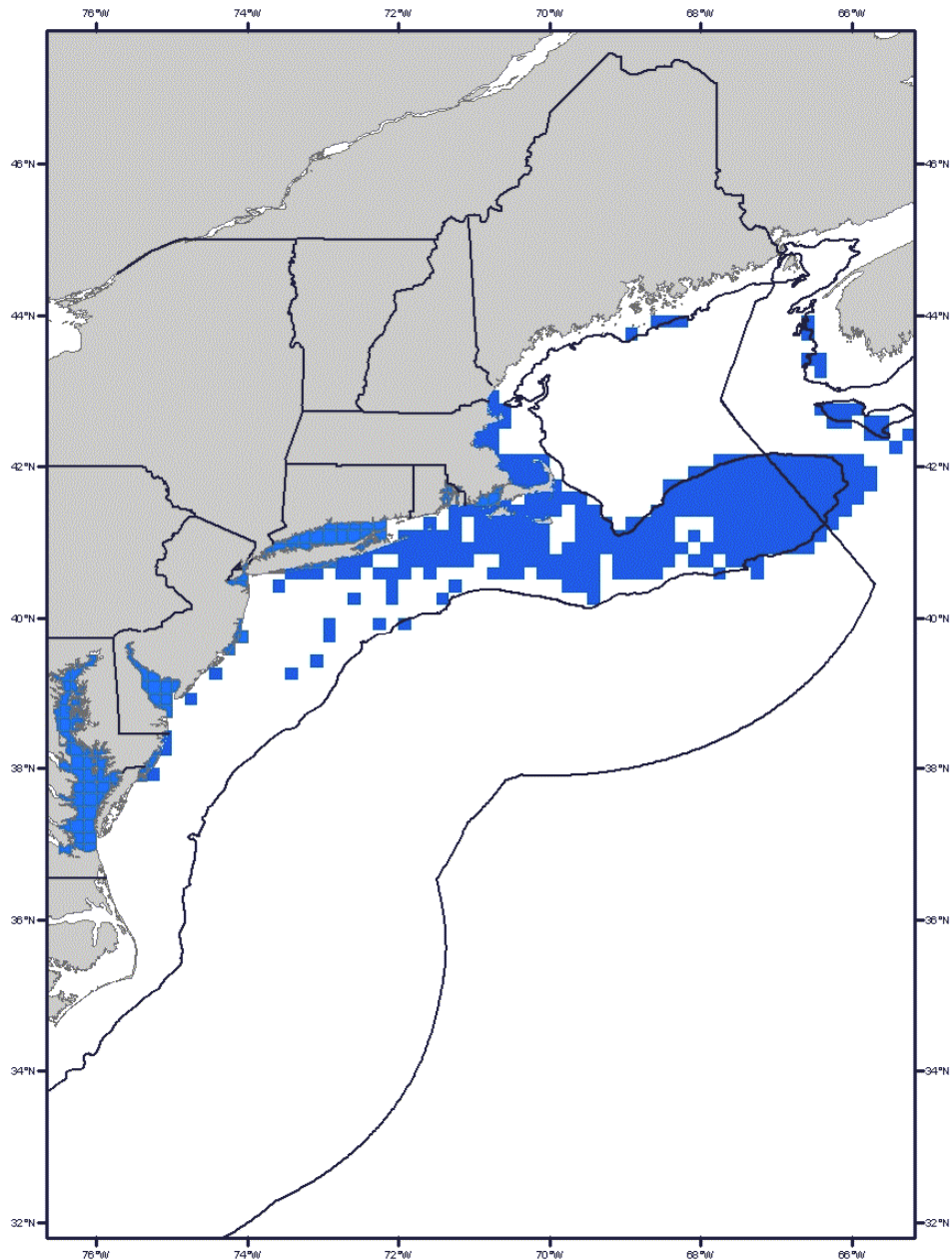
This map represents the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999) and ELMR data presented in Table 5. Only habitats with soft bottom, rocky or gravelly substrates that occur within the shaded areas are designated as EFH. This represents 67% of the observed range of this life stage.

Figure 5 Little Skate EFH Juvenile (90%)



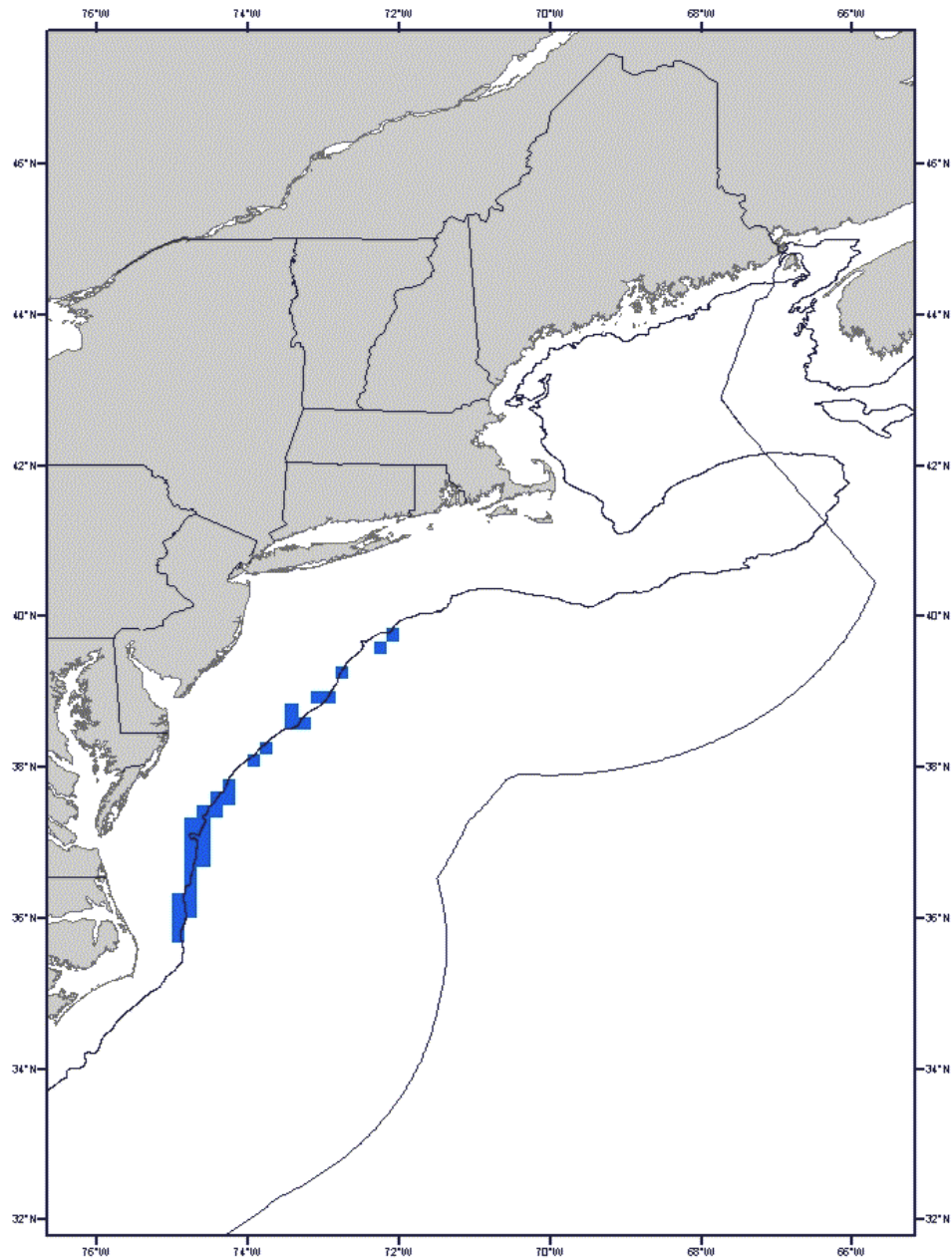
This map represents an option for the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999) and ELMR data presented in Table 5. **Only the shaded squares in U.S. waters represent the EFH designation.** Only habitats with sandy, gravelly, or mud substrates that occur within the shaded areas in U.S. waters are designated as EFH. This represents 58% of the observed range of this life stage.

Figure 6 Little Skate EFH Adult (90%)



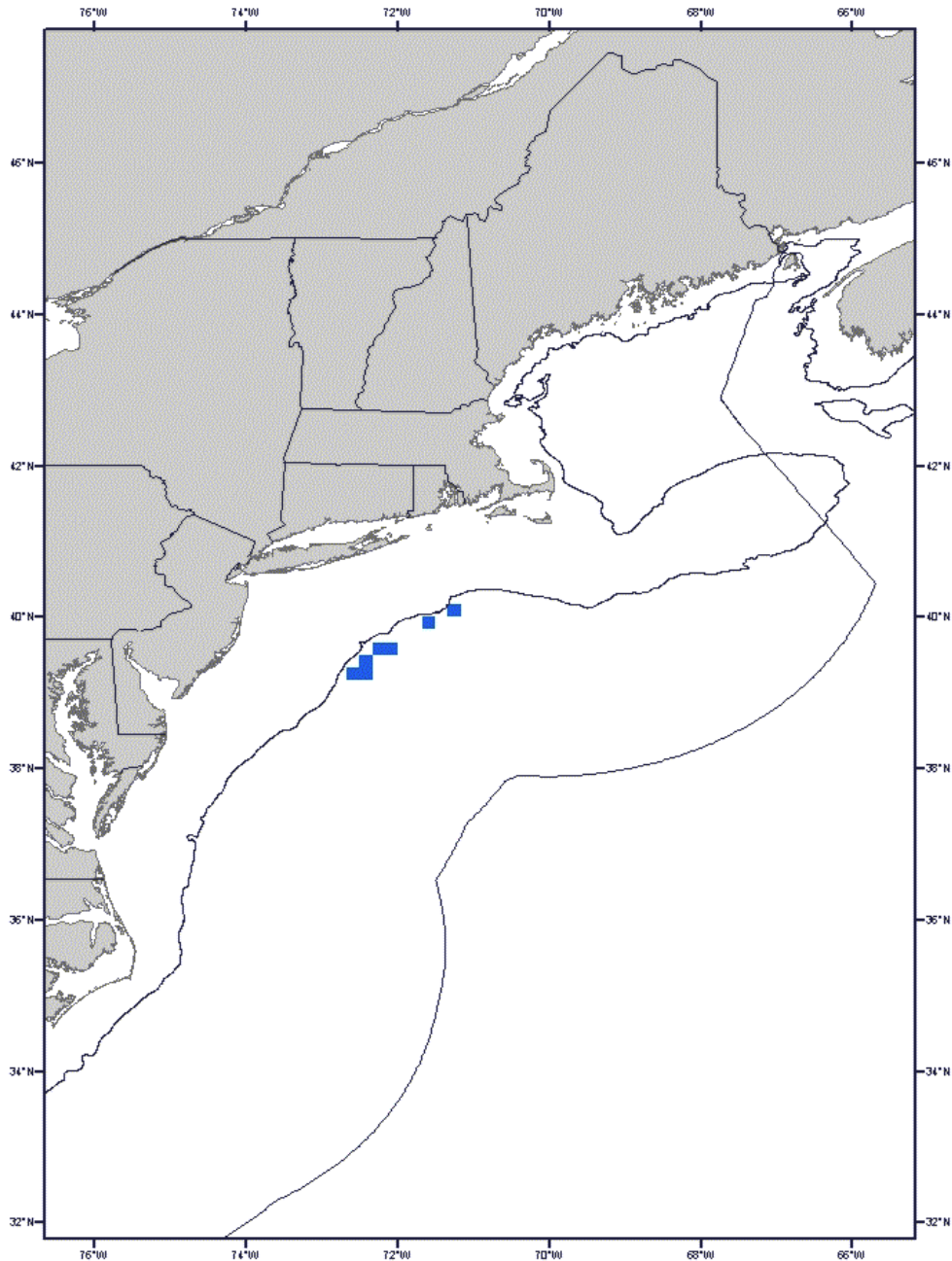
This map represents an option for the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999) and ELMR data presented in Table 5. **Only the shaded squares in U.S. waters represent the EFH designation.** Only habitats with sandy, gravelly, or mud substrates that occur within the shaded areas in U.S. waters are designated as EFH. This represents 57% of the observed range of this life stage.

Figure 7 Rosette Skate EFH Juvenile (90%)



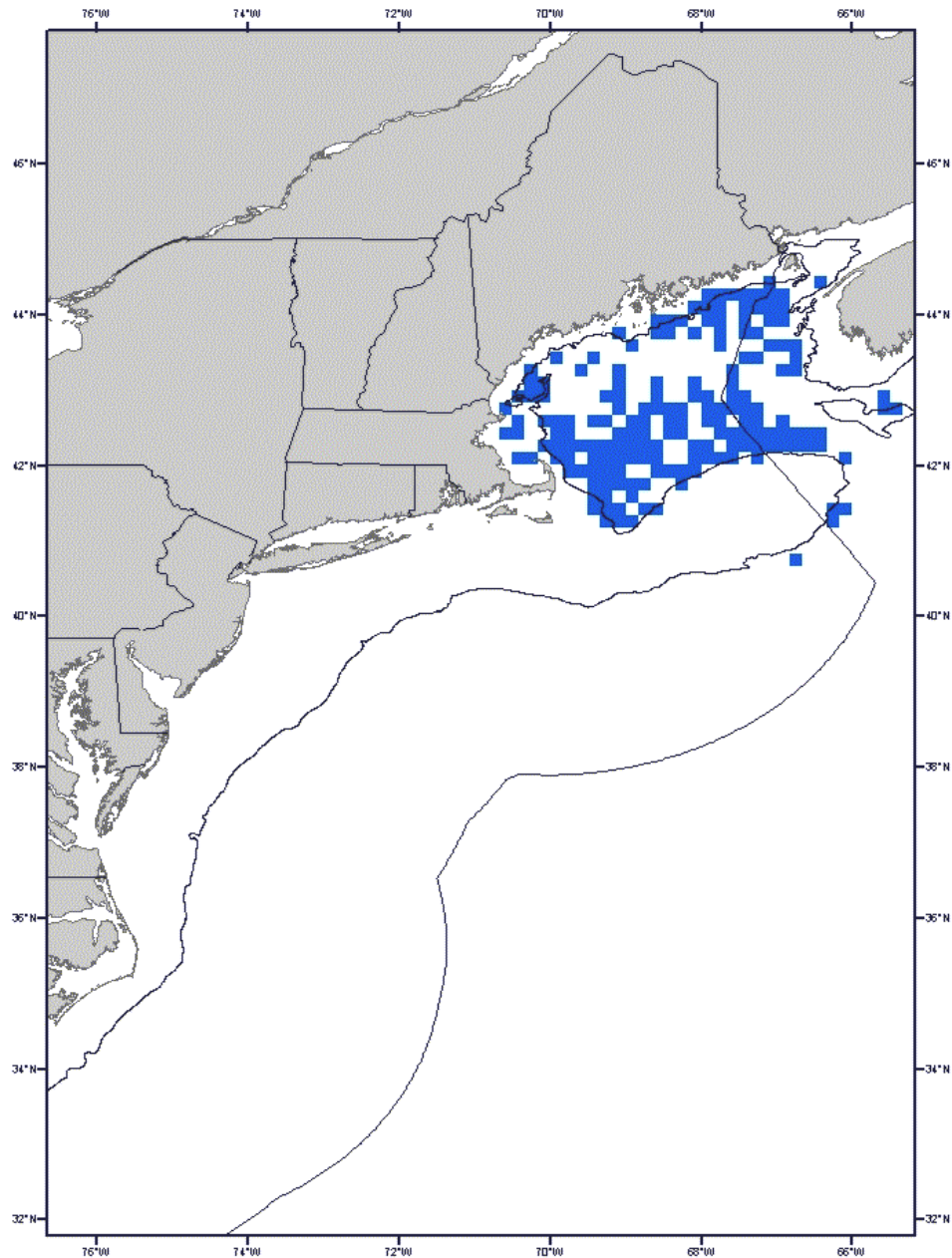
This map represents the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999). Only habitats with a soft substrate, including sand/mud bottoms, mud with echinoid and ophiroid fragments, and shell and pteropod ooze that occur within the shaded areas are designated as EFH. This represents 63% of the observed range of this life stage.

Figure 8 Rosette Skate EFH Adult (90%)



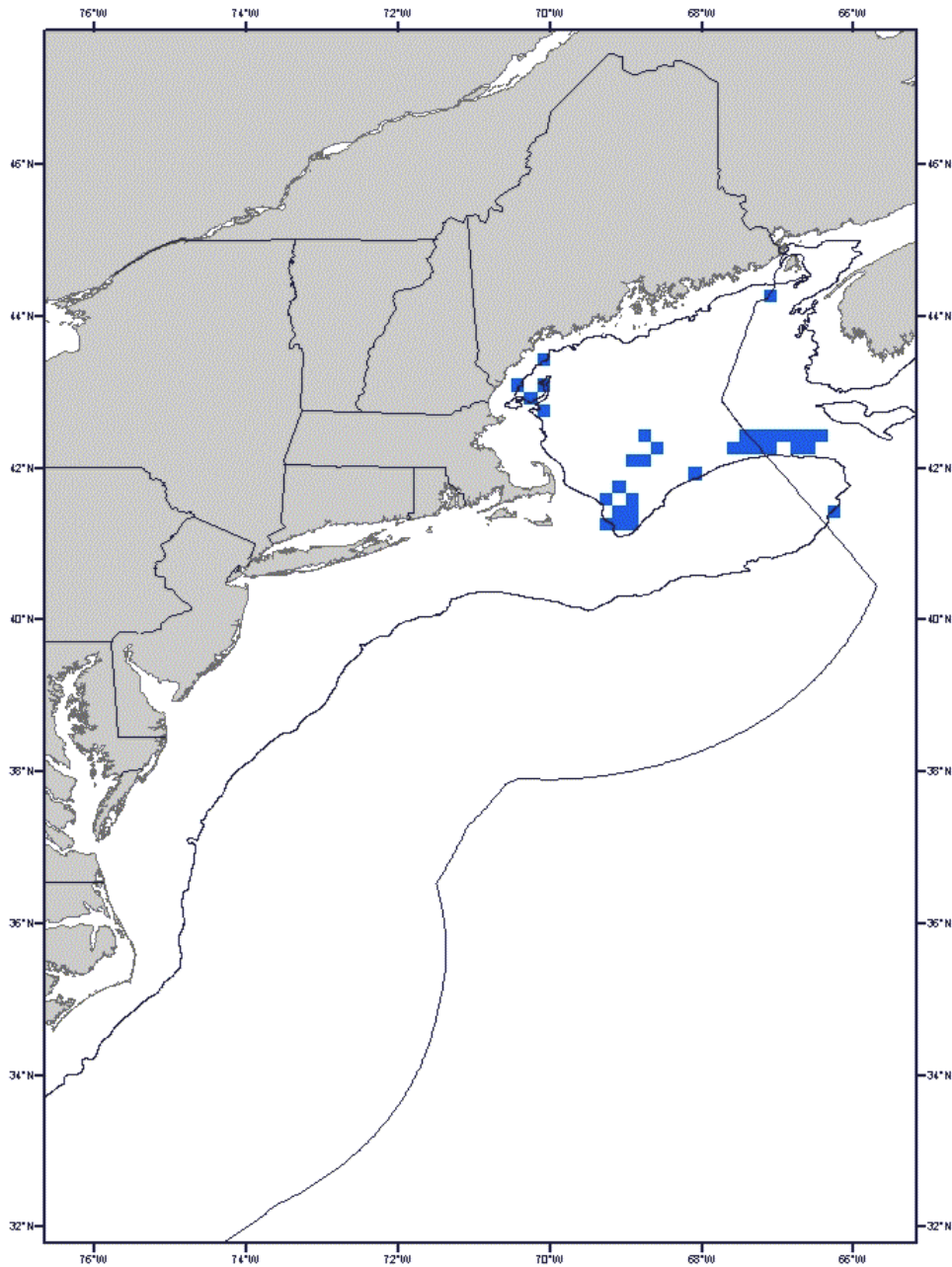
This map represents the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999). Only habitats with a soft substrate, including sand/mud bottoms, mud with echinoid and ophiroid fragments, and shell and pteropod ooze that occur within the shaded areas are designated as EFH. This represents 70% of the observed range of this life stage.

Figure 9 Smooth Skate EFH Juvenile (90%)



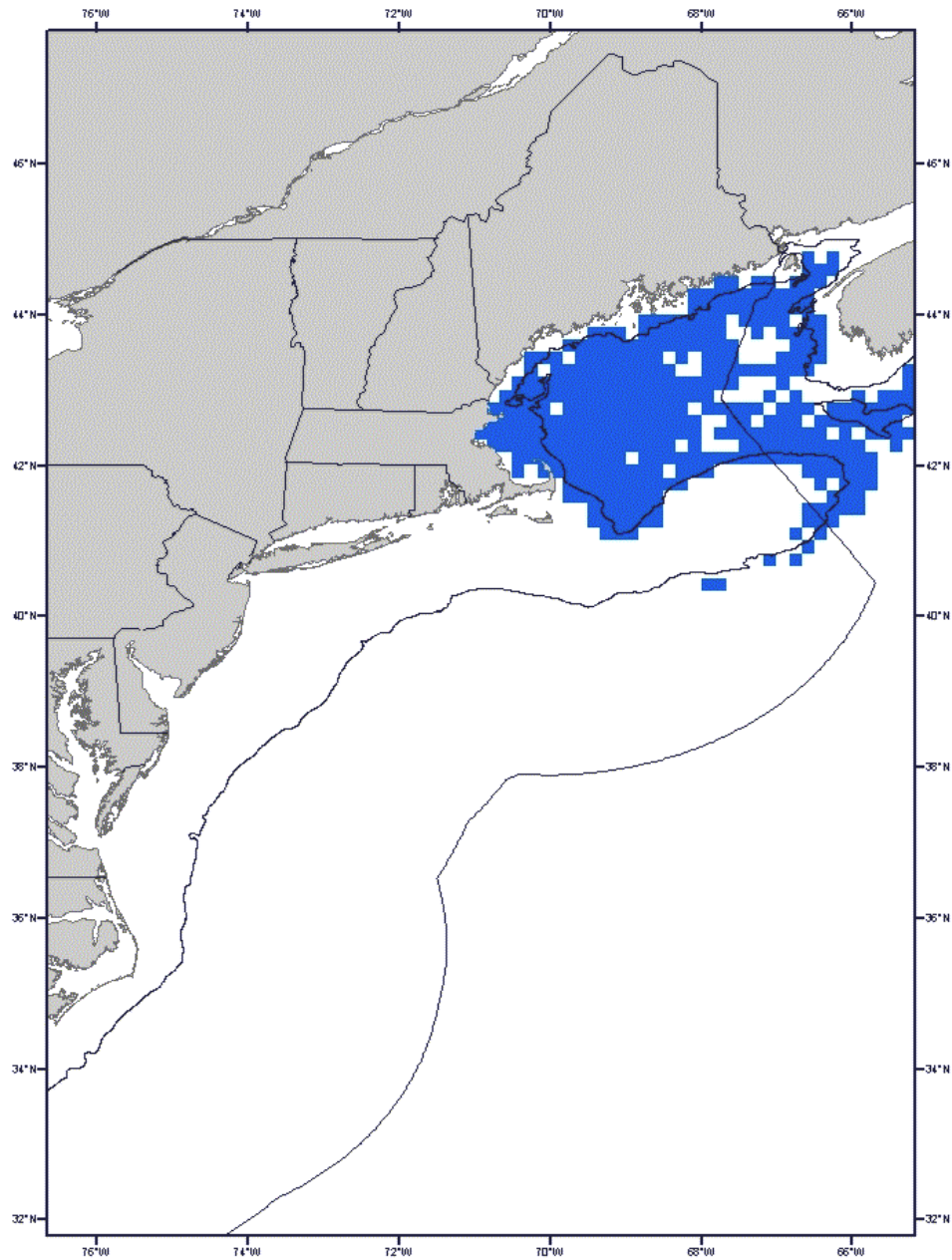
This map represents the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999). **Only the shaded squares in U.S. waters represent the EFH designation.** Only habitats with a substrate of soft mud and also on sand, broken shells, gravel and pebbles that occur within the shaded areas in U.S. waters are designated as EFH. This represents 63% of the observed range of this life stage.

Figure 10 Smooth Skate EFH Adult (90%)



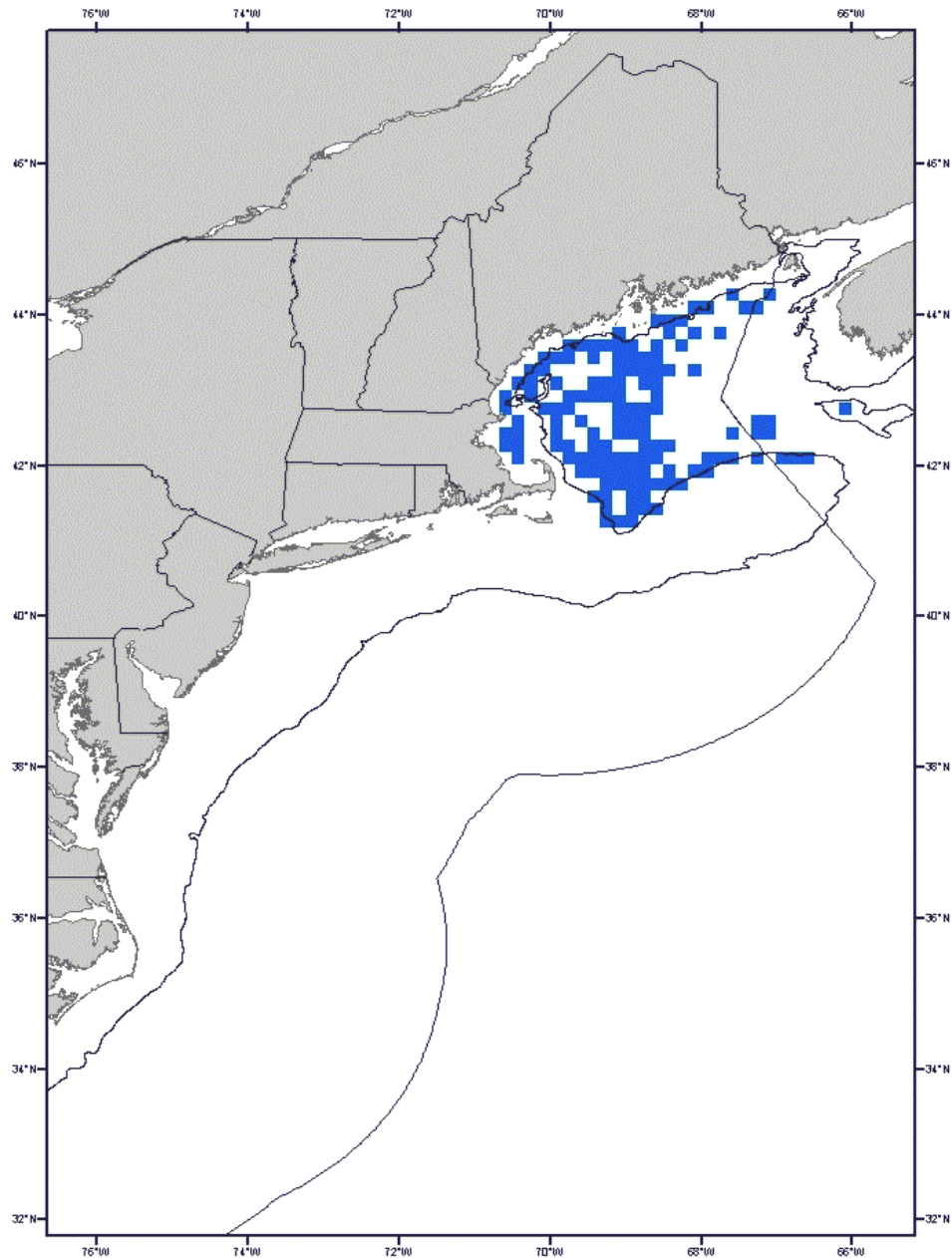
This map represents the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999). **Only the shaded squares in U.S. waters represent the EFH designation.** Only habitats with a substrate of soft mud and also on sand, broken shells, gravel and pebbles that occur within the shaded areas in U.S. waters are designated as EFH. This represents 70% of the observed range of this life stage.

Figure 11 Thorny Skate EFH Juvenile (90%)



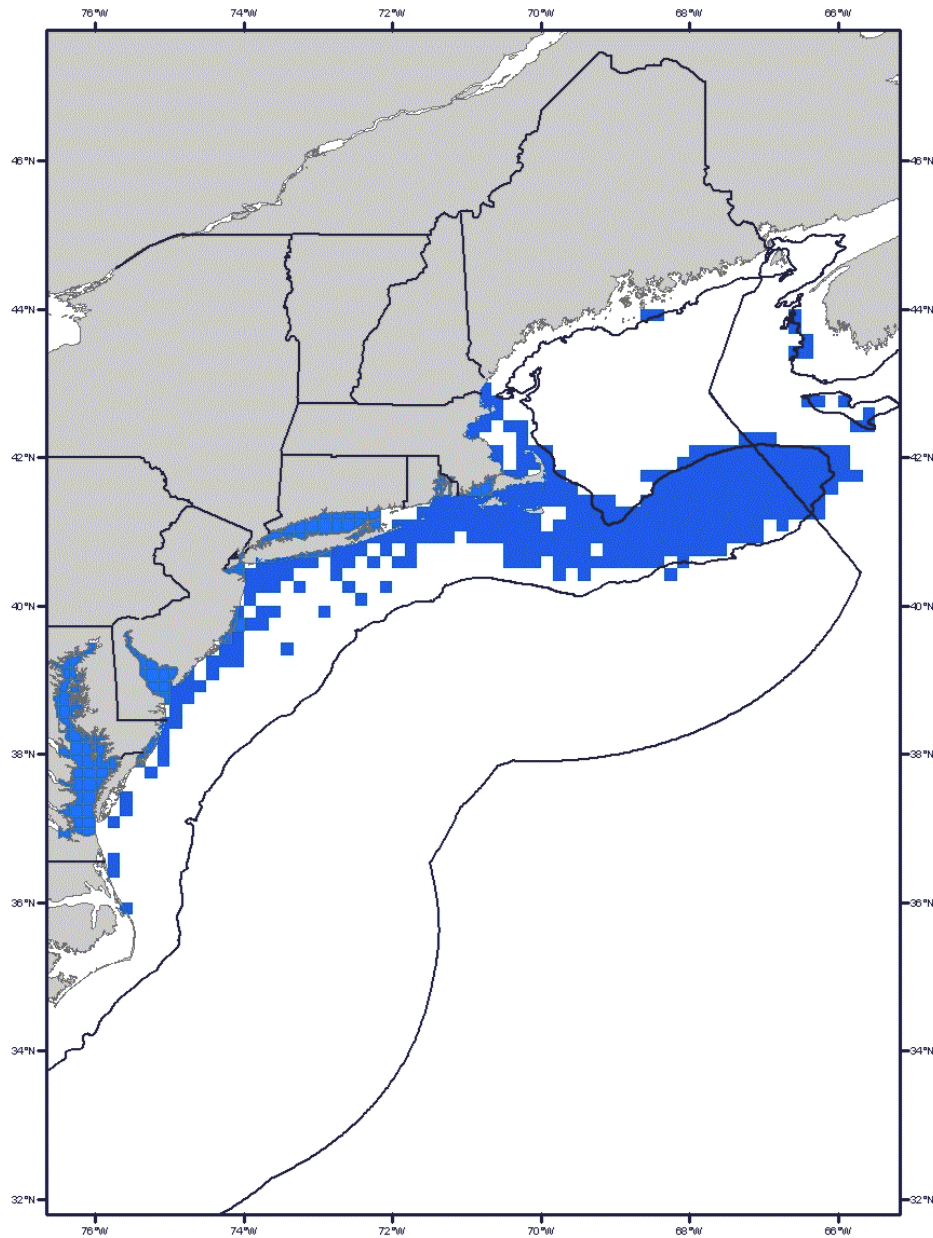
This map represents the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999). **Only the shaded squares in U.S. waters represent the EFH designation.** Only habitats with a substrate of sand, gravel, broken shell, pebbles, and soft mud that occur within the shaded areas in U.S. waters are designated as EFH. This option represents 66% of the observed range of this life stage.

Figure 12 Thorny Skate EFH Adult (90%)



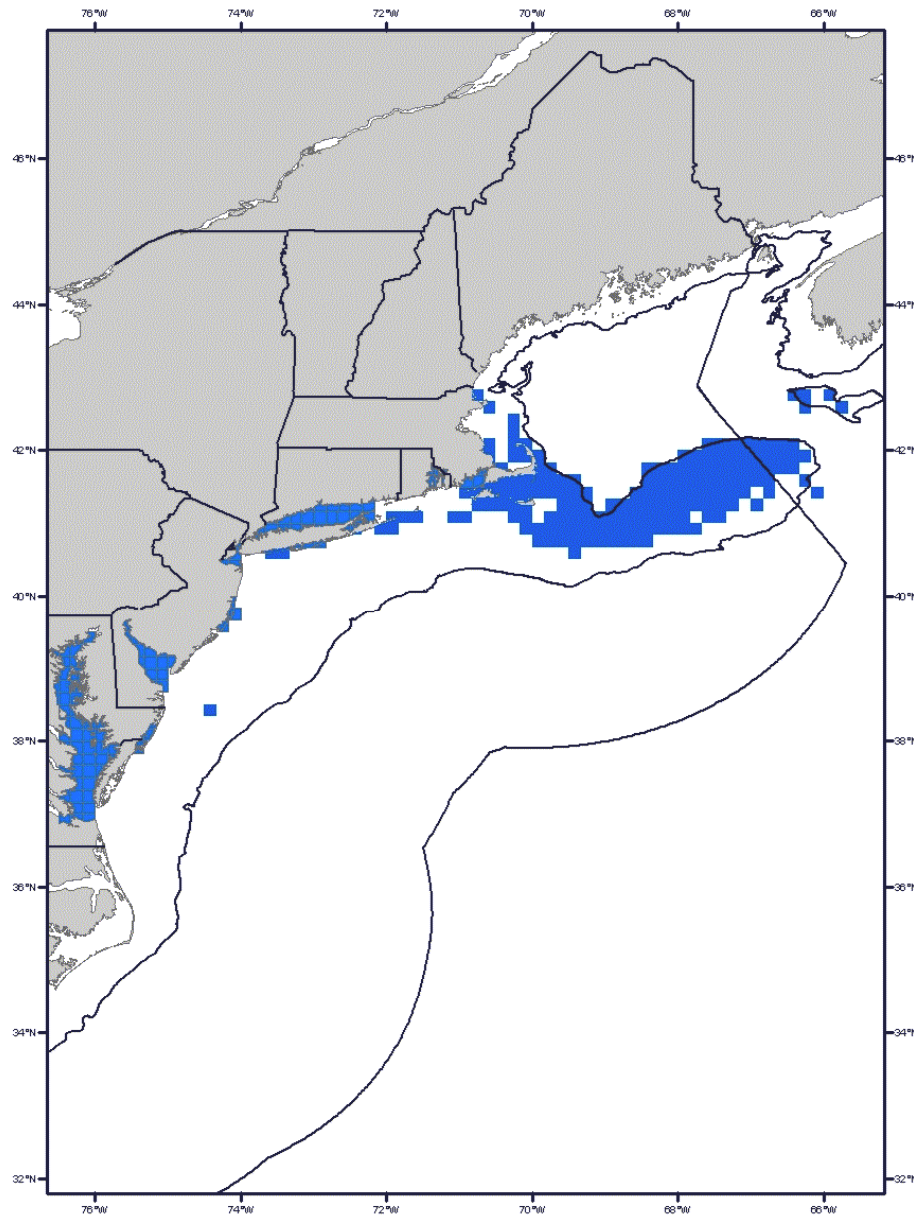
This map represents for the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999). **Only the shaded squares in U.S. waters represent the EFH designation.** Only habitats with a substrate of sand, gravel, broken shell, pebbles, and soft mud that occur within the shaded areas in U.S. waters are designated as EFH. This represents 66% of the observed range of this life stage.

Figure 13 Winter Skate EFH Juvenile (90%)



This map represents the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999) and ELMR data presented in Table 5. **Only the shaded squares in U.S. waters represent the EFH designation.** Only habitats with a substrate of sand and gravel or mud that occur within the shaded areas in U.S. waters are designated as EFH. This represents 48% of the observed range of this life stage.

Figure 14 Winter Skate EFH Adult (90%)



This map represents the designation of EFH for this life history stage based on the areas of highest relative abundance of this species, based on the NMFS trawl survey (1963 - 1999) and ELMR data presented in Table 5. **Only the shaded squares in U.S. waters represent the EFH designation.** Only habitats with a substrate of sand and gravel or mud that occur within the shaded areas in U.S. waters would be designated as EFH. This represents 44% of the observed range of this life stage

Enclosure 6 INRMP Sea Turtle Program Biological Opinion and Biological & Lighting Assessments



United States Department of the Interior

FISH AND WILDLIFE SERVICE



Virginia Field Office
6669 Short Lane
Gloucester, VA 23061

October 21, 2016

Mr. Michael H. Jones
Director, Environmental Planning and Conservation
Navy Region Mid-Atlantic
1510 Gilbert Street
Norfolk, VA 23511- 2737

Re: Sea Turtle Management, Naval Air
Station Oceana – Dam Neck Annex
and Virginia Army National Guard –
Camp Pendleton, Virginia Beach,
VA, Project # 2016 – F-2328

Dear Mr. Jones:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the U.S. Department of the Navy's (Navy) proposed and ongoing sea turtle management at the Naval Air Station Oceana – Dam Neck Annex (NASO-DNA) and the Virginia Army National Guard's operations at Camp Pendleton (VAARNG-CP) in Virginia Beach, VA, and effects on the federally listed endangered Kemp's ridley sea turtle (*Lepidochelys kempii*) and federally listed threatened green sea turtle (*Chelonia mydas*) North Atlantic distinct population segment (DPS) and loggerhead sea turtle (*Caretta caretta*) Northwest Atlantic Ocean DPS in accordance with section 7 of the Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA). Your February 29, 2016 request for formal consultation was received on March 3, 2016.

This biological opinion is based on information provided in the March 3, 2016 biological assessment, the project proposal, telephone conversations, field investigations, and other sources of information. A complete administrative record of this consultation is on file in this office.

The Navy determined in its biological assessment (Navy 2016) that the proposed and ongoing actions may affect, but are not likely to adversely affect the federally listed endangered leatherback (*Dermochelys coriacea*) and hawksbill (*Eretmochelys imbricata*) sea turtles. The Service concurs with the Navy's determination because although leatherback and hawksbill sea turtles have been documented in offshore environments, no nests of either species have been

documented in the area and these species are not expected to occur there in the future. These species are not considered further in this biological opinion.

This biological opinion is valid from the date of signature through August 15, 2031.

CONSULTATION HISTORY

- 10-08-03 The Service issued NASO-DNA a non-jeopardy biological opinion for a proposed beach replenishment project.
- 05-29-08 Agreement between NASO-DNA and the Service's Back Bay National Wildlife Refuge (BBNWR) that NASO-DNA would be responsible for conducting crawl and nest patrols on NASO-DNA beaches and BBNWR was responsible for biological data collection, nest confirmation, and nest relocation on NASO-DNA beaches.
- 05-25-12 The Service issued BBNWR and NASO-DNA a non-jeopardy biological opinion for the updated BBNWR Sea Turtle Management Program.
- 10-17-14 Meeting between the Service and Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic Region (MIDLANT) to discuss sea turtle management.
- 01-06-15 Service review of the NASO-DNA Integrated Natural Resources Management Plan (INRMP) that includes standard operating procedures (SOP) for sea turtle management.
- 05-29-15 National Oceanic and Atmospheric Administration review of the NASO-DNA INRMP that includes SOPs for sea turtle management.
- 06-09-15 INRMP signed into official compliance by the Navy.
- 10-08-15 Coordination of INRMP updates at the INRMP Annual Partners meeting.
- 03-03-16 The Service received the Navy's February 29, 2016 request to initiate formal consultation on the sea turtle management program.
- 04-06-16 Meeting among the Service, NASO-DNA, Joint Expeditionary Base Little Creek-Fort Story, and Virginia Department of Game and Inland Fisheries (VDGIF) to discuss sea turtle management in Virginia.
- 05-03-16 The Service provided a letter to NAVFAC acknowledging receipt of the Navy's February 29, 2016 request to initiate formal consultation.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

Naval Air Station Oceana - Dam Neck Annex (NASO-DNA)

NASO-DNA is an approximately 1,900-acre installation in southern Virginia Beach, VA. NASO-DNA includes approximately 4.0 miles [mi] of intertidal beach and primary and secondary coastal dune habitat along the Atlantic Ocean (Navy 2015). The beaches and dunes on NASO-DNA encompass about 164 acres of dune protection area consisting of undeveloped primary and secondary dunes and natural communities.

The proposed sea turtle patrols and nest and stranding management are defined in the SOPs for sea turtles (Navy 2015, Appendix A) included in the NASO-DNA INRMP (Navy 2015). The SOPs for sea turtle patrols, stranding notifications and actions, and nest management include:

- conducting patrols within the beach and dune areas of NASO-DNA to locate stranded sea turtles, turtle crawls, and turtle nests;
- reporting and coordinating actions for stranded sea turtles with the Virginia Aquarium Stranding Team (VAST);
- protecting and monitoring *in situ* sea turtle nests until all hatchlings have emerged;
- relocating nests to established low activity (green) zones when operational uses of the beach (e.g., red or yellow activity zones) or nest location (e.g., below the high tide line) would result in disturbance or destruction of a nest; and
- reviewing projects proposed in the INRMP or by NASO-DNA or its tenant for their potential to affect sea turtles.

Sea Turtle Patrols – The procedure for sea turtle patrols was developed to identify stranded sea turtles, sea turtle crawls, and sea turtle nests within the beach and dune areas of NASO-DNA. Nesting surveys and egg relocations will only be conducted by persons with prior experience and training in these activities and who are duly authorized to conduct such activities through a valid permit issued by the VDGIF. The patrollers will have training on patrol procedures, crawl recognition, and all-terrain vehicle (ATV) use. From 15 May to 31 August, NASO-DNA's natural resources staff and other authorized individuals will patrol the beaches daily using ATVs starting 30 minutes before sunrise. If the morning is dark, ATV headlights will be covered in red filters before use on the beach. The water's edge will be patrolled first, and then the middle beach will be patrolled. Patrolling above the high-tide line is not advised because this habitat may contain shorebird nests.

If a stranded turtle, turtle crawl, or turtle nest is sighted, procedures outlined in the following sections will be followed. If unauthorized vehicles, artificial light, or any other activity that could negatively impact sea turtle activity on the beach is found, NASO-DNA's security, conservation

law enforcement officer, and Natural Resource Manager (NRM) will be contacted. Information from the patrol will be documented in a Sea Turtle Patrol Log.

Sea Turtle Stranding – During patrols, dead or live sea turtles may be found stranded. The NASO-DNA reporting procedures, which include contacting the NRM and the VAST, will be initiated for any stranded sea turtles. Appropriate contacts will be provided in the sea turtle communication protocol and updated yearly prior to the start of the sea turtle nesting season or as needed. If appropriate, the NRM will contact the NAVFAC MIDLANT Subject Matter Expert and the National Oceanic and Atmospheric Administration Point of Contact. After helping VAST remove either dead or live stranded turtles and completing patrols, the patrollers will complete patrol logs and stranding data sheets.

Dead Stranded Turtles – If the turtle is in the surf, patrollers will move it landward so it does not wash away before the VAST arrives. Patrollers will provide the day, time, and location information on whether the turtle was moved out of the surf and the patroller's name and contact information to the VAST and the NRM. The patrollers will help the VAST with base access, data collection, and removal of the turtle.

Live Stranded Adults – Patrollers will contact the VAST and the NRM, relay the location of the stranded adult turtle, and continue to search the beach. When they finish patrolling, they will return with supplies to protect the stranded turtle. Patrollers will keep the nose and eyes of the turtle moist and its body shaded and await further instruction from the VAST. Patrollers will aid the VAST with base access, data collection, and moving the turtle.

Live Stranded Hatchlings – Patrollers will contact the NRM and the VAST, relay the location of the stranded hatchling, and place the hatchling in a cooler with moist sand until they receive further instructions.

Crawl Procedures – When a patroller finds a nesting or crawling turtle, they will extinguish their ATV headlights. Patrollers will take care not to startle the turtle and keep a safe distance away until the turtle has returned to the sea. Any turtle crawls or nests will be reported to BBNWR, the NRM, range control if found on training beaches, security, VDGIF sea turtle program manager, Command Duty Officer, Public Affairs Officer, Installation Environmental Program Director, and Public Works Officer. The patrollers and NRM will coordinate with all agencies to document the occurrence and determine appropriate actions.

After the turtle crawl has been reported, the crawl will be marked with wire flags and the surrounding area will be identified with stakes and flagging to provide a buffer around the nest. The date, time, weather, crawl measurements, and any information that can be deduced about the time of emergence and return to the ocean will be recorded. The global positioning system location will be documented and pictures taken. Flashes should not be used for nighttime photography. A permitted biologist or other approved and permitted individual (i.e., Navy, VDGIF, Service, or Virginia Aquarium representative) will determine if a false crawl, false nest,

or nest is present. If a nest is present, nest procedures will be followed. Otherwise, the patroller will complete his/her patrol.

Nest Management – The procedures discussed below are general descriptions of nest management actions at NASO-DNA. Specific procedures are found in the *Standard Operating Procedures for Sea Turtles, Naval Air Station Oceana – Dam Neck Annex* (Navy 2016, Appendix A). Only individuals having the appropriate permits (e.g., Navy, VDGIF, Service, VAST) are legally authorized to perform nest management procedures on NASO-DNA.

To locate a nest, a permitted biologist will examine any disturbed areas. Nests will be located by excavating the nest by hand. Nests will be left in place whenever possible. If a nest is relocated by a permitted biologist, it will be moved to the closest available designated location via strict protocols and prior to 9 am. Relocated nests will not be placed in organized groupings. Relocated nests will be randomly staggered along the length and width of the beach in settings that are not expected to experience daily inundation by high tides or known to routinely experience severe erosion and egg loss, predation, or subject to artificial lighting. Nest relocations in association with construction activities will cease when construction activities no longer threaten nests. For all nests, data sheets and photographs documenting the actions taken will be completed and placed in a turtle nest binder.

If a nest is found below the high tide line, the responding permit holder and NRM determine whether the nest should be relocated above the high tide line. The responding permit holder and NRM determine whether the nest should be relocated to a different area of the installation considering whether the beach is in a military training area.

NASO-DNA has identified areas of the installation where sea turtle nests or hatchlings may be impacted as a result of training that cannot be relocated (Figure 1). The majority of this training is limited to between Labor Day and Memorial Day due to the installation's close proximity to Virginia Beach. Areas designated as red zones (Figure 1) are commonly used for training that is difficult to relocate and may put sea turtle nests at risk. In the red zone, routine exercises include: training, testing and evaluation in special warfare, ordinance, overland assault, beach assault, and tactical air operations radar. Amphibious landing exercises can occur up to 4 times per month and involve 1 to 4 amphibious vehicles maneuvering onto and across the beach, foot traffic across the beach and dunes, and support personnel digging foxholes to establish a beachhead. In the red zones (Figure 1), sea turtles may be impacted by ground disturbing training activities, amphibious landing exercises, explosive ordinance disposal, physical training, security patrols, maintenance of buried communication cables, and ATV training. Training and associated activities may disturb nesting attempts or reduce hatching success. To avoid potential adverse effects, nests laid in red zones will be relocated to the nearest adjacent green zone.

Areas designated as yellow zones (Figure 1) are used for training; however, training exercises are less frequent and more flexible than training exercises conducted in red zones and nests will be left *in situ* if they can be avoided. If nests are located in areas with a likelihood of negative effects on training, NASO-DNA will contact the Service and VDGIF to discuss potential for

relocation. Relocation of nests in yellow zones will be considered on a case-by-case basis. Nests above the high tide line can be left in place, with a self-release cage and posts on all sides. Nests that negatively inhibit established training routes may be relocated west, closer to the dune line. If the number of nests negatively inhibits training, and training exercises cannot be moved to a different location the nest will be relocated to the closest green zone. Nest sitting will not occur in yellow zones.

Areas designated as green zones (Figure 1) are generally used for activities where individuals are able to avoid a marked sea turtle nest, primarily recreational use areas. Recreational use of beaches on NASO-DNA occurs seasonally, with most activity concentrated in spring and summer months. Recreational use includes swimming, beachcombing, fishing, wildlife observation, sunbathing, and other typical beach recreation. Seasonal recreational use overlaps with sea turtle nesting season and may disturb nesting attempts or reduce hatching success. A nest laid in green zones will be left *in situ*, unless located below the high tide line, in which case it will be relocated due west above the high tide to avoid inundation. NASO-DNA staff routinely patrol the beach and recreational use areas. Nests will be marked conspicuously to reduce likelihood of disturbance prior to hatching. Nest sitting is authorized in green zones.

In Situ Nest Protection and Monitoring – *In situ* nests will be surrounded by a wire predator-proof enclosure, flagging, reflectors, and signage to inform the public about the protection program. Navy (2016, Appendix D) contains detailed procedures for construction and placement of predator enclosures. Navy (2016, Appendix A) contains detailed procedures for nest monitoring and nest sitting. Nest sitting will only be authorized in green zones (Figure 1).

Nest Relocation – Nest relocation procedures are outlined in Virginia Bureau of Wildlife Resources (2015) and Navy (2016, Appendix A). Nests will be moved to the nearest approved adjacent area (Figure 1). Relocated nests will be moved to an appropriate area on NASO-DNA or VAARNG-CP. In rare circumstances when no approved areas on NASO-DNA or VAARNG-CP are available, the nest will be moved to a beach location at BBNWR. A predator enclosure cage will be placed over the relocated nest using procedures described above and outlined in Navy (2016, Appendix D). The nests will be monitored following the same procedures as for nests left *in situ*.

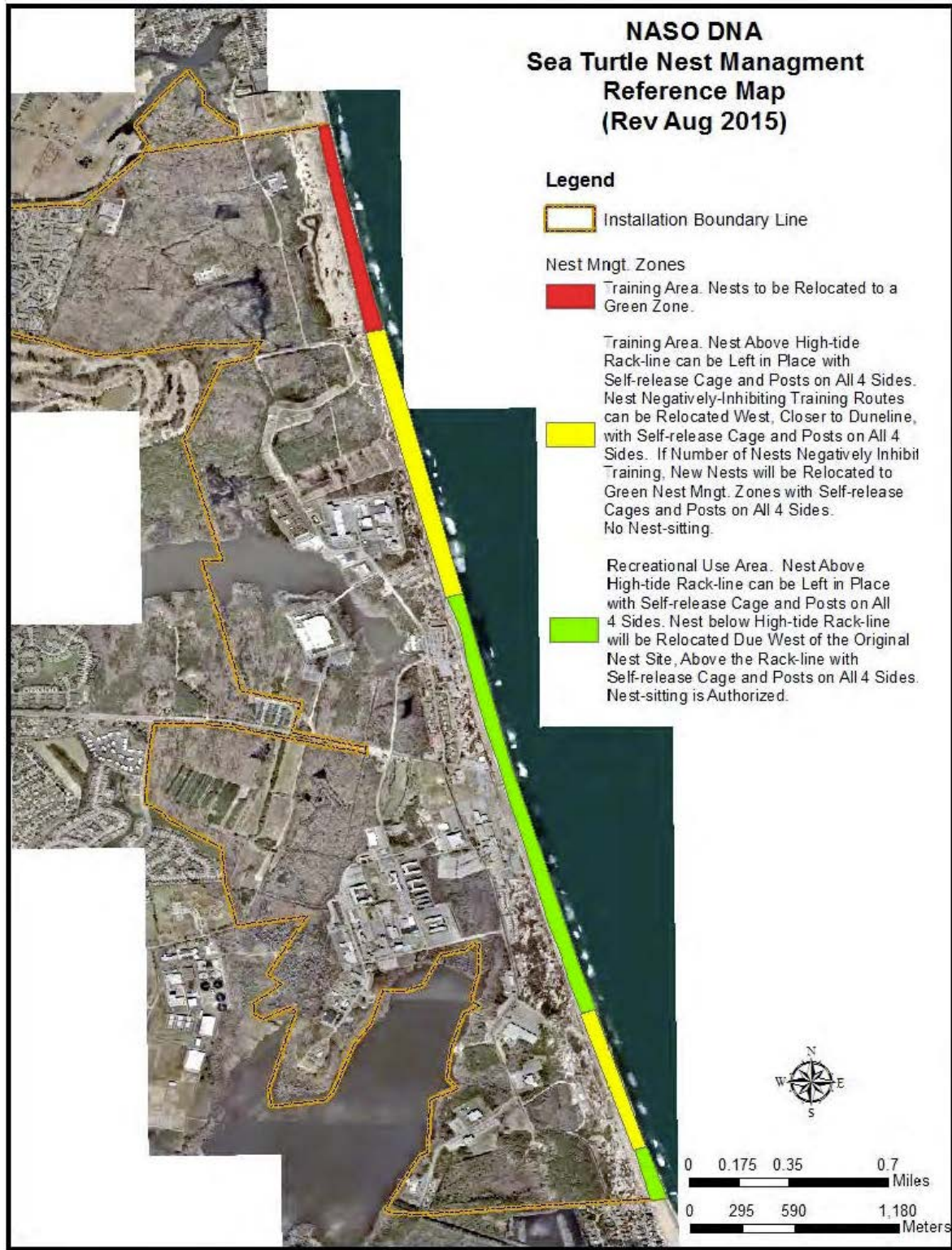


Figure 1. Naval Air Station Oceana – Dam Neck Annex sea turtle nest management map.

Virginia Army National Guard - Camp Pendleton (VAARNG-CP)

VAARNG-CP is adjacent to the northern boundary of NASO-DNA in southern Virginia Beach (Figure 2). The VAARNG-CP is situated along the Atlantic Ocean and has approximately 0.23 mi of intertidal beach and primary and secondary coastal dune habitat continuous with NASO-DNA beaches (VAARNG 2004). The VAARNG-CP beach is bounded to the north by the Croatan residential neighborhood and Croatan public beach and to the south by NASO-DNA. Through a cooperative venture with the City of Virginia Beach, approximately 1,000 ft of the northern portion of the VAARNG-CP beach is opened to the public as the Pendleton Surf Beach.

Sea Turtle Patrols – The VAARNG-CP INRMP recognizes the need for monitoring for sea turtle activity (VAARNG 2004). Currently, VAARNG-CP has a verbal agreement with NASO-DNA to conduct beach patrols. NASO-DNA beach patrols survey the VAARNG-CP beach to the property boundary for the portion of the beach leased to the City of Virginia Beach and use binoculars to survey the remaining beach. The area leased to the City of Virginia Beach is surveyed by Virginia Aquarium volunteers.

If a crawl, stranded sea turtle, or potential nest is located, the patrol will contact the NASO-DNA NRM, who in turn contacts the VAARNG-CP NRM. Notification is passed to the VAARNG-CP command staff. The VAARNG-CP NRM ensures that the Service, VDGIF, and VAST are notified as appropriate.

Nest Management – Limited training activities occur on VAARNG-CP beaches. Training includes driving vehicles such as Humvees and ATVs and can be suspended at any time to accommodate protection of sea turtles. Additional vehicular traffic can occur in an emergency situation for human safety or law enforcement activities. If a nest is located, the VAARNG-CP NRM will consult with the Service, VDGIF, and VAST to determine if the nest will be left *in situ* or relocated on VAARNG-CP, and who will be responsible for relocation. Nest management activities will be conducted in accordance with the 2015 Virginia Sea Turtle Nesting Handbook (Virginia Bureau of Wildlife Resources 2015).

In Situ Nest Protection and Monitoring – In areas with heavy foot or vehicular traffic the nest will typically be marked for avoidance. *In situ* nests will be marked with stakes, flagging, and signs that identify the site as a sea turtle nest. Stakes will be placed at each corner of the nest (36 – 40 inches from nest center) and encircled with flagging to preclude them from being run over or disturbed. A predator exclosure will be placed on the nest as described in Navy (2016, Appendix D). Nests will be monitored daily near the hatch window to determine success. A nest inventory may only be conducted 72 hours after the first sign of emergence or 70 days after the eggs were deposited (90 days for leatherbacks) whichever comes first. The nest will be excavated by permitted persons to quantify nest success.

Nest Relocation – When a nest is located below the mean high tide line, it may be moved immediately above the mean high tide line. A nest will only be moved for unusual activities, such as special military training operations by VAARNG-CP or the U.S. Navy, that pose a

serious threat to the nest. In these instances, VAARNG-CP NRM will consult with the VDGIF and Service to discuss potential mitigation measures that may include relocation. If the nest is relocated, permitted individuals will accomplish the relocation of the nest in accordance with the procedures outlined in the 2015 Virginia Sea Turtle Nesting Handbook (Virginia Bureau of Wildlife Resources 2015). Nests may be relocated to the closest adjacent suitable beach approved for relocation on VAARNG-CP or NASO-DNA. Prior to relocating any nest to the NASO-DNA green zone (Figure 1), coordination and approval must be obtained through the NASO-DNA NRM. Appendix K in the NASO-DNA Standard Operating Procedures for Sea Turtles (Navy 2016, Appendix A) lists areas approved for nest relocation. In rare circumstances when no approved areas on VAARNG-CP or NASO-DNA are available, the nest will be moved to a beach location at BBNWR. Relocated nests are marked as discussed above for *in situ* nest protection and monitoring.

Back Bay National Wildlife Refuge (BBNWR)

BBNWR has approximately 5 mi of intertidal beach and primary and secondary coastal dune habitat and is a potential relocation site for nests from NASO-DNA and VAARNG-CP. BBNWR is located south of Sandbridge, VA, and is about 8 mi south of NASO-DNA (Figure 2).

Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. The Service has determined that the action area for this project includes the beach and dune areas at NASO-DNA, VAARNGCP, and BBNWR. The action area at NASO-DNA is bounded by VAARNG-CP to the north and the community of Sandbridge, VA, to the south. The action area within NASO-DNA includes approximately 4 continuous mi of intertidal beach and primary and secondary coastal dune along the Atlantic Ocean, which total about 164 acres. The action area at VAARNG-CP is bounded to the north by the Croatan residential neighborhood and the Croatan public beach and to the south by NASO-DNA. The action area within VAARNG-CP has approximately 0.23 mi of intertidal beach and primary and secondary coastal dune habitat that is continuous with NASO-DNA beaches and includes the Pendleton Surf Beach. The action area at BBNWR is bounded to the north by Sandbridge beach and to the south by False Cape State Park. The action area within BBNWR has approximately 5 mi of intertidal beach and primary and secondary coastal dune habitat.

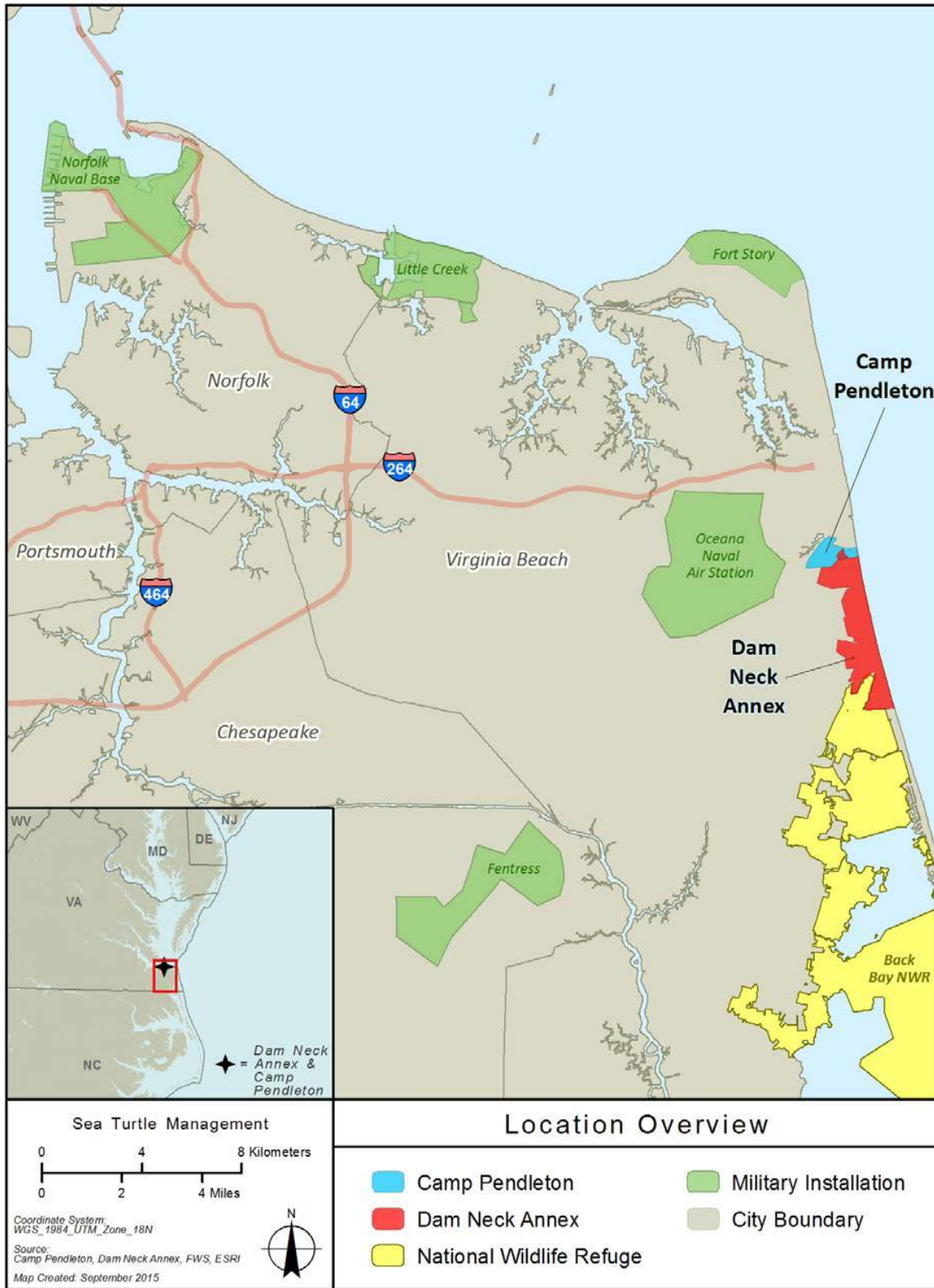


Figure 2. Location of Naval Air Station Oceana – Dam Neck Annex and Virginia Army National Guard – Camp Pendleton.

STATUS OF THE SPECIES AND CRITICAL HABITAT RANGEWIDE

Kemp's Ridley Sea Turtle – The species description, life history, population dynamics, status and distribution, and critical habitat description, if applicable are at: Lazell 1980; Morreale et al. 1982, 2007; Lutcavage and Musick 1985; Henwood and Ogren 1987; Ogren 1989; Collard 1990; Meylan et al. 1990; Manzella et al. 1991; Service and National Marine Fisheries Service (NMFS) 1992; Marquez-Millan 1994; Keinath et al. 1994; Renaud 1995; Weber 1995; Godfrey 1996; Musick and Limpus 1997; Landry and Costa 1999; Turtle Expert Working Group 2000; Coyne et al. 2000; Foote and Mueller 2002; Gulko and Eckert 2004; Morreale and Standora 2005; Renaud and Williams 2005; Seney and Musick 2005; Heppell et al. 2005; Schmid and Barichivich 2006; Frey et al. 2007; NMFS and Service 2011; NMFS et al. 2011; Witherington et al. 2012; Galloway et al. 2013; and Barco and Swingle 2014. No critical habitat has been designated for this species.

Green Sea Turtle North Atlantic Distinct Population Segment – The species description, life history, population dynamics, status and distribution, and critical habitat description, if applicable are at: Dolan et al. 1973; Parmenter 1980; Hosier et al. 1981; Morreale et al. 1982; Peterson et al. 1985; Carr 1987; Anders and Leatherman 1987; Hirth and Samson 1987; Nelson et al. 1987; Nelson and Dickerson 1987, 1988; Schwartz 1989; National Research Council 1990; NMFS and Service 1991, 2007, 2008, 2015; Cox et al. 1994; Epperly et al. 1995a, b; Meylan et al. 1995; Witherington and Martin 1996, 2003; Hirth 1997; Musick and Limpus 1997; Lutcavage et al. 1997; Bouchard et al. 1998; Mortimer 1999; Bjorndal et al. 2000; Broderick et al. 2001; Holloway-Adkins and Provanca 2005; Witherington et al. 2006, 2012; Hiram and Ehrhart 2007; McClellan and Read 2009; and Pintus et al. 2009. No critical habitat has been designated for this species in this area (81 FR 20057-20090).

Loggerhead Sea Turtle Northwest Atlantic Ocean Distinct Population Segment – The species description, life history, population dynamics, status and distribution, and critical habitat description, if applicable are at: Graham 1973; Dolan et al. 1973; Schwartz 1978; Limpus et al. 1979, 1985; Mrosovsky 1980, 1988; Hosier et al. 1981; Carr 1982; Bradner 1983; Mrosovsky et al. 1984; Lutcavage and Musick 1985; Anders and Leatherman 1987; Nelson and Dickerson 1987, 1988; Nelson et al. 1987; Dodd 1988; Musick 1988; Christens 1990; McGehee 1990; National Research Council 1990; NMFS and Service 1991, 2007, 2008; Witherington 1991; Burke et al. 1991; Shoop and Kenney 1992; Cox et al. 1994; Georges et al. 1994; Epperly et al. 1995c; Addison 1996; Witherington and Martin 1996, 2003; Bouchard et al. 1998; Hanson et al. 1998; Steinetz et al. 1998; Bollmer et al. 1999; Turtle Expert Working Group 2000, 2009; Prescott 2000; Wood and Bjorndal 2000; Webster and Cook 2001; Godley et al. 2001; Comer 2002; Snover 2002; Witzell 2002; Mitchell et al. 2002; Avens et al. 2003; Bolten 2003; Lohmann and Lohmann 2003; Carthy et al. 2003; Ehrhart et al. 2003; Hopkins-Murphy et al. 2003; Miller et al. 2003, Schroeder et al. 2003; Bowen et al. 2005; Roberts et al. 2005; Abella et al. 2007; Hawkes et al. 2007, 2011; McClellan and Read 2007; Bimbi 2009; McElroy 2009; Tuttle and Rostal 2010; Service 2011b, 2014; LeBlanc et al. 2012; Griffin et al. 2013; NMFS 2014; Barco and Swingle 2014; Fisher et al. 2014; and Mansfield et al. 2014. Critical habitat has

been designated for this species but not in the terrestrial environment in Virginia (79 FR 39756-39854).

ENVIRONMENTAL BASELINE

Status of the Kemp's Ridley Sea Turtle Within the Action Area – Kemp's ridleys have been recorded off the coast of southeastern Virginia throughout the year. In Virginia, the average strandings per year for Kemp's ridley is 39, with a peak in June and fall (Barco and Swingle 2014). Strandings have been recorded in or near NASO-DNA and VAARNG-CP during spring, summer, and fall. Two Kemp's ridley nests have been recorded in Virginia. One nest was recorded at NASO-DNA in June 2012, which was the first documented nest in Virginia. The nest was left *in situ* and a total of 71 hatchlings emerged in mid-August (VDGIF 2015). The second nest was located and left *in situ* at False Cape State Park near the North Carolina/Virginia border in July 2014 (VDGIF 2015). No Kemp's ridley nests or false crawls have been documented at VAARNG-CP or BBNWR. We anticipate Kemp's ridley turtles may nest on NASO-DNA, VAARNG-CP, or BBNWR in the future.

Status of the Green Sea Turtle Within the Action Area – Green turtles are present in waters off Virginia's coast throughout the year. Strandings have been recorded in the action area during summer and fall and just south of the region during winter. The first green sea turtle nest in Virginia was documented in 2005 at BBNWR (Service 2005). No nests or false crawls have been recorded on NASO-DNA or VAARNG-CP beaches; however, 1 green turtle nest was recorded on Sandbridge Beach, just south of the action area, in August 2005 and was subsequently moved to BBNWR (VDGIF 2015). Based on this previous nesting record in southeastern Virginia, scattered green turtle nesting in nearby North Carolina, and the nesting of other turtle species in the action area, green turtles may nest on NASO-DNA in the future. Habitat for nesting sea turtles at VAARNG-CP is effected by the high concentrations of people using the beach during the nesting season, the relatively short beach (0.23 mi), and proximity to the heavily populated Virginia Beach.

Status of the Loggerhead Sea Turtle Within the Action Area – Loggerheads have been recorded in and near NASO-DNA and VAARNG-CP throughout the year. A total of 128 and 8 strandings have been recorded at NASO-DNA and VAARNG-CP, respectively, particularly during spring, summer, and fall. Three loggerhead false crawls have been documented on NASO-DNA, 2 in 2012 and 1 in 2014. Two loggerhead nests have been documented on NASO-DNA in July 1992 and July 2002. Both nests were relocated to BBNWR (Navy 2016). A loggerhead nest was located on Pendleton Surf Beach in the VAARNG-CP action area in August 2015 (VDGIF 2015). This nest was relocated above the high tide line to prevent tidal inundation; however, the nest was washed out during Hurricane Joaquin in October 2015 (Navy 2016). Previous to 2015, no nests or false crawls had been documented at VAARNG-CP. There have been 78 loggerhead nests at BBNWR between 1970 and 2015; 4 nests in 2010; 6 nests in 2012; 2 nests in 2013; 1 nest in 2014; and 4 nests in 2015.

Factors Affecting the Species Environment Within the Action Area – Sea turtles at NASO-DNA and VAARNG-CP are affected by a suite of existing actions associated with the mission of the installations to provide education and training to sailors in specified combat systems operation and maintenance, to provide specialized skills training, to provide training systems support to operational and systems commands, as well as other functions and tasks. Training, testing, and evaluation facilities operated at NASO-DNA include a helicopter pad, weapons compound, and Beach and Dune Training Areas. The Marine Air Control Squadron operates a compound and radar tower in the northeastern portion of the installation. An explosives test facility is located adjacent to the northern beach. Other training activities on the northern beach include: training, testing and evaluation in special warfare, ordnance, overland assault, beach assault, and tactical air operations radar. Amphibious landing exercises can occur up to 4 times per month and involve 1 to 4 amphibious vehicles maneuvering onto and across the beach, foot traffic across the beach and dunes, and support personnel digging foxholes to establish a beachhead. Training and associated activities may disturb nesting attempts or reduce hatching success. Beach driving during training results in ruts, compaction of sand, and disturbance of beach flora and fauna, and may degrade the condition of upper beach habitat. Vehicle operation on the beach may also reduce beach stability and result in increased levels of sand transport both on and off of the beaches of NASO-DNA.

The facilities and land of VAARNG-CP are used to support training for various military and government agencies. The majority of training is limited to between Labor Day and Memorial Day due to the installation's close proximity to Virginia Beach. Training includes weapons firing certification, classroom training, field artillery drivers training, and construction equipment drivers training. Weapons firing certification is limited to small caliber weapons and is located immediately behind the dunes. No training activities occur on VAARNG-CP beaches. Sea turtles are potentially impacted by ground disturbing training activities, explosive ordnance disposal, physical training, security patrols, maintenance of buried communication cables, and ATV training. Training and associated activities may disturb nesting attempts or reduce hatching success.

Recreational use of beaches on NASO-DNA and VAARNG-CP occurs seasonally, with most activity concentrated in spring and summer months. Recreational use includes swimming, beachcombing, fishing, wildlife observation, sunbathing, and other typical beach recreation. NASO-DNA staff post signage and implement closures to aid in protecting sensitive resources and routinely patrol the beach and recreational use areas. Seasonal recreational use overlaps with sea turtle nesting season and may disturb nesting attempts or reduce hatching success. As a result of the refinement of methods and implementation of a detailed protocol to excavate, transport, and re-bury nests relocated by NASO-DNA and VAARNG-CP personnel, hatch success rates are generally comparable to those that may occur naturally and are likely to vary from approximately 70% to 90% of total eggs (Limpus 1979, Jones and Musick 1988).

The artificial dunes on BBNWR result in narrow beaches that lack upper beach zones and at high tides water is generally at or near the base of the dunes. Recreational use of beaches occurs seasonally, with most activity concentrated in spring and summer months. Recreational use

includes beach driving, beachcombing, fishing, and wildlife observation. BBNWR routinely patrol the beach and recreational use areas for sea turtle crawls and nests and post signage and implement closures to protect nests. Seasonal recreational use overlaps with loggerhead nesting season and may disturb nesting attempts or reduce hatching success. Beach driving results in ruts, compaction of sand, and disturbance of beach flora and fauna, and further contributes to the degraded condition of upper beach habitat. Vehicle operation on the beach may also reduce beach stability and result in increased levels of sand transport both on and off of the beaches of BBNWR.

Climate change effects on the Kemp's ridley sea turtle are summarized from the species recovery plan (NMFS et al. 2011). "In the case of sea turtles, where many other habitat modifications are documented (e.g., beach development, loss of foraging habitat), the prospects for accentuated synergistic impacts on survival of the species may be even more important in the long-term. Such potential problems have been discussed for some time (Myers 1992). In these species, where temperature determines the sex of the developing embryo, even a few degrees change in beach temperatures over the next decade will cause a strong shift toward more female hatchlings being produced. Data suggest that a female bias may be present in the Kemp's ridley population and would be advantageous to the short-term recovery of this endangered sea turtle, but manipulation of natural sex ratios may have long-term, unknown positive or negative consequences. Another serious impact from global climate change is sea level rise. In areas of development, nesting beaches have no possibility for natural barrier island migration landward as sea levels rise. In the case of the Kemp's ridley where most of the critical nesting beaches are undeveloped, beaches may shift landward and still be available for nesting. Impacts from climate change, especially due to global warming, are likely to become more apparent in future years (IPCC 2007)."

Climate change effects on the green sea turtle are summarized from Service's final rule to list 11 DPSs of the green sea turtle as endangered or threatened (81 FR 20058-20090). "Species with high fecundity and low juvenile survival, such as sea turtles, are the most vulnerable to climate change and elevated levels of environmental variability (Cavallo et al., 2015; Halley et al., in review). Temperature changes and sea level rise are likely to change ocean currents and the movements of hatchlings, surface-pelagic juveniles, and adults (Hamann et al., 2007; Hawkes et al., 2009; Poloczanska et al., 2009; Cavallo et al., 2015). Nesting beaches are likely to be impacted by climate change. Sea level rise is likely to reduce the availability and increase the erosion rates of nesting beaches, particularly on low-lying, narrow coastal and island beaches (Fish et al., 2005; Baker et al., 2006; Jones et al., 2007; Fuentes et al., 2009; Hawkes et al., 2009; Anasta'cio et al., 2014; Pike et al., 2015). On undeveloped and unarmored beaches with no landward infrastructure, a typical beach profile may maintain its configuration but will be translated landward and upward (Bruun, 1962); however, along developed coastlines, and especially in areas where erosion control structures have been constructed to limit shoreline movement, sea level rise is likely to cause severe effects on nesting females and their eggs (Hawkes et al., 2009; Poloczanska et al., 2009). Increased storm frequency and intensity are likely to result in altered nesting beaches and decreased egg and hatchling success (Pike and Stiner, 2007; Van Houtan and Bass, 2007; Hawkes et al., 2009; Fuentes et al., 2011a; Dewald

and Pike, 2014; Brost et al., 2015). Increasing air and sea surface temperatures are strongly correlated to sand temperatures (Fuentes et al., 2009; Santos et al., 2015a), which could lead to embryonic mortality at 35 °C (Ackerman, 1997) and the loss of male hatchlings at 30.3 °C (Godfrey and Mrosovsky, 2006; Fuentes et al., 2010b; 2011b).”

“Adaptation by natural selection occurs when individuals with one heritable trait survive and reproduce (passing that trait onto their offspring) at a higher rate than individuals with other heritable traits. It occurs over many generations, and one green turtle generation is approximately 30 years (Seminoff et al., 2015). As climate change progresses (i.e., temperatures increase, ocean acidification increases, sea level rises, and storms increase in frequency and intensity), sea turtles that nest on lowlying beaches with inhospitable sand temperatures will produce less viable offspring than previously and as compared to those nesting at higher elevations and on beaches with sand temperatures conducive to embryonic development. This adaptation scenario will have a net effect of reducing the overall abundance of sea turtle populations in the future (e.g., reduced production at the low-lying beaches and constant production at the higher elevation beaches). The capacity for green turtles to quickly adapt is questionable because they are long-lived and late maturing, and the species has previously evolved in a climate that changed at a much slower rate than projections suggest for the next 100 years (Hamann et al., 2007; Hawkes et al., 2009; Poloczanska et al., 2009). Slow evolutionary rates (Awise et al., 1992) and smaller population sizes (as a result of previous declines and relative to preexploitation populations; McClenachan et al., 2006) may further limit the species’ ability to adapt (Hawkes et al., 2009). Therefore, adaptation by natural selection for green turtles is likely to be limited and may not match the rate of climate change impacts within the foreseeable future. We agree that in response to climate change, green turtles may alter their behavior; for example, nesting females may use beaches with higher elevation or cooler sands (Santos et al., 2015). However, the likelihood of altered behavior is difficult to estimate because green turtles exhibit high nesting site fidelity at some locations (Carr and Carr, 1972; Dizon and Balazs, 1982; Mortimer and Portier, 1989; Marquez, 1990; Bowen et al., 1992) and low nesting site fidelity at others (Basintal 2002; Abe et al., 2003). Dizon and Balazs (1982) state, “It is imperative for the well-being of the population that no alterations in the habitat be made since once imprinted the green turtle is unlikely to switch its breeding habitat.” Santos et al. (2015a) conclude that no environmental condition may be important enough to deter a faithful nester. In addition, alternative nesting sites may not be available. Furthermore, coastal squeeze, where coastal development prevents the landward migration of beaches, may prevent the use of higher elevation areas (Fish et al., 2008; Mazaris et al., 2009), even on continental beaches. Alternative beaches may not provide the optimal substrate for nesting (Fuentes et al., 2010a).”

Climate change effects on the loggerhead sea turtle are summarized from Service’s final critical habitat designation for the loggerhead sea turtle Northwest Atlantic Ocean DPS (79 FR 39756-39854). “Climate change has the potential to impact loggerhead sea turtles in the Northwest Atlantic, affecting nesting habitat availability, temperature dependent sex ratios, timing of the nesting season, and increased erosion from frequent intense storm events (Bender et al. 2010, p. 458; Weishampel et al. 2004, p. 1426; Hawkes et al. 2009, pp. 139–141; Reese et al. 2013, pp. 269– 271). The decline in loggerhead nesting in Florida from 1998 to 2007, as well as the recent

increase, appears to be tied to climatic conditions (Van Houtan and Halley 2011, p. 3). Although rapid changes in sea level are predicted, estimated timeframes and resulting water levels vary due to the uncertainty about global temperature projections and the rate of ice sheets melting and slipping into the ocean (Bindoff et al. 2007, pp. 409, 421; Witt et al. 2009, p. 901). Potential impacts of climate change to the Northwest Atlantic Ocean loggerhead DPS include beach erosion from rising sea levels, repeated inundation of nests, skewed hatchling sex ratios from rising incubation temperatures, and abrupt disruption of ocean currents used for natural dispersal during the complex life cycle (Fish et al. 2005, pp. 489–490; Fish et al. 2008, p. 336; Hawkes et al. 2009, pp. 139–141; Poloczanska et al. 2009, pp. 164–175). Thus, climate change impacts could have profound long-term impacts on loggerhead nesting populations in the Northwest Atlantic Ocean, but it is not possible to project the impacts at this point in time.”

EFFECTS OF THE ACTION

Direct and Indirect Effects – Direct effects are the direct or immediate effects of the project on the species, its habitat, or designated critical habitat. Indirect effects are defined as those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR 402.02).

Sea Turtle Patrols – Patrols are unlikely to disturb nesting sea turtles as they are conducted during morning hours, after a majority of sea turtles have initiated nesting. Protocols for patrols further reduce the likelihood of adverse effects to nesting or stranded sea turtles by limiting the speed of ATVs, training drivers to recognize the presence of stranded sea turtles or nest crawls, covering ATV lights, and implementing general best practices (e.g., communication protocols, avoiding distress to the animal, implementing area closures when needed). ATV use on the beaches may compact beach sand; however, ATVs are lighter than most vehicles and patrollers are trained to limit the likelihood of sand compaction due to ATV use. Therefore, sea turtles are not expected to be adversely affected by patrols.

Sea Turtle Stranding – Stranded sea turtles may suffer from illness, cold stunning, injury, or death. These effects are not a result of assistance (medical attention and transportation) provided to stranded turtles. While stranded turtles are being held or transported, standard protocols will limit the likelihood of further injury or death as a result of the stranding program. Sea turtles are not expected to be adversely affected as a result of the stranding program.

Crawl Procedures – When a patroller finds a nesting or crawling turtle, they will extinguish their ATV headlights, take care not to startle the turtle, and keep a safe distance away until the turtle has returned to the sea. If a nest is present, nest procedures will be followed. Sea turtles are not expected to be adversely affected as a result of crawl procedures.

Nest Management – Only individuals having the appropriate permits will perform nest management procedures. Because Service permits issued to these individuals/entities have already undergone section 7 consultation, effects to turtles from nest locating, nest relocation, and nest monitoring conducted by permittees will not be analyzed in this biological opinion.

In the red zone on NASO-DNA (Figure 1) training and associated activities may disturb nesting attempts or reduce hatching success and all nests will be relocated to the nearest adjacent green zone. Noise from training exercises conducted at night during nesting season may disturb nesting females. Noise can discourage nesting females from using particular sections of beach; however, training exercises are limited in scope and undisturbed beaches are available within other areas of NASO-DNA for nesting. Disturbance is likely to result in sea turtle nests being laid nearby in more protected areas, rather than an overall decrease in the number of nest attempts per year. If nests are not identified during patrols, training exercises may crush eggs within the nest; or crush, entrap, or disturb hatchlings attempting to leave the nest. Due to routine patrols and identification of stranded sea turtles, crawls, and nests within the beach and dune areas of NASO-DNA, the likelihood of unidentified nests being located within red zone training areas is low.

Relocation of sea turtle nests can be an effective conservation method for sea turtle populations where clutches would otherwise be lost and where populations require intervention (Pintus et al. 2009). However, nest relocation should only be conducted as a last resort because relocation may cause negative impacts to eggs and hatchlings through reduced hatch and emergence success (Wyneken et al. 1988, Mortimer 1999, NMFS and Service 2008, Sieg et al. 2011). Handling sea turtle eggs can injure or kill embryos as a result of disrupting membrane attachment (Limpus et al. 1979, Parmenter 1980, Eckert and Eckert 1990, Pintus et al. 2009, Sieg et al. 2011, Revuelta et al. 2014).

Relocated nests may have different moisture levels, gas exchange, thermal conditions, sand grain size, density, compaction, organic content, or color, which can lead to adverse effects on embryonic development and hatchling success, particularly sex ratios and survival of hatchlings (Ackerman 1980, Parmenter 1980, Miller and Limpus 1983, Spotila et al. 1983, McGehee 1990, Mortimer 1990, Georges et al. 1994, Crain et al. 1995, Ackerman 1997, Carthy et al. 2003, Fisher et al. 2014, Revuelta et al. 2014). Relocating nests into sands deficient in oxygen or moisture can result in mortality, morbidity, and reduced behavioral competence of hatchlings. Water availability is known to influence the incubation environment of the embryos and hatchlings of turtles with flexible-shelled eggs, which has been shown to affect nitrogen excretion (Packard et al. 1984), mobilization of calcium (Packard and Packard 1986), mobilization of yolk nutrients (Packard et al. 1985), hatchling size (Packard et al. 1981, McGehee 1990), energy reserves in the yolk at hatching (Packard et al. 1988), and locomotory ability of hatchlings (Miller et al. 1987). In a 1994 Florida study comparing loggerhead hatching and emerging success of relocated nests with nests left in their original location, Moody (1998) found that hatching success was lower in relocated nests at 9 of 12 beaches evaluated. In addition, emerging success was lower in relocated nests at 10 of 12 beaches surveyed in 1993 and 1994. If established protocols are followed successfully, nest relocation should result in a loss of no more than 10% of an average clutch (128 eggs).

It is uncertain whether the effects of intensive nest management discussed above will occur and to what degree they affect hatchling survival. The types of effects may vary depending on the environmental conditions within the specific nesting season, and the specific conditions that each

nest is subjected to during management activities and relocation. While hatch success has been used as a proxy to assess reproductive success, the factors discussed above may reduce recruitment, affect population demography, and affect future turtle use of nesting beaches in the action area. For the purposes of this analysis and in the absence of specific information that would allow us to consider the expected magnitude and severity of effects that may result, we make the conservative assumption that all of these factors affect hatchling sea turtles to a degree that cumulatively results in reduced survival and recruitment probability.

In the yellow zones on NASO-DNA (Figure 1) relocation of nests will be considered on a case-by-case basis. If a nest inhibits training, the nest will be relocated west, closer to the dune line. If there are multiple nests inhibiting training, they will be relocated to the closest green zone. Effects to nests in yellow zones will be similar to effects discussed above for nests in the red zone; however, the frequency, intensity, and duration of effects are likely to be less as training is less frequent and nests may be left *in situ*. If nests are not identified during patrols, training exercises may crush eggs within the nest; or crush, entrap, or disturb hatchlings attempting to leave the nest. Due to routine patrols and identification of stranded sea turtles, crawls, and nests within the beach and dune areas of NASO-DNA, the likelihood of unidentified nests being located within yellow zone training areas is low.

In the green zone on NASO-DNA and on VAARNG-CP nests will be left *in situ*, unless located below the high tide line, in which case the nest will be relocated west above the high tide to avoid inundation. Recreational use of these areas may result in trash on the ground, which could attract predators and increase the carrying capacity of the predators due to increased food availability. The increased numbers of predators may increase losses of turtle eggs and nests. However, use of these sites for recreation is generally light and not continuous and routine, and use of predator proof sea turtle enclosures will limit the ability of predators to disturb nests. Additionally, patrols to identify stranded sea turtles, crawls, and nests within the beach and dune areas of both locations and marking of nests will minimize the likelihood of these effects.

BBNWR is a potential relocation site for nests from NASO-DNA and VAARNG-CP. Impacts to sea turtles nests from relocation will be consistent with those discussed above. Nests will be preferentially relocated to green areas within NASO-DNA; however, in rare circumstances when suitable relocation sites are not available at NASO-DNA or VAARNG-CP, nests may be relocated to BBNWR. If established protocols are followed successfully, nest relocation should result in a loss of no more than 10% of an average clutch (128 eggs).

Interrelated and Interdependent Actions – An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. The Service is not aware of activities interrelated to or interdependent with the proposed action at this time.

Beneficial Actions – Monitoring and *in situ* nest protection provide information on the sea turtle nesting within the action area. Routine patrols to identify stranded sea turtles, crawls, and nests

minimize impacts to nesting turtles and nests from training and recreational activities. Nest marking and predator protection reduce the potential for anthropogenic impacts including disruption of nests and predation.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. The Service is not aware of any future State, tribal, local, or private actions within the action area at this time.

CONCLUSION

The proposed and ongoing sea turtle management is anticipated to benefit stranded and nesting sea turtles and sea turtle nests vs. conducting training and recreational activities at NASO-DNA and VAARNG-CP without such a program in place. Effects to Kemp's ridley, green, and loggerhead sea turtle nests and nestlings/hatchlings as a result of operational and recreational activities are expected to be avoided and minimized as a result of monitoring for turtle crawls and marking of nests. The proposed and ongoing sea turtle management is expected to result in a reduction in either sea turtle reproductive output or success. However, these reductions are less than what would be expected if this program was not implemented.

After reviewing the status of the Kemp's ridley sea turtle, green sea turtle North Atlantic DPS, and loggerhead sea turtle Northwest Atlantic Ocean DPS; the environmental baseline for the action area; the effects of the proposed action; and the cumulative effects, it is the Service's biological opinion that proposed and ongoing sea turtle management at NASO-DNA and VAARNG-CP, as proposed, are not likely to jeopardize the continued existence of the Kemp's ridley sea turtle, green sea turtle North Atlantic DPS, and loggerhead sea turtle Northwest Atlantic Ocean DPS. No critical habitat has been designated for the Kemp's ridley sea turtle; therefore, none will be affected. No critical habitat has been designated for the green sea turtle North Atlantic DPS in this area; therefore, none will be affected. Critical habitat for the loggerhead sea turtle Northwest Atlantic Ocean DPS has been designated but not in the terrestrial environment in Virginia; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed

species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by the Navy so that they become binding conditions of any grant or permit issued to any applicant/contractor, as appropriate, for the exemption in section 7(o)(2) to apply. The Navy has a continuing duty to regulate the activity covered by this incidental take statement. If the Navy (1) fails to assume and implement the terms and conditions or (2) fails to require any applicant/contractor to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Navy must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

AMOUNT AND EXTENT OF TAKE

During military operations, direct mortality of the developing embryos in nests within the red zone may occur for nests that are not found and relocated. The exact number of these missed nests is not known. However, in 2 separate monitoring programs, where hand digging was performed to confirm the presence of nests and thus reduce the chance of missing nests through misinterpretation, trained observers missed about 6 to 8% of the nests because of natural elements (Martin 1992, Ernest and Martin 1993). In another study, Schroeder (1994) found that under the best conditions, about 7% of nests can be misidentified as false crawls by highly experienced sea turtle nest surveyors.

The Service anticipates incidental take of sea turtles will be difficult to detect for the following reasons: (1) sea turtles nest primarily at night and all nests are not found because [a] natural factors, such as rainfall, wind, and tides may obscure crawls and [b] human-caused factors, such as pedestrian and vehicular traffic, may obscure crawls, and result in nests being destroyed because they were missed during a nesting survey and egg relocation program; (2) total number of hatchlings per missed nest is unknown; (3) reduction in percent hatching and emerging success per relocated nest vs a natural nest is unknown; (4) an unknown number of females may avoid the red zone beach and nest in a less than optimal area; and (5) lights may misdirect an unknown number of hatchlings and result in death.

However, the following level of take of these species can be anticipated by the disturbance of suitable sea turtle nesting beach habitat because turtles nest within the military operation area (red zone) and military operations will likely occur in the red zone during a portion of the nesting season. Incidental take is anticipated for 1 mile of sea turtle nesting beach habitat (0.75 miles in the red zone at NASO-DNA and 0.25 miles at VAARNG-CP) as a result of the proposed military

operations. The take is expected to be in the form of: (1) destruction of all nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the red zone; (2) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (3) harassment in the form of disturbing or interfering with female turtles attempting to nest during military operations; (4) misdirection of nesting and hatchling turtles during military operations.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes that all reasonable and prudent measures necessary and appropriate to minimize take of Kemp's ridley, green, and loggerhead sea turtles have been incorporated into the proposed action.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the ESA, the Navy must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

1. Provide an annual report summarizing sea turtle survey and monitoring efforts, location and status of all sea turtle occurrences recorded, and any additional relevant information (nesting success, hatching success, emergence success, disorientations, and lighting surveys). Reports should be provided to the Service in digital format, at the email address provided below, by December 31 of each year.
2. Care must be taken handling any dead specimens of proposed or listed species that are found to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the ESA. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective. Upon locating a dead specimen, notify the Service's Virginia Law Enforcement Office at 804-771-2883, 7721 South Laburnum Avenue, Richmond, Virginia 23231, and the Service's Virginia Field Office at 804-693-6694 at the address provided on the letterhead above.

The Service believes that no more than 1 mile of nesting beach habitat will be incidentally taken as a result of the proposed action over the 15-year term of the biological opinion. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to further minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

- Collect data on characteristics of beaches where sea turtles nest and provide this information to the Service and VDGIF. Coordinate with other interested parties to develop protocols for data collection and analysis throughout Virginia to improve understanding of sea turtle habitat characteristics.

For the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Mr. Jones

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If you have any questions, please contact Sarah Nystrom of this office at 804-824-2413, or Sarah_Nystrom@fws.gov.

Sincerely,

Cindy Schulz
Field Supervisor
Virginia Ecological Services

cc: NMFS, Gloucester, VA (Attn: David O'Brian)
Service, Virginia Beach, VA (Attn: Doug Brewer)
VDCR, False Cape State Park, Virginia Beach, VA (Attn: Kyle Barbour)
VDCR, DNH, Richmond, VA (Attn: René Hypes)
VDGIF, Machipongo, VA (Attn: Ruth Boettcher)
VDGIF, Richmond, VA (Attn: Ernie Aschenbach)

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Biological Assessment

Sea Turtle Management

at

Naval Air Station Oceana - Dam Neck Annex

and

**Virginia Army National Guard - Camp Pendleton,
Virginia Beach, Virginia**

Prepared for

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	degree(s) Celsius
°F	degree(s) Fahrenheit
ac	acre(s)
ATV	all-terrain vehicle
BA	biological assessment
BBNWR	Back Bay National Wildlife Refuge
CETAP	Cetacean and Turtle Assessment Program
cm	centimeter(s)
DOD	Department of Defense
DODI	Department of Defense Instructions
DON	Department of the Navy
DPS	distinct population segment
ESA	Endangered Species Act
FR	Federal Register
ft	foot (feet)
GPS	global positioning system
ha	hectare(s)
INRMP	Integrated Natural Resources Management Plan
in	inch(es)
IUCN	International Union for the Conservation of Nature
kg	kilogram(s)
km	kilometer(s)
lb	pound(s)
LCAC	landing craft air cushion
m	meter(s)
MACS	Marine Air Control Squadron
mi	mile(s)
MIDLANT	Mid-Atlantic Region
NASO-DNA	Naval Air Station Oceana-Dam Neck Annex
NAVFAC	Naval Facilities Engineering Command
NEFSC	Northeast Fisheries Science Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRM	Natural Resources Manager
SEFSC	Southeast Fisheries Science Center
SOP	Standard Operating Procedure

SST	sea surface temperatures
STSSN	Sea Turtle Standing and Salvage Network
SWOT	State of the World's Sea Turtles
T&E	threatened and endangered species
TEWG	Turtle Expert Working Group
US	United States
USC	United States Code
USFWS	United States Fish and Wildlife Service
USVI	United States Virgin Islands
VAARNG-CP	Virginia Army National Guard- Camp Pendleton
VAST	Virginia Aquarium Standing Team
VDGIF	Virginia Department of Game and Inland Fisheries
VACAPES	Virginia Capes
VIMS	Virginia Institute of Marine Science

1.0 INTRODUCTION

1.1 PURPOSE AND NEED

The purpose of this Biological Assessment (BA) is to address the effect of sea turtle nest and stranding management and relocation at Naval Air Station Oceana - Dam Neck Annex (NASO-DNA) and Virginia Army National Guard - Camp Pendleton (VAARNG-CP) on federally listed species and designated critical habitat under the jurisdiction of the United States Fish and Wildlife Service (USFWS). The United States (US) Navy proposes to implement a nesting sea turtle management strategy to comply with legal mandates in Section 7 of the Endangered Species Act (ESA) of 1973 as amended (16 US Code [USC] 1531 et seq) in accordance with 32 Code of Federal Regulations Part 190 – Department of Defense (DOD) Natural Resources Management Program; 16 USC §670a et seq. – Sikes Act, as amended; DOD Instruction (DODI) 4715.03 – Natural Resources Conservation Program; DOD Manual 4715.03 – Integrated Natural Resources Management Plan (INRMP) Implementation Manual; Chief of Naval Operations Operating Instruction 5090.1D – Environmental Readiness Program; and Chief of Naval Operations Operating Manual OPNAV M-5090.1.

The proposed action involves nesting and stranded sea turtle management at NASO-DNA and VAARNG-CP in Virginia Beach, Virginia. These actions have the potential to impact the following ESA-listed species in the Action Area: loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), hawksbill sea turtle (*Eretmochelys imbricata*), and Kemp's ridley sea turtle (*Lepidochelys kempii*). No critical habitat for these sea turtle species has been designated in or near the Action Areas.

The purpose of the proposed action is to ensure consistency with the installations' military mission and to support "no net loss" in military mission capability for the installation lands, while providing for the conservation and rehabilitation and the sustainable multipurpose use of natural resources on the installations. The nesting sea turtle management plan at NASO-DNA and VAARNG-CP is a component of the separate INRMPs for these two contiguous properties. NASO-DNA and VAARNG-CP are not jointly operated; however, a partnership exists between the two installations in regards to sea turtle management. In accordance with DOD policy on natural resources conservation programs, the INRMP must work to guarantee DOD's continued access to its land, air, and water resources for realistic military training and testing and to sustain the long-term ecological integrity of natural resources and the ecosystem services they provide (DODI 4715.03). The INRMP must also ensure the natural resources conservation program and military operations are integrated and consistent with Navy policy on stewardship and all legal requirements concerning natural resources.

1.2 OBJECTIVES

This BA provides the information necessary for compliance with Section 7 of the ESA. Section 7 assures that, through consultation (or conferencing for proposed species) with the appropriate federal agency, federal actions do not jeopardize the continued existence of any threatened, endangered, or proposed species or result in the destruction or adverse modification of critical habitat. The objective of this BA is to determine how the turtle management actions may affect threatened and endangered (T&E) species and ensure that management decisions and actions associated with the implementation of the proposed actions do not place any T&E species in jeopardy of extinction.

1.3 CONSULTATION HISTORY

1.3.1 Naval Air Station Oceana - Dam Neck Annex

Early coordination and pre-consultation with the USFWS was conducted during meetings and phone conversations. The following is a list of relevant consultations and meetings between NASO-DNA and the USFWS, Gloucester, Virginia Field Office specifically for sea turtle management:

1. USFWS and NASO-DNA. Biological Opinion issued on the effects of a proposed beach replenishment project at NASO-DNA on loggerhead turtles (*Carretta carreta*). 8 October 2003
2. USFWS Back Bay National Wildlife Refuge (BBNWR) and NASO-DNA. Relocation of Sea Turtle Nests from Naval Air Station (NAS) Oceana, Dam Neck Annex to Back Bay National Wildlife Refuge. Agreement between BBNWR and NASO-DDNA that the Navy was responsible for conducting crawl and nest patrols on NASO-DNA beaches and the BBNWR was responsible for biological data collection, nest confirmation, and nest relocation. 29 May 2008.
3. USFWS, BBNWR, NASO-DNA. Biological Opinion issued on the updated Back Bay National Wildlife Refuge Sea Turtle Management Program (2011) and updated to include NASO DNA. 25 May 2012.
4. Meeting between USFWS and Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic Region (MIDLANT). The USFWS notified NAVFAC MIDLANT at this time of the changes to sea turtle management strategy in the state of Virginia. 17 October 2014.
5. USFWS, NOAA, and NASO-DNA. Review of the NASO-DNA INRMP that includes Standard Operating Procedures (SOP) for sea turtle management. USFWS reviewed and signed 1 January 2015; NOAA reviewed and signed 29 May 2015; INRMP signed into official compliance by the Navy on 9 June 2015.
6. USFWS and NASO-DNA. Coordination of INRMP updates at the INRMP Annual Partners meeting, 8 October 2015.

1.3.2 *Virginia Army National Guard - Camp Pendleton*

No consultations exist between VAARNG-CP and the USFWS regarding sea turtle management. In the event that crawls or nests are discovered on VAARNG-CP, the installation Natural Resource Manager (NRM) would notify the USFWS, Virginia Department of Game and Inland Fisheries (VDGIF), and the Virginia Aquarium Stranding Team (VAST) as appropriate. The NRM will consult with these agencies to determine the appropriate actions and who will be responsible for nest management if the nest is left *in situ*. Nest management activities would be done in accordance with the 2015 Virginia Sea Turtle Nesting Handbook (Virginia Bureau of Wildlife Resources 2015).

2.0 DESCRIPTION OF THE ACTION AREA AND PROPOSED ACTION

2.1 ACTION AREA

The Action Area includes the beach and dune areas of two military bases in the tidewater area of southeastern Virginia in the southeastern portion of the City of Virginia Beach: NASO-DNA and VAARNG-CP (Figure 1).

2.1.1 *Naval Air Station Oceana - Dam Neck Annex*

NASO-DNA is an approximately 769-hectare (ha) (1,900-acre [ac]) installation in southern Virginia Beach, Virginia. The Action Area at NASO-DNA includes approximately 6.4 kilometers (km) (4.0 continuous miles [mi]) of intertidal beach and primary and secondary coastal dune habitat along the Atlantic Ocean. (DON 2015) (Figures 2 and 3). The beaches and dunes on NASO-DNA encompass about 77 ha (164 ac) of dune protection area consisting of undeveloped primary and secondary dunes and natural communities. The Action Area at NASO-DNA is bounded by VAARNG-CP in the north and the community of Sandbridge, Virginia, to the south.

2.1.2 *Virginia Army National Guard - Camp Pendleton*

VAARNG-CP is adjacent to the northern boundary of NASO-DNA in southern Virginia Beach. The VAARNG-CP portion of the Action Area is situated along the Atlantic Ocean and has approximately 0.37 km (0.23 mi) of intertidal beach and primary and secondary coastal dune habitat that is continuous with NASO-DNA beaches (VAARNG 2004) (Figure 4). The VAARNG-CP beach is bounded to the north by the Croatan residential neighborhood and a public beach and to the south by NASO-DNA. Through a cooperative venture with the City of Virginia Beach, approximately 300 m (1000 ft) of the northern portion of the VAARNG-CP beach is opened to the public as a surf beach (Croatan - Pendleton Surf Beach) when the VAARNG-CP firing range is not being actively used.

2.2 PROPOSED ACTION

2.2.1 *Naval Air Station Oceana - Dam Neck Annex*

The proposed actions for sea turtle patrols and nest and stranding management are defined in the Standard Operating Procedures (SOPs) for Sea Turtles (Appendix A) included in the NASO-DNA INRMP (Department of the Navy [DON] 2015a). The SOPs for sea turtle patrols, stranding notifications and actions, and nest management at NASO-DNA include:

- conducting patrols within the Action Area to locate stranded sea turtles, turtle crawls, and turtle nests;
- reporting and coordinating actions for stranded sea turtles with VAST;
- protecting and monitoring *in situ* sea turtle nests within the Action Area until all hatchlings have emerged;
- relocating nests when operational uses of the beach within the Action Area or its location on the beach (e.g., below the high tide line, within public use areas) would result in the disturbance or destruction of a nest; and
- reviewing projects proposed in the INRMP or by the installation or tenant of the installation for their potential to affect sea turtles.

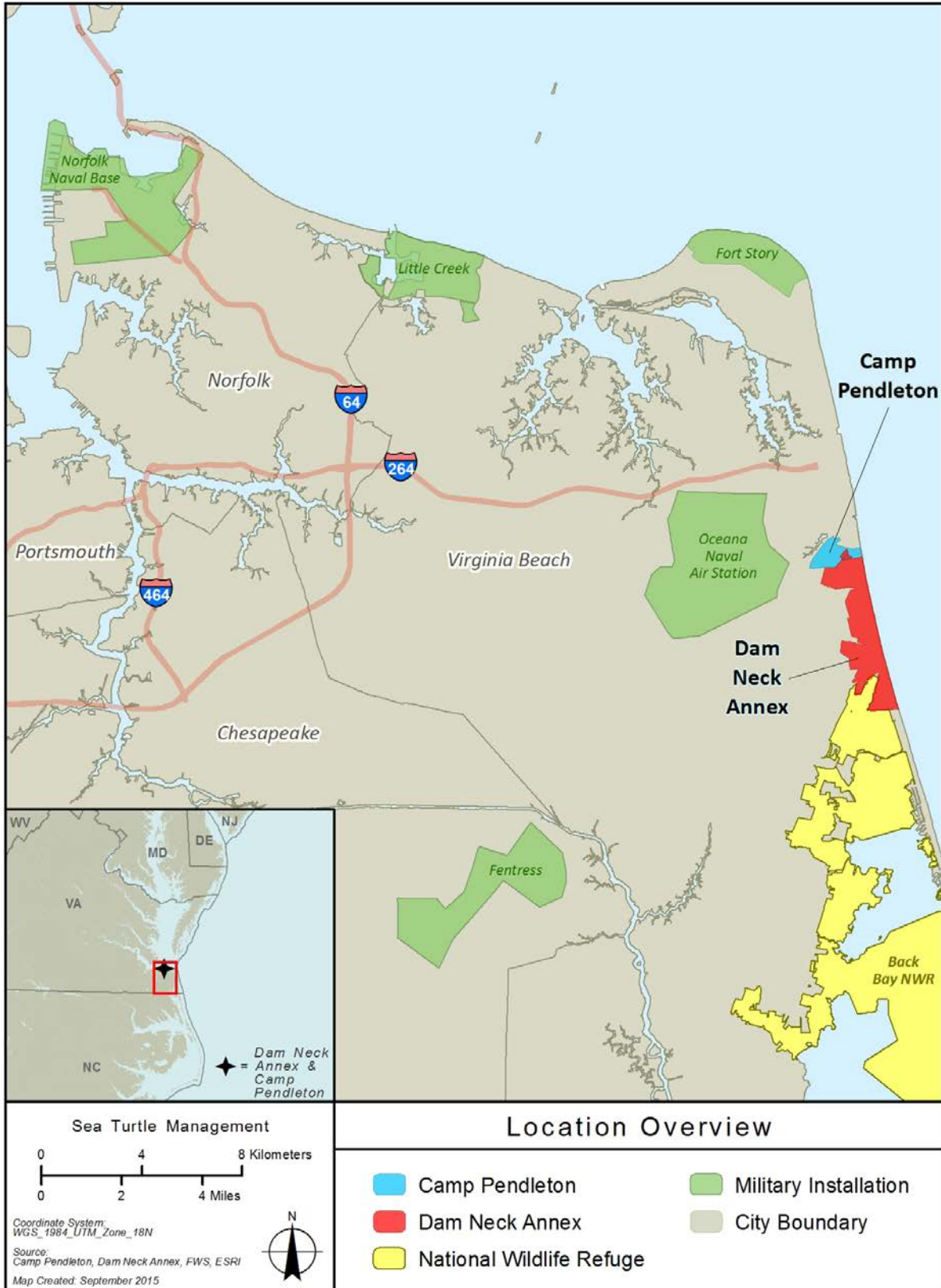


Figure 1. Location of Naval Air Station Oceana – Dam Neck Annex and Virginia Army National Guard – Camp Pendleton

**Biological Assessment at NASO-DNA and VAARNG-CP
Sea Turtle Management**

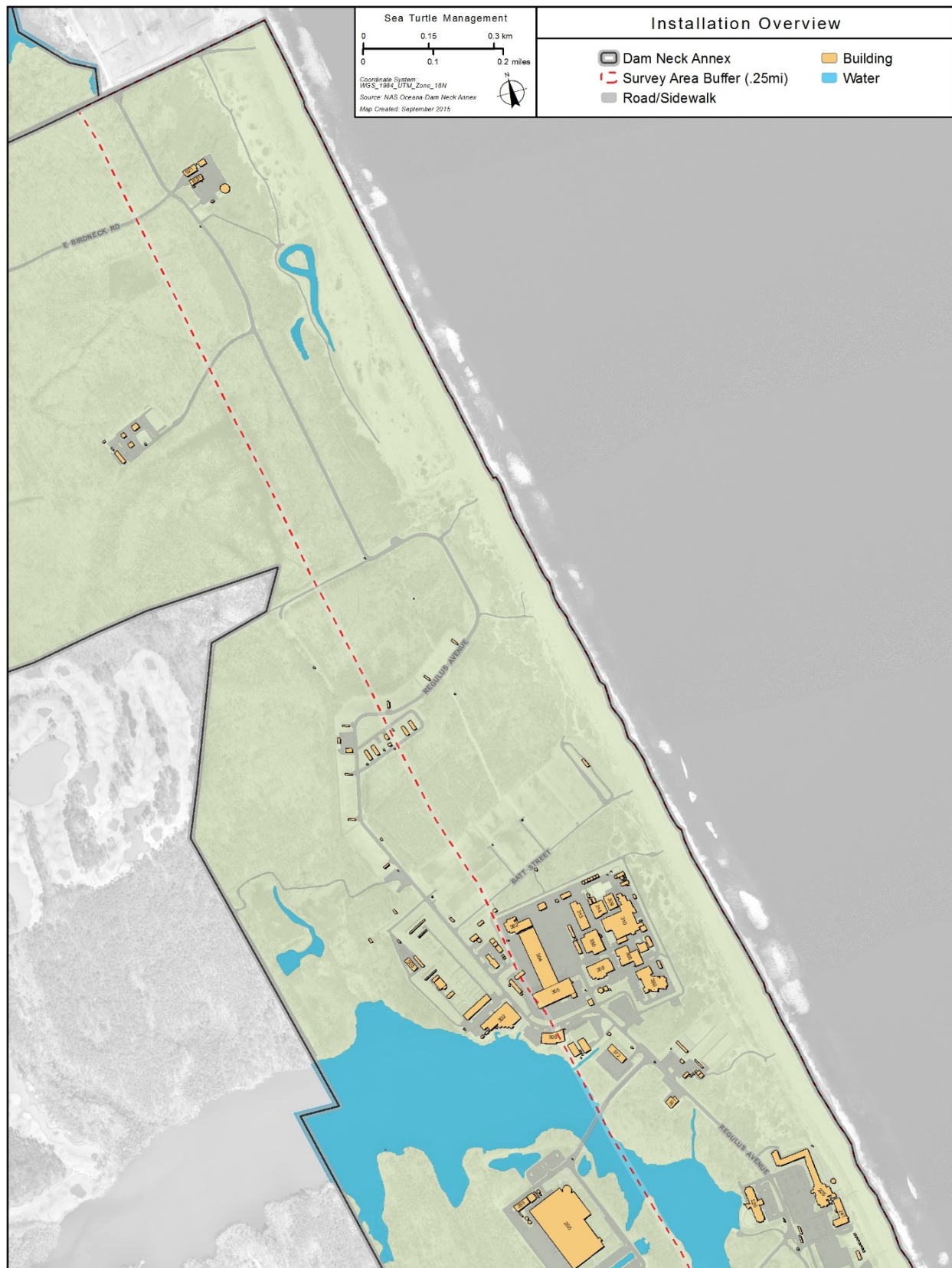


Figure 2. Naval Air Station Oceana – Dam Neck Annex Action Area (north)

**Biological Assessment at NASO-DNA and VAARNG-CP
Sea Turtle Management**



Figure 3. Naval Air Station Oceana – Dam Neck Annex Action Area (south)

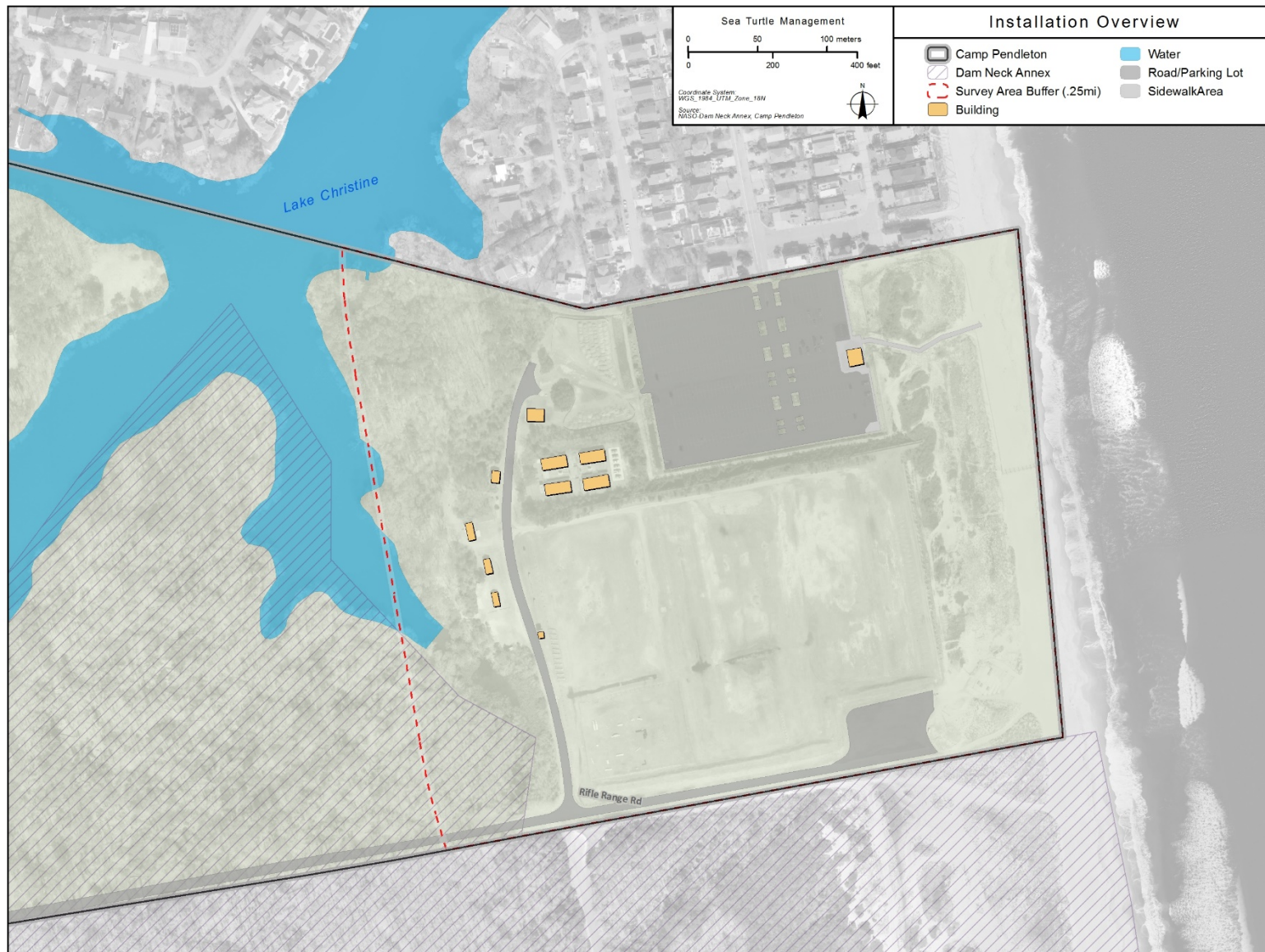


Figure 4. Virginia Army National Guard – Camp Pendleton Action Area

2.2.1.1 Sea Turtle Patrols

The procedure for sea turtle patrols has been created to identify any stranded sea turtles, sea turtle crawls, and sea turtle nests within the Action Area. The patrollers would have training sessions on the patrol procedures as well as crawl recognition training and all-terrain vehicle (ATV) training. From 15 May to 31 August, the base's natural resources staff and other authorized individuals would patrol the beaches starting 30 minutes before sunrise. If the morning is dark, headlights would be covered in red filters before use on the beach. Patrollers would first check along the water's edge and then survey the middle beach. Patrolling above the high-tide line is not advised because this habitat may contain piping plover nests. If a stranded turtle, turtle crawl, or turtle nest is sighted, patrollers would follow the procedures outlined in the following sections. If unauthorized vehicles, artificial light, or any other activity that could negatively impact sea turtle activity on the beach is found, patrollers would contact base security, the installation's conservation law enforcement officer (or "Game Warden"), and the installation's NRM. Patrollers would document information from the patrol in a Sea Turtle Patrol Log.

2.2.1.2 Sea Turtle Stranding

During patrols, sea turtles may be found stranded on the beach either dead or alive. The in-house reporting procedures, which includes contacting the NRM and the VAST, will be initiated for any turtles found on the beach. If appropriate, the NRM would contact the NAVFAC MIDLANT EV22 Subject Matter Expert and the National Oceanic and Atmospheric Administration (NOAA) Point of Contact. If the turtle is in the surf, patrollers would drag it up the beach so that it does not wash away before the VAST arrives at the site. Patrollers would provide the day, time, base, location, information on whether the turtle was dragged out of the surf, their own name, and contact information to the VAST and the NRM. The patrollers would also help the VAST with base access, data collection, and removal of the turtle.

If the patrollers locate a living stranded adult or hatchling turtle, the NRM and the VAST are notified immediately. If patrollers find a hatchling, they would contact the NRM and the VAST, relay the location at which the hatchling was found, and then place the hatchling in a cooler with moist sand until they receive further instructions. If the patrollers find an injured or uninjured adult turtle, they would contact the VAST and the NRM, relay the location at which the adult turtle was found, and then continue to search the beach. When they finish patrolling, they would return with supplies to protect the turtle. In order to protect a stranded turtle that is injured, patrollers would keep the nose and eyes of the turtle moist and its body shaded and then await further instruction from the VAST. Patrollers would aid the VAST with base access, data collection, and moving the turtle. After helping VAST remove either dead or living stranded turtles and completing patrols, the patrollers would complete and turn in patrol logs and stranding data sheets.

2.2.1.3 Crawl Procedures

A crawl can be identified by the impressions left in the sand by a sea turtle's flipper when the turtle is exiting or entering the ocean. A nest area is identified by the body cavity a turtle creates as it digs a hole, deposits and buries its eggs, and turns away from the dunes to reenter the ocean. The nest usually contains both a mound and a flattened area.

When a patroller comes across a nesting or crawling turtle, they would extinguish their ATV headlights and park a safe distance away. Patrollers would take care not to startle the turtle and keep a safe distance away until the turtle has returned to the sea. Any turtle crawls or nests would be reported to the BBNWR, the NRM, range control if found on training beaches, security, VDGIF sea turtle program manager, Command Duty Officer, Public Affairs Officer, Installation Environmental Program Director, and Public Works Officer. The patrollers and NRM will coordinate with all agencies to document the occurrence and determine the appropriate actions.

After the turtle crawl has been reported, the crawl would be marked with wire flags and the surrounding area would be blocked off. The date, time, weather, crawl measurements, and any information that can be deduced about the time of emergence and return to the ocean would be recorded. The global

positioning system (GPS) location would be documented, and pictures would be taken. Flashes should not be used for nighttime photography. A permitted biologist or other approved and permitted individual (i.e., Navy, state, USFWS, or Virginia Aquarium representative) will then determine if a false crawl, false nest, or nest is present. If a nest is discovered, nest procedures would be followed. Otherwise, the patroller would complete the rest of his/her patrol.

2.2.1.4 Nest Management

The procedures discussed below are general descriptions of the management actions that would occur at NASO-DNA for sea turtle management. Specific procedures are found in the *Standard Operating Procedures for Sea Turtles, Naval Air Station Oceana – Dam Neck Annex* (Appendix A). Only individuals having the appropriate Regulatory Issued Permit (e.g., Navy, state, USFWS, VAST) are legally authorized to perform nest management procedures on NASO-DNA.

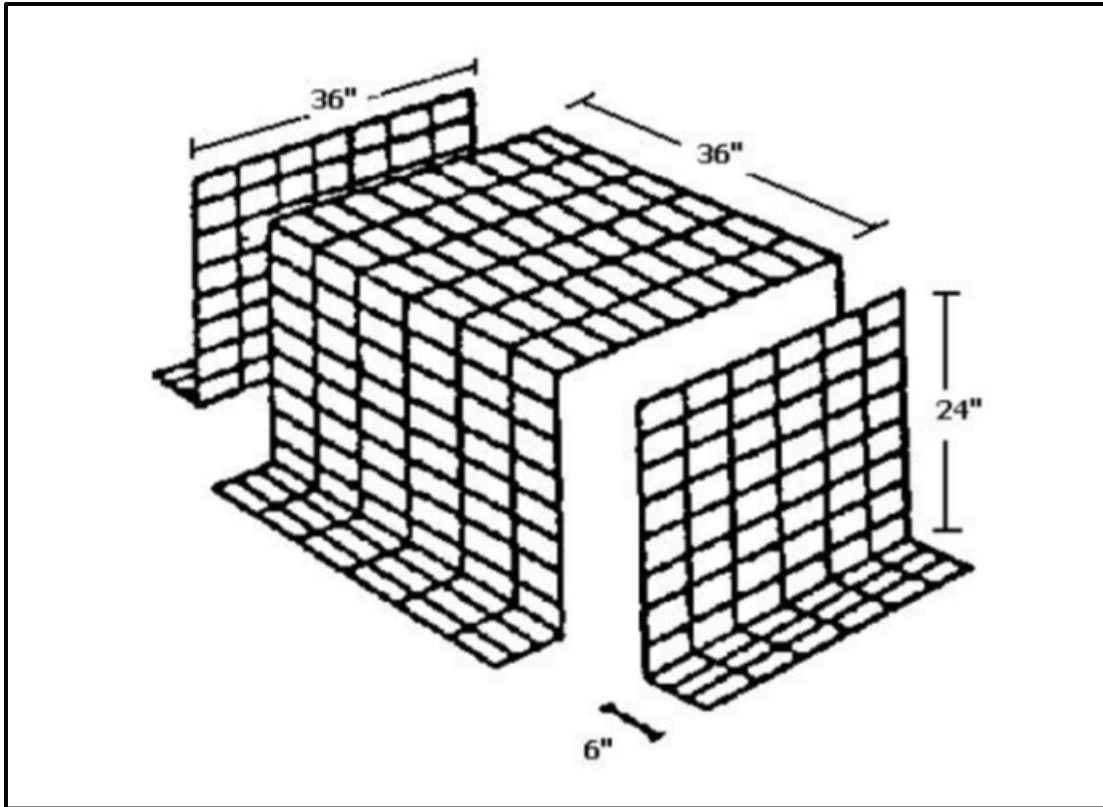
Nest Procedures

In order to locate a nest, a permitted biologist will examine any disturbed areas, such as mounds or depressions, found along flipper tracks. If a flipper impression can be found, the area opposite the impression is the probable nest location. If no impression is found, the biologist will check for flattened circular areas along and at the end of the turtle tracks indicating the probable nest location. The biologist will examine potential nests closely for front flipper impressions to determine how a turtle was positioned when it laid its eggs. A properly trained and permitted person would excavate to locate the nest by hand so that the eggs are less likely to be damaged. Eggs would be found a few inches below a soft layer of sand.

If a nest is found, the responding permit holder and base NRM must determine whether the nest should be relocated considering the following factors: how high the nest is located on the beach (the nest location relative to the high tide line), the width of the beach, whether the area is at a high risk of erosion, and whether the nest is located on a sloughing escarpment where it could be buried. The social environment of the beach, such as the amount of public use of the beach and whether the beach is in a military training area, would also be taken into account. Lastly, upcoming weather conditions (e.g., hurricanes) would be considered. If a nest is not relocated, it would be protected using the procedures described in the next section. If a nest is relocated, it would be moved to the closest available safe location via strict protocols. In either case, data sheets and photographs documenting the actions taken to relocate the turtle nest would be completed and placed in a turtle nest binder.

In Situ Nest Protection and Monitoring

If a nest is left *in situ*, it would be surrounded by a wire predator-proof enclosure, flagging, reflectors, and informational signage to inform the public about the protection program. Predator-proof enclosures are 36 in. wide, 36 in. length, 24 in. high cages constructed from 2 in. by 4 in. mesh fencing, each side also has a 6 in. flange (Figure 5). Enclosures are centered exactly over the egg chamber and the flanges are anchored with stakes and covered with sand. Appendix D contains detailed procedures for the construction and placement of predator enclosures. The nest would be checked every morning and afternoon for unauthorized disturbances or disturbances from predators. The person checking would also determine if the turtles have started hatching. In locations where nest sitting is approved, 10 days before the turtles are expected to hatch, nest sitting would begin every night from 8 P.M. to 5 A.M. Nest sitting would only be authorized in the approved (green) zones (Figure 6). Nest sitters would notify the Navy and BBNWR if the turtles begin to hatch, record the emergence time, prepare their path into the surf, count the number of hatchlings, and protect them from predators; however, nest sitters would not assist hatchlings in making the journey to the ocean. *In situ* nests located in training areas will be allowed to hatch “naturally” without nest sitters. After 2 to 3 weeks, when all the turtles have hatched, the nest would be excavated to collect data. Dead hatchlings and infertile eggs would be frozen in the BBNWR biology freezer. Data sheets would be completed and placed in a turtle nest binder.



Source: VDGIF 2015

Figure 5. Example of a predator-proof sea turtle egg chamber enclosure

Nest Relocation

Relocating a nest involves two steps: removing the nest from one location and forming a new nest in another location. Both steps require great care and attention to improve the chances for hatchling survival.

Before removing eggs, responders would measure the depth from the beach surface to the top of the eggs. Using sand from the original nest, the bottom of a cooler would be lined with 2 inches (in.) of sand with a 1-in. border of sand placed between cooler sides. As a responder removes eggs from the nest, they would keep them shaded under an umbrella and be careful not to rotate them. The responders would record the order of the eggs being placed into the cooler and the number of eggs in each layer. Eggs will be packed in a manner so that they are not touching with 2 in. of sand from the nest placed between each layer. The distance from the beach surface to the bottom of the nest and the nest temperature would then be measured and recorded. Extra sand from the bottom of the nest would be placed on top of the eggs in the cooler and also collected in a separate container used to surround the reburied eggs at the relocation site. Responders would then rake over tracks and fill the cavity from the nest excavation. During transportation, responders would avoid jolting or shifting the eggs, keep the eggs out of direct sunlight, and maintain them at a moderate temperature.

Nests would be moved to the nearest oceanfront nursery site or approved adjacent area (Figure 6). If none, the nest would be moved to a nursery site at BBNWR. At the new site, responders would dig a hole with the same dimensions as the original nest. The bottom and sides of the hole would be filled with sand from the original nest. The same person who removed the eggs would transfer them to the new nest without rotating them. The eggs will be placed in the reverse order from the original nest because the first egg placed in the cooler will be the last egg taken out. Responders would record if and how any eggs break during the relocation.

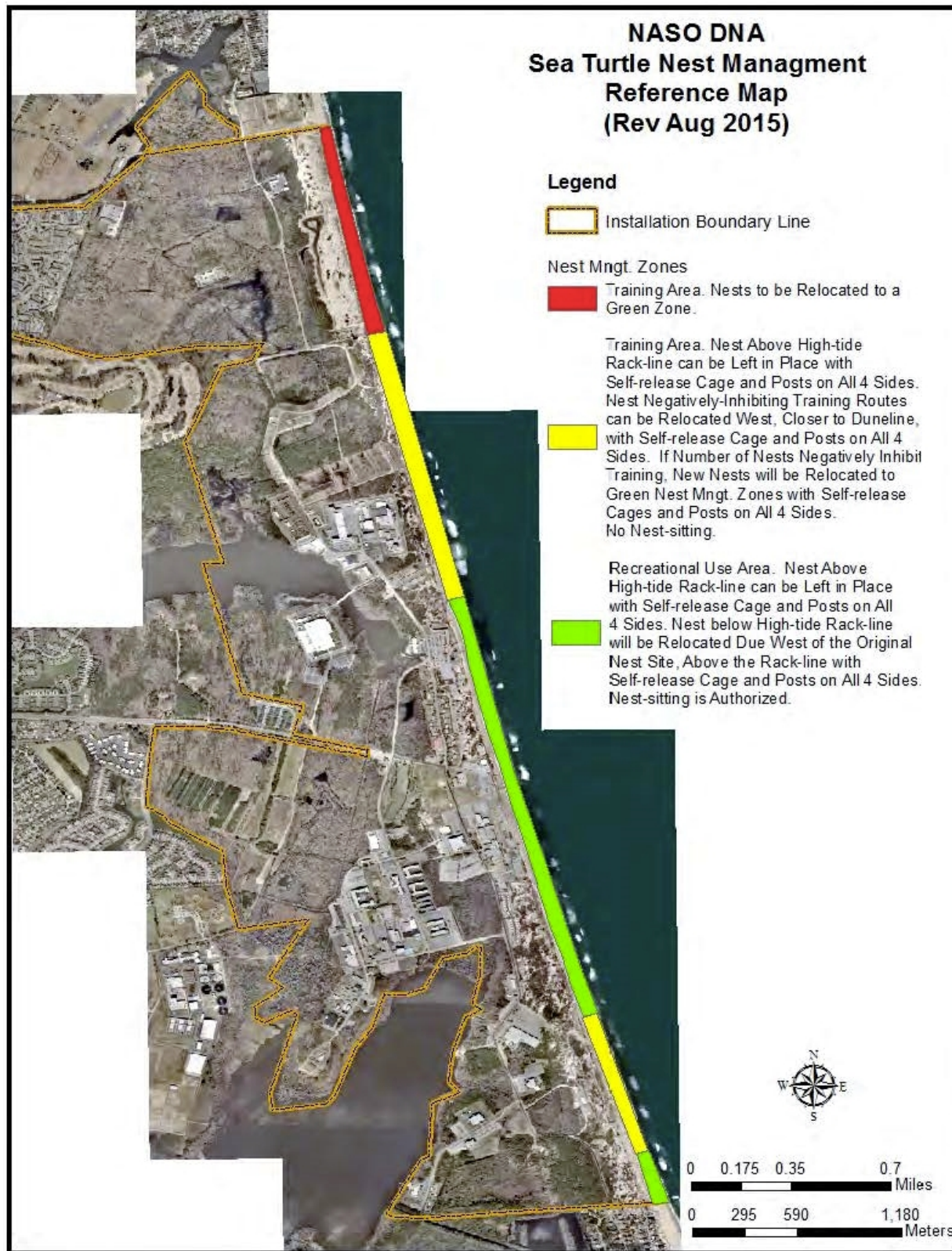


Figure 6. Naval Air Station Oceana – Dam Neck Annex Sea Turtle Nest Management Map

After the new nest has been built, a predator enclosure cage would be placed over the nest using the procedures described above and outlined in Appendix D. This cage will allow hatchlings to escape without human help. The nest number would be placed on top of the cage. If the nest is not located on a nursery site, information about the nest will be posted 1-2 feet (ft) away from the predator exclusion cage on all four sides. If the nest is located within a nursery site, the entire site would be cordoned off and information posted for the site as a whole. Responders would rake all footprints from the beach to the dunes to avoid attracting attention to the nests. The data sheets about the nest relocation would be placed in a turtle nest binder along with photos of the relocation process. The nests would then be monitored following the same procedures given for nests left *in situ*.

2.2.2 Virginia Army National Guard - Camp Pendleton

2.2.2.1 Sea Turtle Patrols

The VAARNG-CP INRMP recognizes the need for monitoring for sea turtle activity on the beach (VAARNG 2004). Currently, VAARNG-CP has a verbal agreement with NASO-DNA to conduct beach patrols and lighting surveys. NASO-DNA beach patrols survey the VAARNG-CP beach to the leased property boundary and use binoculars to survey the remaining beach.

In the event that a crawl, stranded sea turtle, or potential nest is located, the patrol will contact the NASO-DNA NRM, who in turn contacts the VAARNG-CP NRM. Notification is passed up to the VAARNG-CP command staff. The VAARNG NRM ensures that the USFWS, VDGIF, and the VAST are notified as appropriate.

2.2.2.2 Nest Management

In the event a nest is located, the VAARNG-CP NRM will consult with USFWS, VDGIF, and the VAST to determine the appropriate actions, if the nest will be left *in situ* or relocated on VAARNG-CP, and who will be responsible for relocation if necessary. Nest management activities would be conducted in accordance with the 2015 Virginia Sea Turtle Nesting Handbook (Virginia Bureau of Wildlife Resources 2015).

In Situ Nest Protection and Monitoring

Nests left *in situ* will be marked with stakes, flagging, and signs that identify the site as a sea turtle nest. Stakes should be placed at each corner of the nest (36 – 40 in. from nest center) and encircled with flagging to preclude them from being run over or disturbed. A predator enclosure (see Figure 5) will be placed on the nest as described in Appendix D. Nests will be monitored daily near the hatch window in order to determine their success. At the end of the hatching window, when all anticipated hatching is expected to be completed, the nest will be excavated by permitted persons to quantify the success of the nest.

Nest Relocation

Nest relocation is considered as a last resort in instances where the nest is located below the mean high tide line. In areas with heavy foot or vehicular traffic the nests would typically be marked for avoidance. For human activities, a nest should only be moved for unusual, but lawfully conducted activities that pose a serious threat. In these instances, VAARNG-CP NRM will consult with the VDGIF and USFWS to discuss potential mitigation measures that may include relocation. If the nest is to be relocated, permitted individuals will accomplish the relocation of the nest in accordance with the procedures outlined in the 2015 Virginia Sea Turtle Nesting Handbook. Nests may be relocated to the closest adjacent suitable beach and approved for relocation on VAARNG-CP, Croatan Beach, or NASO-DNA. Prior to relocating any nest within the NASO-DNA Green Zone (see Figure 5), coordination and approval must be obtained through the DNA-NASO NRM. Appendix K in the NASO-DNA Standard Operating Procedures for Sea Turtles (Appendix A) lists the areas approved for nest relocation.

All attempts should be made to relocate the nest within 6 hours after eggs are laid to reduce the potential for movement-induced mortality. Care will be taken to ensure eggs are not rotated during handling and movement. Nests are excavated by hand without the use of digging tools. During nest excavation and handling, the eggs should remain shaded. Once located, eggs are placed in a rigid container(s) with 2-3 in. of moist sand from the nest in the bottom. Once all the eggs have been collected they should be covered with 2-3 in. of moist sand from the nest.

Nests should be relocated to areas above the high tide line that are relatively free of vegetation in order to preclude roots encroaching into nest chambers. At the new site, responders would dig a hole with a rounded bottom with the same dimensions and depth as the original nest. The eggs will be placed in the new nest while maintaining each egg's original orientation. The new nest should be covered with moist sand excavated from the new egg chamber to the upper level of the surrounding moist sand. Dry sand should not be allowed to enter the nest chamber. Once the nest chamber is buried, the sand is gently patted by hand and covered with dry sand. Nests are marked as discussed in above for *in situ* nest protection and monitoring.

2.2.3 Back Bay National Wildlife Refuge

BBNWR is a potential nest relocation site for sea turtle nests found in the Action Areas. BBNWR is located south of Sandbridge, Virginia, and is about 12.9 km (8 mi) south of NASO-DNA (see Figure 1). The refuge contains over 3,683 ha (9,100 ac) of barrier islands that border the Atlantic Ocean and Back Bay with beach, dune, woodland, marsh, and farm field habitats (USFWS 2011).

2.3 BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES

The proposed action provides a nesting sea turtle management strategy for the Action Area that includes measures that would be implemented by the Navy to avoid, reduce, and offset potential adverse direct effects to the leatherback, loggerhead, Kemp's ridley, green, and hawksbill sea turtles. The proposed action includes regular patrols of the Action Area to identify the presence of sea turtles on land, to document the occurrence, and to protect and monitor turtles and turtle nests and coordinate with the BBNWR biologists or other permitted biologists to move nests if deemed necessary. The Navy would implement these best management practices and protective measures during all compliance activities. In addition to active beach patrols, the Navy has conducted lighting surveys in areas near the beach and dunes to identify the light sources reaching the beach (Appendix B). Common recommendations for mitigating effects of light visible on the beach include:

- removing or turning off unnecessary light sources causing light pollution on the beach;
- minimizing lighting from outdoor sources by realigning, modifying, repositioning, or shielding fixtures to keep light from reaching the beach;
- minimizing lighting from indoor sources by turning off unnecessary lights, repositioning fixtures, and using tinting or opaque curtains or blinds;
- replacing certain fixtures with others that produce less light pollution;
- reducing the wattage or changing the type of bulb to a type that is less disruptive to sea turtles; and
- creating natural light screens to block light from reaching the beach.

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3.0 LISTED SPECIES AND CRITICAL HABITAT IN THE ACTION AREA

3.1 SPECIES CONSIDERED

The following ESA-listed sea turtle species are known to occur in Virginia’s waters, including the Chesapeake Bay: the leatherback, loggerhead, Kemp’s ridley, green, and hawksbill turtles (Table 1). Based on known distributions and habitat associations, these five species may occur in the Action Area and may be affected by the proposed actions. The loggerhead and green turtles are listed as threatened under the ESA, while the leatherback, hawksbill, and Kemp’s ridley turtles are designated as endangered. Critical habitat has not been designated in Virginia for any species of sea turtle; therefore, no critical habitat is located in or near the Action Area.

Table 1. Federally listed sea turtle species

	Scientific Name	ESA Status
Order Testudines, Suborder Cryptodira		
Family Cheloniidae		
Loggerhead turtle ¹	<i>Caretta caretta</i>	Threatened ¹
Green turtle ²	<i>Chelonia mydas</i>	Threatened ²
Hawksbill turtle	<i>Eretmochelys imbricata</i>	Endangered
Kemp’s ridley turtle	<i>Lepidochelys kempii</i>	Endangered
Family Dermochelyidae		
Leatherback turtle	<i>Dermochelys coriacea</i>	Endangered

¹Four distinct population segments (DPSs) of the loggerhead turtle are designated as threatened, while five DPSs are designated as endangered under the ESA. The Northwest Atlantic Ocean DPS, which occurs in Virginia, is designated as threatened.

²Although this species as a whole is listed as threatened, the Florida and Mexican Pacific nesting stocks of the green turtle are listed as endangered. The nesting area for green turtles encountered at sea cannot be determined; therefore, a conservative management approach is to assume that green turtles in the offshore environment may be from the endangered populations.

Sea turtles occur throughout Virginia’s coastal waters, in the entire main-stem Chesapeake Bay, and 8 to 16 km (5 to 10 mi) up the tributaries. Some individual turtles may travel beyond the 5-mi tributary limit into fresher waters (Lutcavage and Musick 1985; Byles 1988; Musick 1988; Mansfield 2006; DON 2009). Sea turtles occur in Virginia waters from May through October or early November although a few strandings have been recorded as early as April and as late as December (Byles 1988; Keinath 1993; Coles 1999). Sea turtle occurrence in the Chesapeake Bay is based on seasonal temperature fluctuations (Byles 1988; Musick 1988; Keinath 1993; Coles 1999; Mansfield 2006). Based on aerial and stranding data, turtles migrate into the Bay during the spring when sea surface temperatures (SSTs) warm to approximately 18 degrees Celsius (°C; 64 degrees Fahrenheit [°F]) (Lutcavage and Musick 1985; Keinath et al. 1987; Byles 1988; Musick 1988; Keinath 1993; Coles 1999). Southern migrations to winter habitats south of Cape Hatteras, North Carolina, are typically triggered when SSTs drop below 20°C (68°F) in the fall (Mansfield et al. 2009).

Most of the sea turtles found in the Chesapeake Bay are either immature loggerhead or Kemp’s ridley turtles utilizing the bay as a seasonal foraging ground (Lutcavage and Musick 1985; Musick 1988). The Bay is considered an important developmental habitat for juvenile loggerhead turtles (Musick and Limpus 1997; Mansfield et al. 2009). Leatherback and green turtles occur less frequently, and hawksbill turtles are considered extremely rare in Virginia waters. Only three hawksbills have been recorded in the Bay (Keinath et al. 1991; Virginia Institute of Marine Science [VIMS] 2008; Barco and Swingle 2014).

Sea turtle nesting habitat in Virginia includes beaches along the Atlantic side of the Eastern Shore and beaches south of the Chesapeake Bay mouth from the Virginia Beach oceanfront to the Virginia/North Carolina border. Nesting occurs during the spring and summer months, particularly June, July, and August (VDGIF data). The loggerhead is the only turtle species that nests regularly on Virginia beaches; approximately 5 to 15 nests are reported annually along the ocean-facing beaches (Barco and Swingle

2014). Based on VDGIF nesting data between 2000 and 2014, the dates of the earliest and latest reported loggerhead nest in Virginia were 15 May 2006 and 2 September 2013, respectively. Only two Kemp's ridley nests have been recorded in Virginia: one on Dam Neck Naval Base in June 2012 and one on False Cape State Park near the North Carolina/Virginia border in July 2014 (R. Boettcher, VDGIF, unpublished data). One green turtle nest was recorded in southeastern Virginia in August 2005 (R. Boettcher, VDGIF, unpublished data).

Although the majority of stranding records in Virginia are of juvenile loggerhead and Kemp's ridley turtles, leatherback, green, and hawksbill turtles have also stranded here based on the comprehensive database of sea turtle strandings dating to 1991 (Barco and Swingle 2014). Between 2001 and 2013, over 2,800 loggerhead turtles and 500 Kemp's ridley turtles stranded in Virginia (Barco and Swingle 2014). Most of the turtles stranded on Virginia beaches were moderately to severely decomposed individuals; therefore, evidence of illness or human-induced mortality is difficult to impossible to determine. Potential causes of death include propeller strikes, ingested fishing gear, cold stunning, and net entanglement (Mansfield et al. 2002b; Mansfield et al. 2002a; Mansfield 2006). Virginia's turtles have also been known to interact with some fishing gear and commercial vessels such as pound nets, pot gears, larger mesh gillnets, longline and trawling gear, and hopper dredges (Mansfield 2006). In Virginia, sea turtles are susceptible to mortality from the Virginia pound net fishery (Lutcavage and Musick 1985). Offshore the mid-Atlantic coast, loggerheads and leatherbacks are caught as bycatch in the pelagic longline fishery (Garrison and Richards 2004). Loggerheads, in particular, appear to be affected by vessels in Virginia waters and rarely survive the trauma from propeller strikes (Barco and Swingle 2014).

Both natural and anthropogenic stressors continue to affect sea turtles and their nesting and marine habitats throughout their ranges. General human-related threats common to sea turtles in estuarine and marine environments include fisheries by-catch, illegal harvesting, vessel strikes, construction and development, marine debris ingestion or entanglement, noise pollution, power generation activities (e.g., intake into the cooling systems of power plants), oil and gas activities, military activities, and environmental contamination (Lutcavage et al. 1997; National Marine Fisheries Service [NMFS] and USFWS 2008; Hamann et al. 2010; NMFS et al. 2011; NMFS and USFWS 2013a; NMFS and USFWS 2013b).

Anthropogenic stressors to sea turtles in the terrestrial nesting environment include beach cleaning, beach nourishment, shoreline armoring, coastal development and construction, recreational beach equipment, debris, beach driving, artificial lighting, nest relocation, and military activities (Witherington and Martin 2003; Turtle Expert Working Group [TEWG] 2007; NMFS and USFWS 2008; Hamann et al. 2010; NMFS et al. 2011; NMFS and USFWS 2013a; NMFS and USFWS 2013b). Many of these stressors may directly impact hatchling or adult turtles on beaches or indirectly affect them via the loss or degradation of nesting habitat. In addition, the illegal harvesting of sea turtles and their eggs continues to threaten sea turtle species, particularly in regions outside the US (Dow et al. 2007). Of all the anthropogenic activities that cause sea turtle mortality, shrimp trawling is thought to be the most detrimental to the recovery of sea turtle populations (NMFS and USFWS 2008).

Climate change is also considered an anthropogenic factor that affects sea turtle habitat and biology through increased temperatures, sea level rise, ocean acidification, changes in precipitation and circulation patterns, and increased cyclonic activity (Poloczanska et al. 2009; Hamann et al. 2010; NMFS and USFWS 2013b). Sea level rise threatens all nesting beaches, particularly since portions of the southeast US and Caribbean are known to be highly vulnerable to sea level rise (Melillo et al. 2014). Sea turtles are particularly vulnerable to climate change because of their sensitivity to environmental temperatures (Hawkes et al. 2009; Fossette et al. 2012). Rising water temperatures will lead to shifts in the range and abundance of algae, plankton, and fish which could affect sea turtle prey distribution and abundance (NMFS and USFWS 2013b). In addition, rising air temperatures may skew natural sex ratios of embryos (NMFS and USFWS 2013b). Although some sea turtles species and populations, such as northwest Atlantic leatherbacks, may be more resilient to climate change than others, non-climate-related threats, including fisheries bycatch and coastal development, will influence the resilience of sea turtles to climate change (Fuentes et al. 2013).

Natural stressors that directly affect sea turtles include disease and predation, particularly predation on eggs and hatchlings (Eckert et al. 2012). Tsunamis can cause encroachment and erosion of nesting habitat and increased debris in the marine habitat (NMFS and USFWS 2013b).

3.2 SPECIES ACCOUNTS

3.2.1 *Leatherback Sea Turtle (Dermochelys coriacea)*

3.2.1.1 Description

The leatherback turtle is the largest living sea turtle; adults average between 200 and 700 kilograms (kg) (440 and 1,543 pounds [lb]) with carapace lengths ranging from 119 to 176 centimeters (cm) (47 to 69 in.) (NMFS and USFWS 1992). The leatherback's carapace lacks the outer layer of horny scutes possessed by all other sea turtle species and is composed of a flexible layer of dermal bones underlying tough, oily connective tissue and smooth skin. The body is barrel-shaped and tapered to the rear with seven longitudinal dorsal ridges, and it is almost completely black with variable spotting. All adults possess a unique pink spot on the dorsal surface of their head. Scientists use this marking to identify specific individuals (McDonald and Dutton 1996).

3.2.1.2 Status

Leatherback turtles are listed as endangered under the ESA (35 Federal Register [FR] 6069). Critical habitat for Atlantic leatherbacks is designated in the Caribbean at Sandy Point, St. Croix, US Virgin Islands (USVI) (NMFS 1979). The most recent abundance estimates for adult leatherbacks range from 34,000 to 94,000 individuals in North Atlantic waters (NMFS and USFWS 2007; TEWG 2007). Based on the latest assessment of the Atlantic leatherback population, leatherbacks are significantly increasing at most nesting beaches in the Atlantic (TEWG 2007). In Florida, where leatherback nesting was once considered rare, the number of nests has been increasing by approximately 10 percent per year since 1979 (Stewart et al. 2011). Determining the definitive causes of these observed increases is difficult although researchers suggest that improved nest monitoring and protection and variable ocean climates may be contributing to these population changes (Stewart et al. 2011). Populations nesting in Culebra, Puerto Rico, and St. Croix, USVI, also appear to be increasing due to heightened protection and monitoring of the nesting habitat over the past 20 years (Hillis-Starr et al. 1998; Fleming 2001; Thompson et al. 2001; Dutton et al. 2005).

3.2.1.3 Threats

Both natural and anthropogenic stressors continue to affect leatherbacks and their nesting and marine habitats (NMFS and USFWS 2013b). Natural stressors that directly affect leatherbacks include disease and predation, particularly predation on eggs and hatchlings (Eckert et al. 2012). Tsunamis can cause encroachment and erosion of nesting habitat and increased debris in the marine habitat (NMFS and USFWS 2013b). Anthropogenic threats to leatherback turtles are generally related to fisheries interactions, marine debris ingestion, poaching, and boat strikes (TEWG 2007). Climate change is also considered an anthropogenic factor that will affect leatherback habitat and biology (NMFS and USFWS 2013b). Rising water temperatures will lead to shifts in the range and abundance of algae, plankton, and fish which could affect leatherback prey distribution and abundance (NMFS and USFWS 2013b). In addition, rising air temperatures may skew natural sex ratios of embryos, and sea level rise may lead to loss of nesting habitat (NMFS and USFWS 2013b). According to Fuentes et al. (2013), the northwest Atlantic leatherbacks may be the most resilient sea turtle management unit to climate change. They may be able to mitigate the effects of long-term climate change due to their migratory nature, relatively weak fidelity to nesting beaches, individual nesting preferences, and spatial nesting strategies (e.g., tendency to place some nests in the cooler wash-over zone of beaches) (Dutton et al. 1999; Kamel and Mrosovsky 2004); however, non-climate-related threats, such as fisheries bycatch and coastal development, will influence the resilience of sea turtles to climate change (Fuentes et al. 2013).

3.2.1.4 Habitat Associations

Late juvenile and adult leatherback turtles are known to range from mid-ocean to continental shelf and nearshore waters (Schroeder and Thompson 1987; Shoop and Kenney 1992; Grant and Ferrell 1993; Dodge et al. 2014). Juvenile and adult foraging habitats include both coastal feeding areas in temperate waters and offshore feeding areas in tropical waters (Eckert and Abreu-Grobois 2001). Adults may also feed in cold waters at high latitudes (James et al. 2006a). Leatherbacks foraging in the western North Atlantic prefer waters from 16 to 18°C (60.8 to 64.4°F) (Thompson et al. 2001; James et al. 2006b); their lower thermal limit is in SSTs between 10 and 12°C (50.0 and 53.6°F) (Witt et al. 2007). Leatherback nesting beach habitat is generally associated with deep water, strong waves, and oceanic currents, but shallow waters near mud banks are also utilized for nesting (TEWG 2007).

3.2.1.5 Distribution

A regular, seasonal occurrence of leatherbacks is known along the northeast US Atlantic coast. In the late winter and early spring, leatherbacks are distributed primarily in tropical latitudes (Stewart and Johnson 2006); survey data show that around this time of year, individuals begin to move north along the North American Atlantic coast. By February and March, the majority of leatherbacks found in US Atlantic waters are distributed off northeast Florida. This movement continues through April and May when leatherbacks begin to occur in large numbers off the coasts of Georgia and the Carolinas (NMFS 1995; NMFS 2000). Leatherbacks become more numerous off the mid-Atlantic and southern New England coasts in late spring and early summer, and by late summer and early fall, they may be found in the waters off eastern Canada (Cetacean and Turtle Assessment Program [CETAP] 1982; Shoop and Kenney 1992; Thompson et al. 2001; Dodge et al. 2014).

Leatherback nesting occurs on isolated mainland beaches in tropical and temperate oceans (NMFS and USFWS 1992) and to a lesser degree on some islands, such as the Greater and Lesser Antilles. In the US, the densest nesting is on the Atlantic coast of Florida (Stewart and Johnson 2006). Sporadic nesting occurs in Georgia, South Carolina, and North Carolina (Rabon et al. 2003).

Leatherbacks occur off Virginia year round; peak occurrence is during the spring and summer (April through September) based on sighting and stranding data (Barco and Swingle 2014) (Figure 5). Between 2001 and 2013, a total of 92 leatherbacks stranded in Virginia (Barco and Swingle 2014). Leatherbacks typically strand on Virginia's ocean-facing beaches but also occasionally in the mid-Chesapeake Bay (Figure 7). Leatherback strandings in the Chesapeake Bay area peak during the months of May and July (Barnard et al. 1989), which suggests peak abundances during this time of year although few leatherbacks are observed in the Chesapeake Bay during any given year. Live leatherbacks have been reported in the upper Chesapeake Bay and in the Severn River in the Mobjack Bay system (Musick 1988; Keinath and Musick 1990).

Occurrence in the Naval Air Station Oceana - Dam Neck Annex Action Area

Leatherback turtles have been recorded in or near the NASO-DNA Action Area throughout the year except during winter (Figure 7). Several strandings have been recorded in the Action Area during spring, summer, and fall (Figure 7). Sightings have been recorded just off the coast of southeast Virginia during summer and fall (Figure 7). Although no leatherback nests or false crawls have been documented in the Action Area, leatherback nesting may occur along the beaches of this installation. Sporadic nesting of leatherbacks occurs just south of Virginia along the coast of North Carolina (Rabon et al. 2003), and other turtle species have nested on NASO-DNA beaches (see loggerhead and Kemp's ridley turtle sections).

Occurrence in the Virginia Army National Guard - Camp Pendleton Action Area

Leatherback turtles have been recorded in or near the VAARNG-CP Action Area throughout the year except during winter (Figure 7). Strandings have been recorded in or near the Action Area during spring, summer, and fall (Figure 7). Sightings have been recorded just off the coast of southeast Virginia during

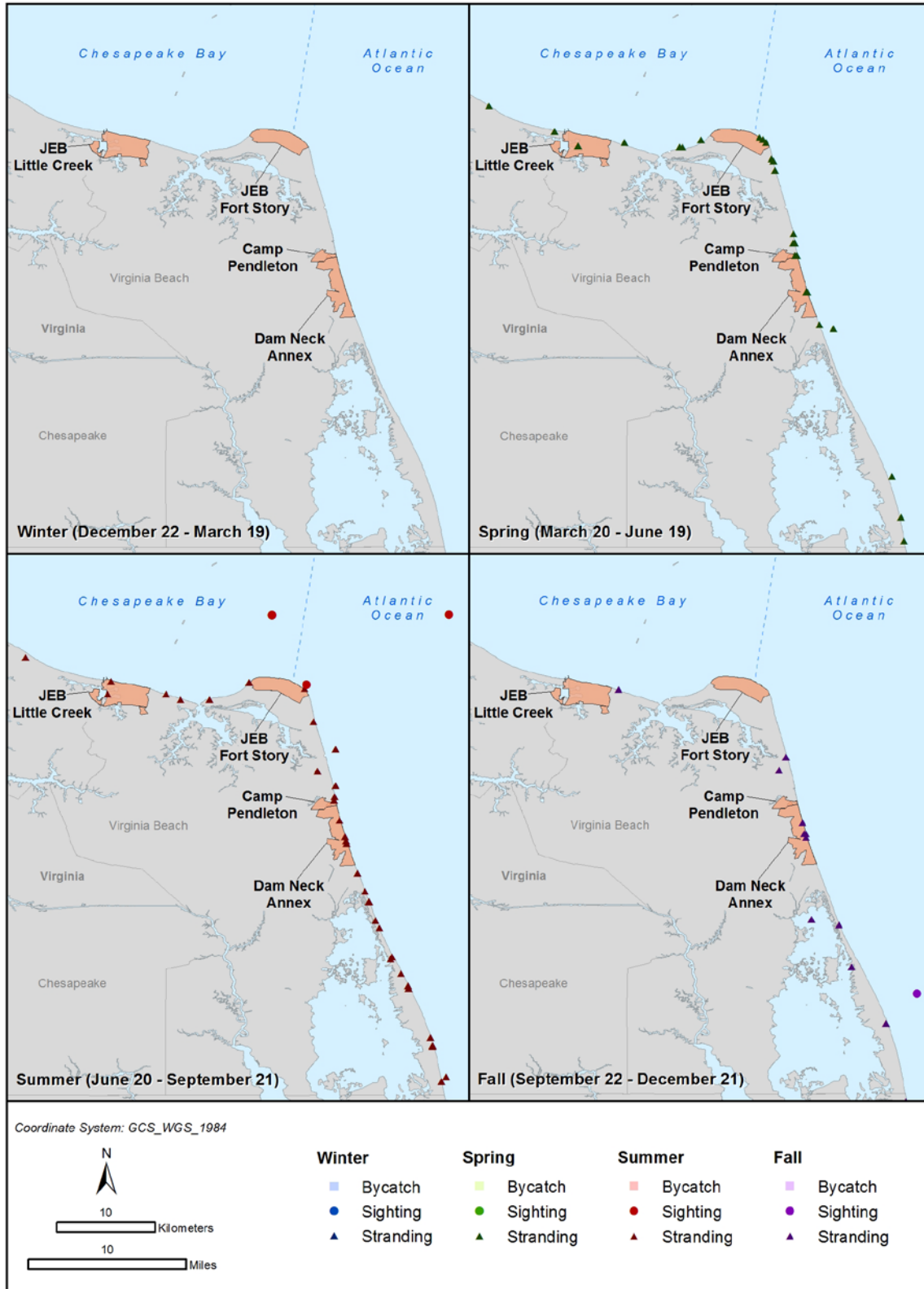


Figure 7. Sighting, stranding, and incidental fisheries bycatch records of the leatherback turtle near the Action Area. Source data: Refer to Appendix C.

summer and fall (Figure 7). No leatherback nests or false crawls have been documented in the Action Area or elsewhere in Virginia although sporadic nesting does occur just south of Virginia along the coast of North Carolina (Rabon et al. 2003). This installation may not provide suitable habitat for nesting turtles due to the crowds of people who frequent the beaches during the nesting season and the fact that the beachfront is relatively short (366 m [1,200 ft]) and immediately adjacent to heavily populated Virginia Beach. Suitable nest sites have been suggested to be within the sheltered foredune area (VAARNG 2004); however, the dune vegetation's roots in this area could inundate nests and damage, entrap, and suffocate the eggs and hatchlings (M. Wright, NASO-DNA NRM, personal communication).

3.2.2 *Loggerhead Sea Turtle (Caretta caretta)*

3.2.2.1 Description

The loggerhead turtle is a large, hard-shelled sea turtle named for its proportionately large head and powerful jaws. Adult loggerheads weigh between 100 and 150 kg (220 and 331 lb) with average carapace lengths ranging from 90 to 95 cm (35 to 37 in) (Dodd 1988; NMFS and USFWS 1991b). Adult loggerheads usually possess a reddish-brown carapace with scutes that are bordered with yellow (NMFS and USFWS 1991b).

3.2.2.2 Status

The loggerhead sea turtle comprises nine distinct population segments (DPSs). The Northwest Atlantic Ocean DPS occurs in Virginia and is designated as threatened under the ESA (USFWS and NMFS 2011). Five recovery units (nesting subpopulations) are identified in the Northwest Atlantic: (1) Northern - Florida/Georgia border to southern Virginia; (2) Peninsular Florida – Florida/Georgia border south through Pinellas County, Florida (excluding Key West); (3) Dry Tortugas – islands west of Key West, Florida; (4) Northern Gulf of Mexico - Franklin County, Florida west through Texas; and (5) Greater Caribbean – Mexico through French Guiana, The Bahamas, and Lesser/Greater Antilles (NMFS and USFWS 2008; USFWS and NMFS 2011). The Peninsular Florida population represents approximately 87 percent of all nesting effort in the Northwest Atlantic Ocean DPS (Ehrhart et al. 2003). Although overall nesting has been significantly declining in the Northwest Atlantic Ocean DPS, nesting data from 2008 through 2010 show a more positive trend (USFWS and NMFS 2011).

The loggerhead is the most abundant sea turtle occurring in US waters. The most recent preliminary abundance estimate of loggerheads in US continental shelf waters was approximately 588,000 individuals and was generated from aerial survey data recorded between Cape Canaveral, Florida, and the mouth of the Gulf of St. Lawrence in 2010 (Northeast Fisheries Science Center [NEFSC] and Southeast Fisheries Science Center [SEFSC] 2011). The most recent estimate of adult females in the Northwest Atlantic Ocean DPS is 30,000 (USFWS and NMFS 2011). Regional estimates of loggerhead abundance in coastal ocean waters of Virginia were recently generated from aerial surveys conducted in 2011 and 2012 from the Convention on the International Regulations for Preventing Collision at Sea line to approximately 50 km (31 mi) offshore between Ship Shoal Inlet and the Virginia/North Carolina border (Barco and Swingle 2014). Loggerhead abundance was 26,674 in the spring (May/June); 19,004 in the summer (July/August); and 5,443 in the fall (September/October); however, this fall estimate was based on only one survey and is likely an underestimation (Barco and Swingle 2014).

Critical habitat for the Northwest Atlantic Ocean DPS was recently designated for terrestrial and marine areas in the Atlantic and Gulf of Mexico (NMFS 2014; USFWS 2014). The USFWS-designated terrestrial critical habitat areas include 88 nesting beaches in North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi (USFWS 2014). These critical habitat areas include a total of 38 units encompassing 393.7 km (244.6 mi) of the Atlantic Ocean shoreline designated for the Northern Recovery Unit: 8 units in North Carolina, 22 in South Carolina, and 8 in Georgia. These units comprise approximately 86 percent of the documented nesting within the recovery unit (USFWS 2014). Although the extreme northern nesting range of this DPS is important to the conservation and recovery of loggerhead turtles, no areas in Virginia and Delaware were designated as critical habitat due to the low number of nests in these states (USFWS 2014).

The NOAA-designated marine critical habitat for the Northwest Atlantic Ocean DPS includes some nearshore reproductive areas directly offshore of nesting beaches from North Carolina through Mississippi, winter habitat in North Carolina, breeding habitat in Florida, constricted migratory corridors in North Carolina and Florida, and *Sargassum* habitat in the western Gulf of Mexico and in US waters within the Gulf Stream in the Atlantic Ocean (NMFS 2014). The nearshore reproductive areas are adjacent to high-density nesting beaches used by hatchlings egressing to the open-water environment and by nesting females transiting between the beach and open water during the nesting season and extend 1.6 km (1.0 mi) offshore. The winter habitat in North Carolina includes warm-water habitats between Cape Hatteras and Cape Fear near the western edge of the Gulf Stream (between the 20- and 100-m isobaths) that are used by a high concentration of juveniles and adults during the winter months. The constricted migratory corridor off North Carolina consists of waters between 36°N and Cape Lookout from the edge of the Outer Banks barrier islands to the 200-m isobath. This corridor overlaps with the northern portion of winter habitat off North Carolina and serves as a migratory pathway for loggerheads transiting to neritic foraging areas in the north and back to winter, foraging, and/or nesting areas in the south. The majority of loggerheads pass through this migratory corridor in the spring (April to June) and fall (September to November), but loggerheads are also present in this area from April through November (NMFS 2014).

3.2.2.3 Threats

Loggerhead turtles face the same general natural and anthropogenic threats of other sea turtles as mentioned previously. The primary threats to the Northwest Atlantic population extend throughout the terrestrial and marine habitats and include bottom trawl, pelagic longline, demersal longline, and demersal large mesh gillnet fisheries; legal and illegal harvesting; vessel strikes; beach armoring; beach erosion; marine debris; oil pollution; light pollution; and predation by native and exotic species (NMFS and USFWS 2008).

3.2.2.4 Habitat Associations

Loggerheads occur worldwide in habitats ranging from coastal estuaries, bays, and lagoons to pelagic waters (Dodd 1988). Neonate loggerheads are oceanic and rarely occupy continental shelf waters. Neonates recently tagged in the western North Atlantic moved throughout the Gulf Stream and into the Sargasso Sea, probably to take advantage of *Sargassum* habitats which provide a thermal environment that supports growth (Mansfield et al. 2014). Older, larger juveniles are oceanic but also utilize neritic environments (Witzell 2002; McClellan and Read 2007; TEWG 2009). Late juveniles and adult loggerheads most often occur on the continental shelf and along the shelf break of the US Atlantic and Gulf coasts as well as in coastal estuaries and bays (CETAP 1982; Shoop and Kenney 1992). Subadult and adult loggerhead turtles tend to inhabit deeper offshore feeding areas along the western Atlantic coast from mid-Florida to New Jersey and most likely forage on benthic prey (Hopkins-Murphy et al. 2003; Roberts et al. 2005; Hawkes et al. 2007).

Typical loggerhead nesting beaches tend to be sandy, wide, open beaches backed by low dunes and fronted by a flat, sandy approach from the ocean (Miller et al. 2003). Loggerheads typically nest on beaches close to reef formations and adjacent to warm temperature currents (Dodd 1988; TEWG 2000). Nesting beaches often face the open ocean or are situated along narrow bays (NMFS and USFWS 1991b). Nest site selection tends to depend more on beach slope and width than temperature, moisture, or salinity (Wood and Bjorndal 2000).

3.2.2.5 Distribution

In the US North Atlantic, loggerhead turtles commonly occur in shelf waters as far north as the New York Bight (CETAP 1982; Shoop and Kenney 1992). Loggerhead distribution along the US Atlantic coast is strongly seasonal and is dictated primarily by SSTs. Loggerheads are associated with SSTs between 13 and 28°C (55.5 and 82.4°F) (Mrosovsky 1980); they tend to become lethargic in SSTs below 15°C (59°F) and may become incapacitated ("cold-stunned") at temperatures below 10°C (50°F) (Schwartz 1978; Mrosovsky 1980). Loggerheads occur north of Cape Hatteras primarily in late spring through early fall

(May and October) with a peak occurrence in June; however, sightings are recorded in mid-Atlantic and northeast waters throughout the year (CETAP 1982; Lutcavage and Musick 1985; Shoop and Kenney 1992; DON 2008a; DON 2008b). During the summer, loggerheads may be found regularly in shelf waters from Delaware Bay to Hudson Canyon, including Long Island Sound and Cape Cod Bay (Burke et al. 1991; Shoop and Kenney 1992; Prescott 2000; University of Delaware Sea Grant 2000). As SSTs decrease in the winter, most individuals move south of Cape Hatteras to overwinter (Epperly et al. 1995c; Mitchell et al. 2002; Hawkes et al. 2011). From November to April, loggerheads are primarily found off the coast of southern North Carolina in the South Atlantic Bight (Griffin et al. 2013); however, stranding and sighting data indicate that not all loggerheads leave mid-Atlantic and New England waters during the winter (Burke et al. 1991) (Figure 8).

Loggerhead nesting beaches are distributed throughout warm, temperate, and subtropical regions (between 40°N and 40°S) with some scattered nesting in the tropics (The SWOT Team 2007). Loggerheads are the only marine turtles that nest predominantly outside of the tropics (Ehrhart et al. 2003). Along the US east coast, loggerheads regularly nest from southeastern Florida to Virginia, and occasional nests have been recorded in Maryland, Delaware, and New Jersey (Graham 1973; Brandner 1983; Musick 1988; NMFS and USFWS 1991b; USFWS 2014). Adult loggerheads exhibit strong site fidelity to nesting beaches and typically return to their natal beaches or nearby areas to nest (Addison 1996; Comer 2002). Intra-seasonal nesting patterns for females vary; some females may nest only once a season while others may nest several times (Webster and Cook 2001). Although nesting has been recorded in May and September, most loggerhead nesting in Virginia occurs in June, July, and August (VDGIF data) (Figure 9). Between 2010 and 2015, annual loggerhead nests in Virginia ranged from 2 to 16 (VDGIF data; Navy data).

Occurrence in the Naval Air Station Oceana - Dam Neck Annex Action Area

Loggerhead turtles have been recorded in and near the NASO-DNA Action Area throughout the year (Figure 8). A total of 128 strandings have been recorded in the Action Area, particularly during spring, summer, and fall (Figure 8). Three loggerhead false crawls have been documented on NASO-DNA: 14 July 2002, 12 August 2002, and 26 June 2014 (Figure 9). A total of two loggerhead nests were recorded on NASO-DNA beaches in July 1992 and July 2002 (Figure 9). Both nests were relocated to a protected hatchery site within the BBNWR (VDGIF data; M. Wright, NASO-DNA-NRM, personal communication).

Occurrence in the Virginia Army National Guard - Camp Pendleton Action Area

Loggerhead turtles have been recorded in and near the VAARNG-CP Action Area throughout the year (Figure 8). Numerous strandings have been recorded along the southeast Virginia coastline; eight of these strandings were in the Action Area (Figure 8). A loggerhead nest was confirmed on Croatan - Pendleton Surf Beach in the VAARNG-CP Action Area in August 2015 (R. Boettcher, VDGIF, unpublished data) (Figure 9). Although this nest was relocated to prevent the highest seasonal tides from washing over and inundating the nest, it was washed out as a result of high surf during Hurricane Joaquin on 2 October 2015 (S. Rose, Virginia Aquarium and Marine Science Foundation, personal communication). Until 2015, no nests or false crawls had been recorded on VAARNG-CP beaches. This installation may not provide suitable habitat for nesting turtles due to the crowds of people who frequent the beaches during the nesting season and the fact that the beachfront is relatively short (366 m [1,200 ft]) and immediately adjacent to heavily populated Virginia Beach. Suitable nest sites have been suggested to be within the sheltered foredune area (VAARNG 2004); however, the dune vegetation's roots in this area would inundate nests and damage, entrap, and suffocate the eggs and hatchlings (M. Wright, NASO-DNA NRM, personal communication).

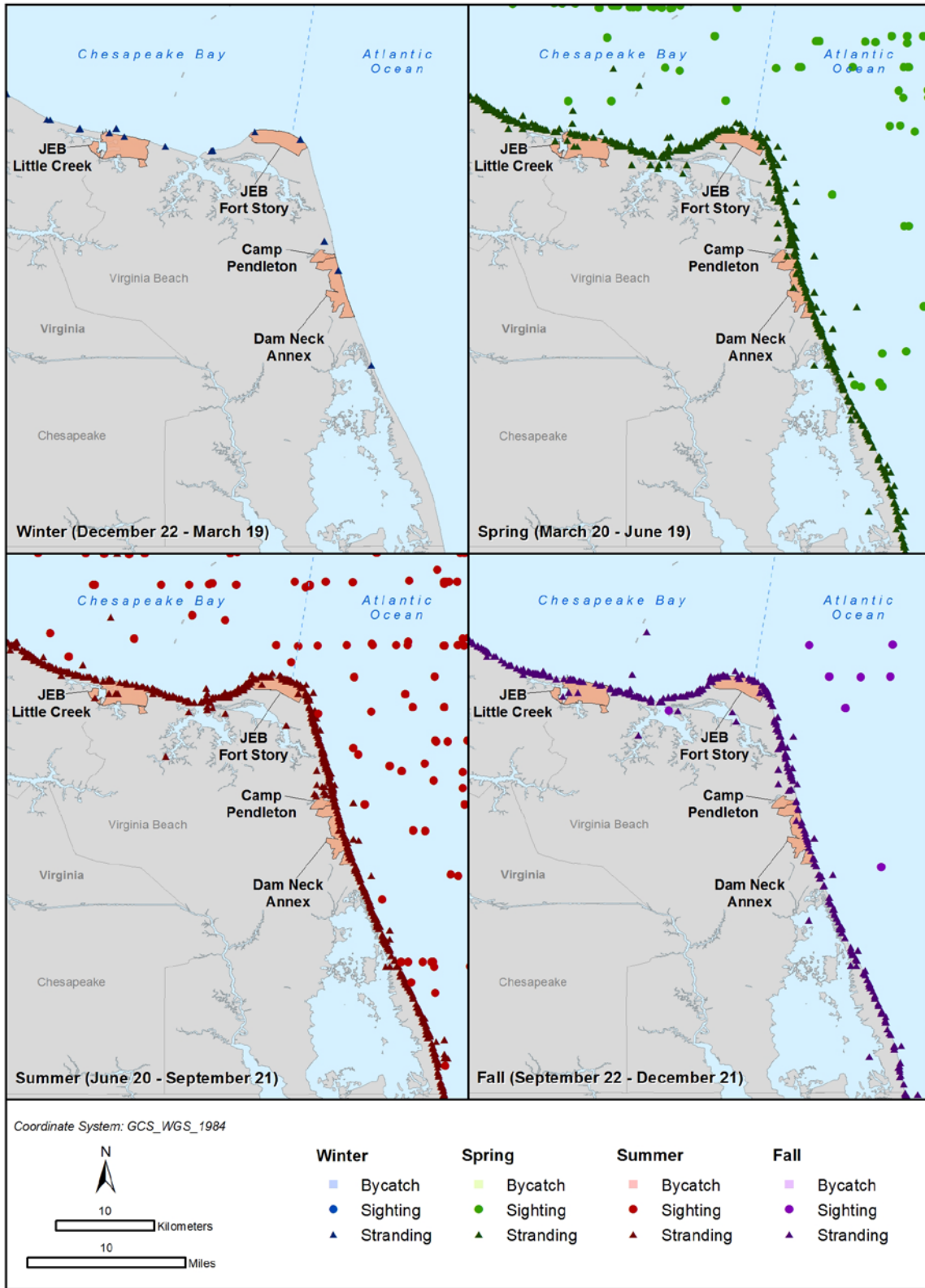


Figure 8. Sighting, stranding, and incidental fisheries bycatch records of the loggerhead turtle near the Action Area. Source data: Refer to Appendix C.

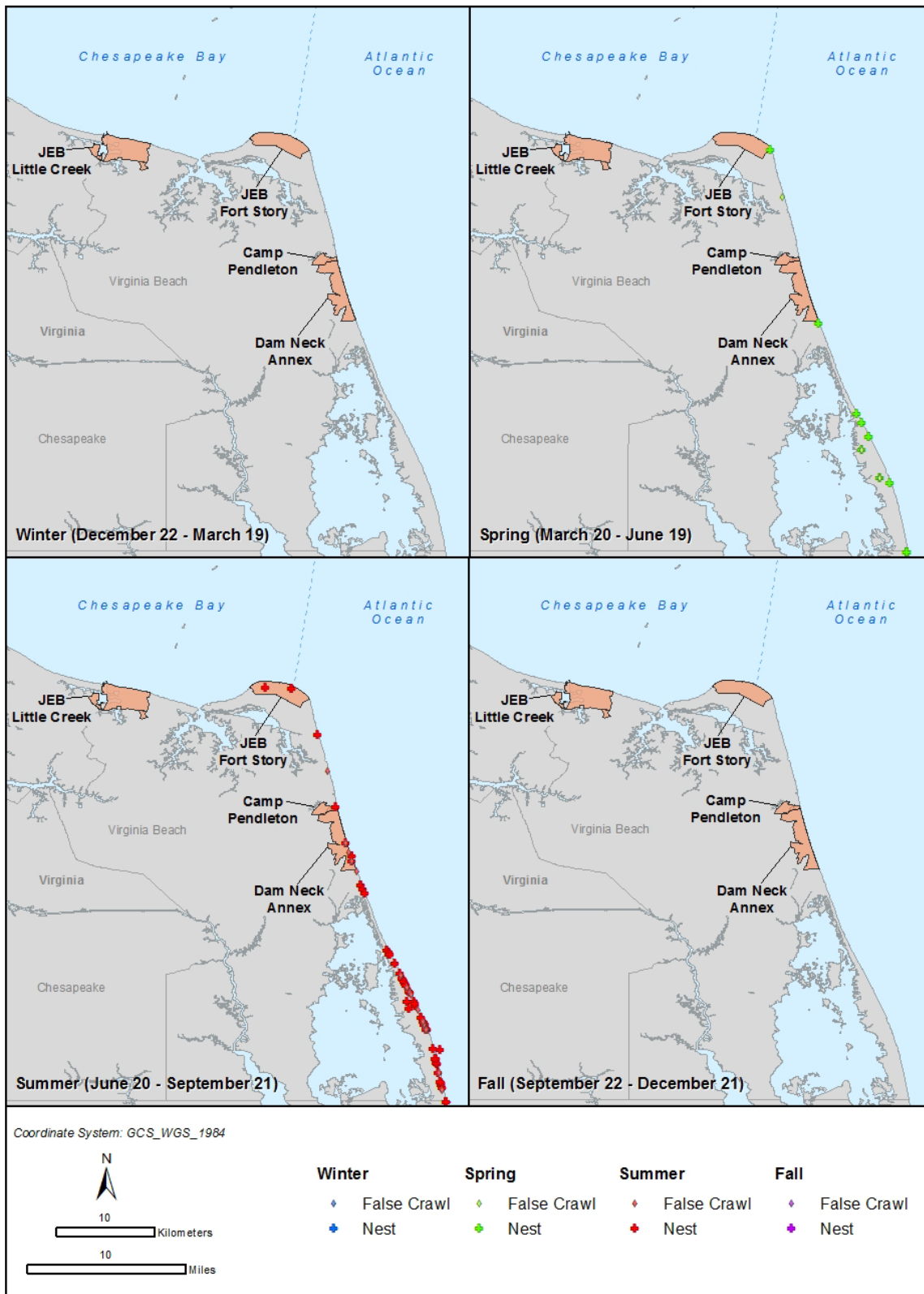


Figure 9. False crawl and nesting records of the loggerhead turtle near the Action Area. Source data: Refer to Appendix C.

3.2.3 *Green Sea Turtle (Chelonia mydas)*

3.2.3.1 Description

Named for the color of their fat, green turtles are the largest of the hard-shelled sea turtles. Adult green turtles commonly weigh over 100 kg (220 lb) and are greater than 100 cm (39 in.) in length (NMFS and USFWS 1991a). Hatchlings have distinct countershading: black on the dorsal surface and mostly cream white on the ventral surface (Witherington et al. 2006). Adult carapaces range in color from solid black to gray, yellow, green, and brown in starburst or irregular patterns; the plastron is a much lighter yellow to white (NMFS and USFWS 1991a). Green turtles in the Atlantic exhibit a slower growth rate than Pacific green turtles (Bjorndal et al. 2000).

3.2.3.2 Status

The green turtle is currently designated as threatened under the ESA with the Florida and Mexican Pacific coast nesting populations listed as endangered. The nesting area for green turtles encountered at sea cannot be determined; therefore, a current conservative management approach is to assume that green turtles in the offshore environment may be from the endangered populations. The NMFS and USFWS recently proposed to remove the current range-wide listing for the green turtle and list 11 DPSs under the ESA (NMFS and USFWS 2015). Based on this proposed rule, eight DPSs would be listed as threatened, and the remaining three DPSs would be designated as endangered. If this ruling is approved, the green turtles occurring in Virginia would be considered part of the threatened North Atlantic DPS (NMFS and USFWS 2015). Recent population estimates for green turtles in the western North Atlantic are not available. Over the past 5 years (2010-2014), the number of green turtle nests in Florida averaged 16,064 annually (Florida Fish & Wildlife Conservation Commission-Fish & Wildlife Research Institute 2015). The only designated critical habitat for this species is in Puerto Rico (NMFS 1998).

3.2.3.3 Threats

Threats to green turtles in the North Atlantic include destruction or modification of habitat; overutilization for commercial, recreational, scientific, or educational purposes; disease; predation; incidental bycatch in fishing gear; dredging; vessel strikes; climate change and natural disasters; contaminants; and marine debris (Hirama 2007; McClellan and Read 2009; NMFS and USFWS 2015). Green turtle nesting habitat is specifically threatened by coastal development, coastal armoring, beachfront lighting, erosion, sand extraction, and vehicle and pedestrian traffic on nesting beaches (Lutcavage et al. 1997; Witherington and Martin 2003; Witherington et al. 2006).

3.2.3.4 Habitat Associations

Post-hatchling and early-juvenile green turtles reside in convergence zones in the open ocean (Carr 1987; Witherington et al. 2012). Once green turtles reach a carapace length of 20 to 25 cm (8 to 10 in), they migrate to shallow, nearshore areas (<50 m [164 ft] in depth) where they spend the majority of their lives as late juveniles and adults. The optimal developmental habitats for late juveniles and foraging adults are warm, shallow waters (3 to 5 m [10 to 16 ft] in depth) with an abundance of subaquatic vegetation and also areas in close proximity to nearshore reefs or rocky areas (Holloway-Adkins and Provanca 2005; Witherington et al. 2006). Green turtles primarily nest on sandy oceanic beaches of mainland shorelines, barrier islands, volcanic islands, and atolls (Witherington et al. 2006). Nesting habitat at Tortuguero Beach, Costa Rica, the largest remaining green turtle rookery in the Atlantic, is associated with more heavily vegetated portions of the beach (Hirth and Samson 1987). In Florida, green turtles seem to prefer nesting on barrier-island beaches that are susceptible to high wave energy and have coarse sands, steep slopes, and prominent foredunes. These beaches also have minimal artificial lighting (Witherington et al. 2006).

3.2.3.5 Distribution

Along the US east coast, green turtles are found as far north as Massachusetts (NMFS and USFWS 1991a). Juvenile green turtles utilize estuarine waters as far north as Long Island Sound, Chesapeake Bay, and North Carolina sounds as summer developmental habitat (Epperly et al. 1995a; Epperly et al. 1995b; Musick and Limpus 1997). As adults, green turtles are restricted to more southern latitudes (Epperly et al. 1995b) and are only occasionally found north of Florida. During nonbreeding periods, adults and juvenile distributions may overlap in coastal feeding areas (Hirth 1997).

Green turtles nest on both island and continental beaches between 30°N and 30°S (Witherington et al. 2006). The major Atlantic nesting colonies are located at Ascension Island (in the South Atlantic Ocean), Aves Island (in the Caribbean Sea, west of Guadeloupe), and on the beaches of Costa Rica and Suriname (NMFS and USFWS 1991a). Although Florida is near the northern extent of the green turtle's Atlantic nesting range, it hosts a significant proportion of green turtle nesting (Witherington et al. 2006). Approximately 99 percent of the green turtle nesting in Florida occurs on the Atlantic coast with Brevard through Broward Counties hosting the greatest nesting activity (Meylan et al. 1995; Witherington et al. 2006). Scattered nesting have been recorded in Georgia and the Carolinas (Peterson et al. 1985; Schwartz 1989; NMFS and USFWS 1991a). Green turtle nesting in North Carolina has been documented at Onslow Beach, Caswell Beach, Bald Head Island, and near Cape Hatteras (Schwartz 1989). The first ever green turtle nest in Virginia was documented in 2005 at BBNWR (USFWS 2005; R. Boettcher, VDGIF, unpublished data).

Occurrence in the Naval Air Station Oceana - Dam Neck Annex Action Area

Green turtles have been recorded in Virginia throughout the year (Figure 10). Strandings have been recorded in the Action Area during summer and fall and just south of this region during winter (Figure 10). No nests or false crawls have been recorded on NASO-DNA beaches (Figure 11); however, one green turtle nest was recorded on Sandbridge Beach just south of this Action Area in August 2005 and was subsequently moved to BBNWR (VDGIF data) (Figure 11). Green turtles may nest on NASO-DNA beaches based on this previous nesting record in southeastern Virginia, scattered green turtle nesting in nearby North Carolina, and the nesting of other turtle species in this Action Area (Schwartz 1989).

Occurrence in the Virginia Army National Guard - Camp Pendleton Action Area

Green turtles have been recorded in Virginia throughout the year (Figure 10). Strandings have been recorded in or near the Action Area during summer and fall (Figure 10). No green turtle nests or false crawls have been recorded on VAARNG-CP beaches (Figure 11). This installation may not provide suitable habitat for nesting turtles due to the crowds of people who frequent the beaches during the nesting season and the fact that the beachfront is relatively short (366 m [1,200 ft]) and immediately adjacent to heavily populated Virginia Beach. Suitable nest sites have been suggested to be within the sheltered foredune area (VAARNG 2004); however, the dune vegetation's roots in this area would inundate nests and damage, entrap, and suffocate the eggs and hatchlings (M. Wright, NASO-DNA NRM, personal communication).

3.2.4 *Hawksbill Sea Turtle (*Eretmochelys imbricata*)*

3.2.4.1 Description

The hawksbill turtle is a small- to medium-sized sea turtle. Adults typically weigh around 80 kg (176 lb) with carapace lengths ranging from 65 to 90 cm (26 to 35 in) (Witzell 1983; NMFS and USFWS 1993). The carapace is often brown or amber with irregularly radiating streaks of yellow, orange, black, and reddish-brown. Hawksbills are distinguished from other sea turtles by their hawk-like beaks, posteriorly overlapping carapace scutes, and two pairs of claws on their flippers (NMFS and USFWS 1993).

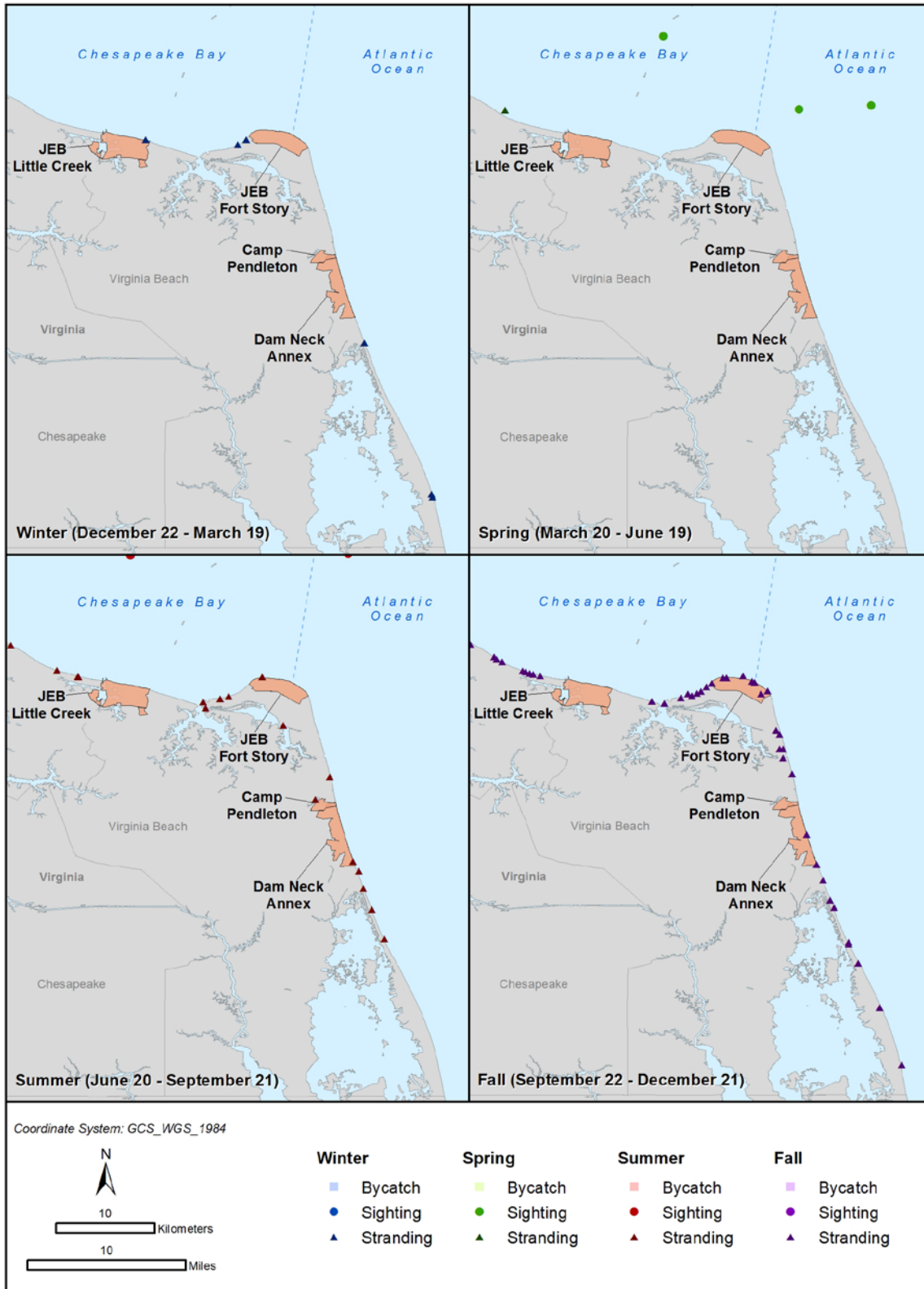


Figure 10. Sighting, stranding, and incidental fisheries bycatch records of the green turtle near the Action Area. Source data: Refer to Appendix C.

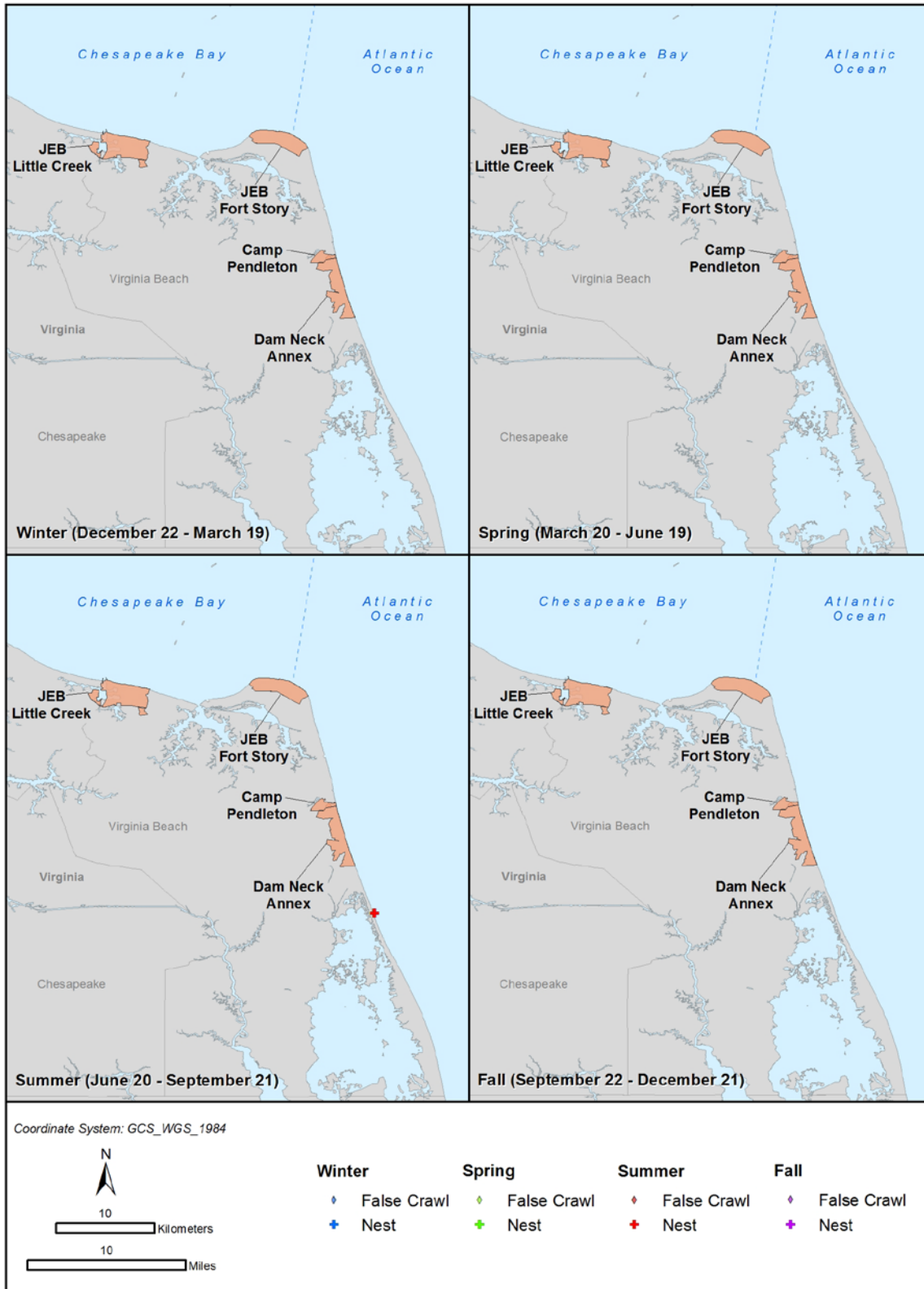


Figure 11. Nests and false crawls of the green turtle near the Action Area. Source data: Refer to Appendix C.

3.2.4.2 Status

The hawksbill turtle is designated as endangered under the ESA. This species is second only to the Kemp's ridley in terms of endangerment (NMFS and USFWS 1993; Bass 1994). The most recent estimate of hawksbill abundance in the Atlantic Ocean was 3,626 to 6,108 nesting females per season based on historical and recent estimates of nesting colonies from around the Atlantic Basin (NMFS and USFWS

2013a). Critical habitat for this species is designated on Mona and Monito Islands in Puerto Rico (NMFS 1998). One of the two most important nesting populations in the US is located on Mona Island and is increasing. The other important US nesting population is on Buck Island Reef National Monument in the USVI and is also increasing (NMFS and USFWS 2013a).

3.2.4.3 Threats

Impacts to hawksbill nesting and marine habitats are increasing and include construction, beach armoring and renourishment, artificial lighting, and sand extraction (NMFS and USFWS 2013a). Throughout the Western Atlantic and Caribbean, hawksbill nesting and foraging habitat has been lost to beach development, sand mining, lights, and pollution (Mortimer and Donnelly 2008). Because hawksbills prefer to nest under vegetation (Horrocks and Scott 1991; Kamel and Delcroix 2009), they are particularly impacted by beachfront development and clearing of dune vegetation (Mortimer and Donnelly 2008). In addition to impacts from coastal development, anthropogenic threats to hawksbill turtles include poaching, the tortoiseshell trade, degradation of coral reefs, ingestion and entanglement in marine debris, oil spills, other contaminants, and incidental capture in commercial and artisanal fisheries. Climate change and associated factors like sea level rise are emerging and are major threats to the conservation and recovery of hawksbills. Warmer sea temperatures are expected to impact coral reefs, which serve as important foraging habitats for hawksbill turtles. Sea level rise threatens nesting beaches (Mortimer and Donnelly 2008; NMFS and USFWS 2013a). Vessel strikes are also a threat to hawksbills, particularly in the southeast US (NMFS and USFWS 2013a).

3.2.4.4 Habitat Associations

As post-hatchlings and small juveniles, hawksbill turtles inhabit oceanic waters where they are sometimes associated with driftlines and floating patches of *Sargassum* (Parker 1995; Witherington et al. 2012). The developmental habitats for juvenile benthic-stage hawksbills are the same as the primary feeding grounds for adults; they include tropical, nearshore waters associated with coral reefs, hard bottoms, cliff-wall habitats with soft corals and invertebrates, or estuaries with mangroves (Musick and Limpus 1997; Diez et al. 2003). Coral reefs are optimal habitat for juveniles, subadults, and adults (NMFS and USFWS 1993; Diez et al. 2003). Late juveniles generally reside on shallow reefs less than 18 m (59 ft) deep; however, as they mature into adults, hawksbills move to deeper habitats and may forage to depths greater than 90 m (295 ft). Benthic-stage hawksbills are seldom found in waters beyond the continental or insular shelf unless they are transiting between distant foraging or nesting grounds (NMFS and USFWS 1993). Although hawksbills exhibit a wide tolerance for nesting substrate type, they prefer to nest under vegetation on beaches with low wave energy and steep slopes (Horrocks and Scott 1991; Kamel and Delcroix 2009).

3.2.4.5 Distribution

In the western Atlantic Ocean, this species is found throughout the Gulf of Mexico, the Greater and Lesser Antilles, and southern Florida, as well as along the mainland of Central America south to Brazil (NMFS and USFWS 1993). The hawksbill is rare north of Florida (Lee and Palmer 1981; Keinath et al. 1991; Parker 1995; Plotkin 1995; USFWS 2001). Small hawksbills have stranded as far north as Cape Cod, Massachusetts (NMFS 2006).

The largest nesting aggregation in the Caribbean occurs along the Yucatán Peninsula, Mexico (NMFS and USFWS 1993). Other small, yet important, nesting assemblages are found in Belize, Nicaragua,

Panama, Venezuela, Cuba, Antigua, and the Grenadines (NMFS and USFWS 1993). Within the continental US, hawksbill nesting is rare and is restricted to beaches in southern Florida and the Florida Keys (Dodd 1995). Nesting has been documented at Jupiter Island, Biscayne National Monument, and the Canaveral National Seashore on the eastern Florida coast (Lund 1985).

Hawksbill turtles are considered extralimital to the Chesapeake Bay area (DON 2009). The first verified account of a hawksbill turtle in the Bay occurred in November 1991, when a commercial fisherman caught a juvenile hawksbill at the mouth of the James River; the turtle was later released in Florida (Keinath et al. 1991). Since then, two additional hawksbill sea turtles have been reported in the Chesapeake Bay: one in December 2000 and one in November 2004 (VIMS 2008). These individuals were also juveniles and were both cold-stunned. Another hawksbill stranded along the coast of Virginia north of the mouth of the Chesapeake Bay (Barco and Swingle 2014) (Figure 12).

Occurrence in the Naval Air Station Oceana - Dam Neck Annex Action Area

Hawksbill turtles have stranded on ocean-facing beaches in southeastern Virginia (Figure 12); however, this species has not been documented in the Action Area. Hawksbill turtles typically nest in tropical areas and are not known to nest in Virginia; therefore, hawksbills are not expected to nest on NASO-DNA beaches.

Occurrence in the Virginia Army National Guard - Camp Pendleton Action Area

Hawksbill turtles have stranded on ocean-facing beaches in southeastern Virginia (Figure 12); however, this species has not been documented in the Action Area. Due to the rare occurrence of this species this far north (DON 2009) and the potential unsuitable habitat of VAARNG-CP beaches (VAARNG 2004), hawksbill turtles are not expected to nest in the VAARNG-CP Action Area.

3.2.5 Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)

3.2.5.1 Description

The Kemp's ridley is the smallest sea turtle species, reaching approximately 60 to 70 cm (24 to 28 in.) straight carapace length and weighing around 45 kg (99 lb) (USFWS and NMFS 1992; Gulko and Eckert 2004). The carapace is round to somewhat heart-shaped and changes from the gray-black color of hatchlings to a pale olive-gray color of adults (Marquez-M. 1994).

3.2.5.2 Status

The Kemp's ridley turtle is designated as endangered under the ESA (35 FR 18319). Once considered the most endangered sea turtle species, the Kemp's ridley turtle has experienced a consistent increase in nesting numbers since the lowest recorded nest count of 702 nests in 1985 (Heppell et al. 2005). From 2005 through 2010, approximately 5,500 females were estimated to be nesting at all monitored beaches in the Gulf of Mexico. In 2011 and 2012, the preliminary estimates of nests observed at the primary nesting beaches in Mexico were 19,368 and 20,197, respectively (Gallaway et al. 2013). Based on a predicted annual growth rate of 12 to 16 percent, this population may grow to 10,000 nesting females in Mexico by 2015 (Heppell et al. 2005). No critical habitat has been designated for this species.

3.2.5.3 Threats

The decline of this species is primarily due to human activities, particularly the direct harvest of adults and eggs and incidental capture in commercial fishing operations. The resurgence in nesting numbers over the last few decades is largely due to efforts to protect females and hatchlings on nesting beaches and reductions in fisheries-related mortality resulting from the use of Turtle Excluder Devices in the US and Mexican trawl fisheries (Heppell et al. 2005). In the northeast US, cold-stunning events are common for this species; 1,084 immature Kemp's ridleys were cold-stunned between 1994 and 2006 (NMFS et al. 2011). Additional threats to Kemp's ridley turtles include construction, beach nourishment, predation,

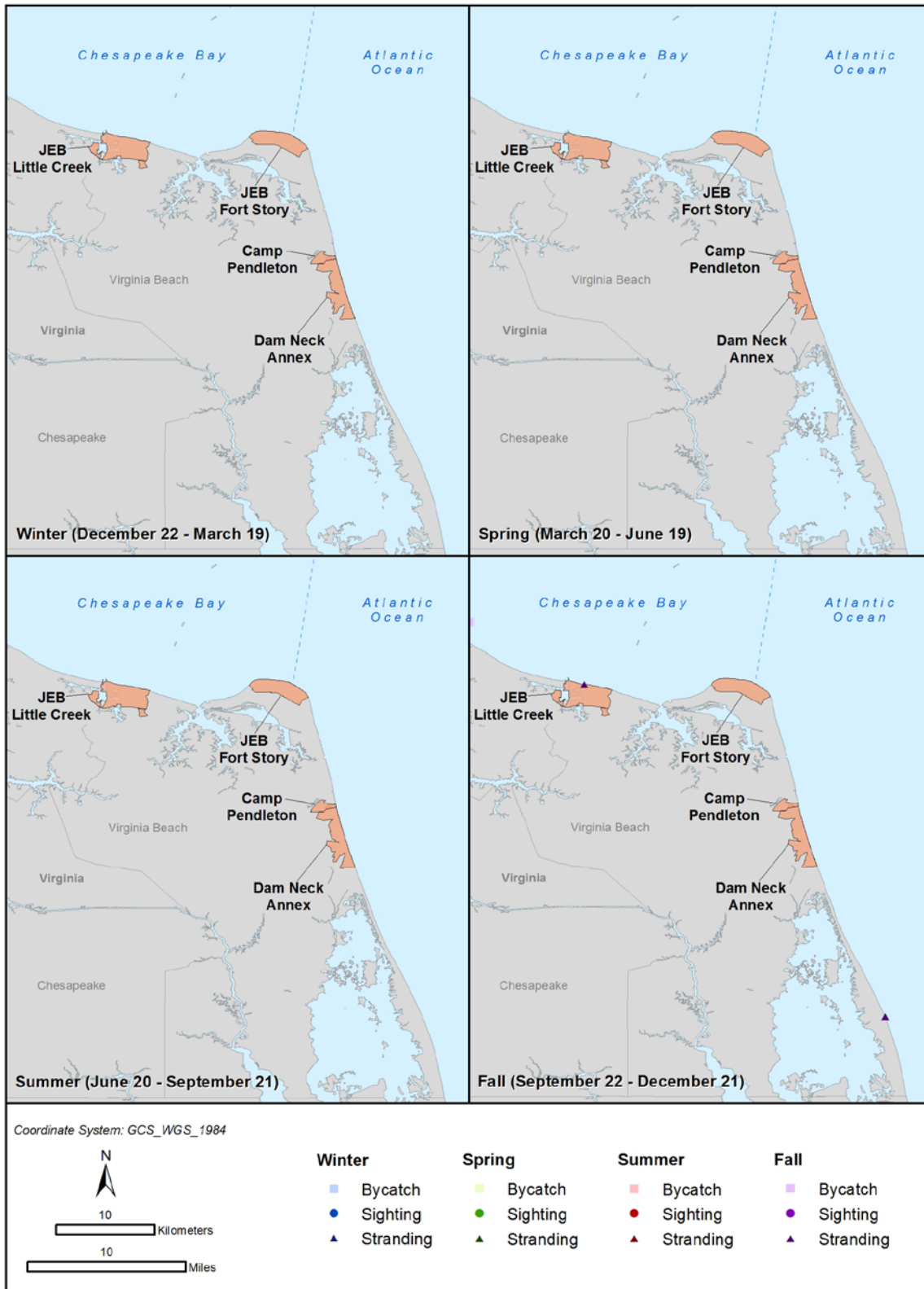


Figure 12. Sighting, stranding, and incidental fisheries bycatch records of the hawksbill turtle near the Action Area. Source data: Refer to Appendix C.

artificial lighting, diseases, climate change, vessel strikes, dredging, and pollution (NMFS et al. 2011; Gallaway et al. 2013). Because the Gulf of Mexico is an area of high-density offshore oil exploration and extraction, chronic, low-level spills and occasional massive spills, such as the Deepwater Horizon oil spill incident in 2010, may impact Kemp's ridley turtles at sea and on nesting beaches in the Gulf. Although short-term impacts were minimized via coordinated response efforts, the long-term effects of this 2010 disaster on Kemp's ridley turtle are not yet known (NMFS et al. 2011).

3.2.5.4 Habitat Associations

Kemp's ridley turtles inhabit open-ocean and *Sargassum* habitats of the North Atlantic Ocean as post-hatchlings and small juveniles (Manzella et al. 1991; Witherington et al. 2012). Large juveniles and adults move to benthic, nearshore feeding grounds along the US Atlantic and Gulf coasts (Morreale and Standora 2005). Habitats frequently utilized include warm-temperate to subtropical sounds, bays, estuaries, tidal passes, shipping channels, and beachfront waters where their preferred prey occurs (Lutcavage and Musick 1985; Landry and Costa 1999; Seney and Musick 2005). Their most suitable habitats are less than 10 m (33 ft) deep with SSTs between 22 and 32°C (72 and 90°F) (Coyne et al. 2000). Seagrass beds, mud bottom, and live bottom are important developmental habitats (Schmid and Barichivich 2006). Post-nesting Kemp's ridleys travel along coastal corridors generally shallower than 50 m (164 ft) (Morreale et al. 2007). Nesting habitat is typically sandy ocean beaches. The beach at Rancho Nuevo, Mexico, where a majority of nests are laid, is formed by low dunes and isolated on the land side by shallow coastal lagoons with several narrow cuts that open during the rainy season forming estuaries or temporary sand bars (Marquez-M. 1994). Kemp's ridleys typically nest just beyond the high-tide line in front of the first dune, on the windward slope, or on top of the dune (Marquez-M. 1994).

3.2.5.5 Distribution

The Kemp's ridley range is restricted to the North Atlantic Ocean (Marquez-M. 1994). Oceanic transport of hatchling Kemp's ridleys is controlled primarily by hydrography in the Gulf of Mexico (Collard 1990). Upon leaving the nesting beach of Rancho Nuevo, hatchling Kemp's ridleys enter the Mexican Current and are swept eastward into the northern Gulf of Mexico (Musick and Limpus 1997). Many juveniles are retained in the northern Gulf until they migrate inshore to demersal habitat. Others may be carried south from the northern Gulf into the Loop Current where they are swept into the Florida Current and, subsequently, the Gulf Stream (Musick and Limpus 1997). Once they reach a size of approximately 20 to 30 cm (8 to 12 in.) or at least two years of age, they actively migrate to neritic developmental habitats along the US Atlantic Coast (Musick and Limpus 1997). Adults are largely confined to the Gulf of Mexico with moderate numbers along the eastern US coast as far north as Nova Scotia (Lazell 1980; Morreale et al. 1992).

Kemp's ridleys occur in waters off North Carolina from April through October and in Virginia in May through November (Morreale and Standora 2005). Some juveniles may migrate as far north as New York and New England, arriving in these areas around June and leaving to travel south in early October (Morreale and Standora 2005). During the winter, they migrate south to warmer waters off Florida (Marquez-M. 1994). They typically migrate within the nearshore waters along the mid-Atlantic coast (Morreale and Standora 2005; Morreale et al. 2007); juveniles and adults often travel inshore of the 18-m isobath (Renaud and Williams 2005). Individuals are known to overwinter south of Cape Hatteras although the majority of Kemp's ridley turtles stay in Florida near Cape Canaveral during the winter (Henwood and Ogren 1987). Individuals that overwinter off southern North Carolina may subsequently move into warmer waters (e.g., Gulf Stream or areas off South Carolina) during mid-winter (Renaud 1995; Morreale and Standora 2005). For example, an individual tagged in Beaufort, North Carolina, in 1989 remained in Onslow Bay during the winter and moved into the Gulf Stream when temperatures cooled close to shore in January 1990 (Renaud 1995). Kemp's ridleys utilize the Chesapeake Bay and coastal Virginia waters, in particular, as summer developmental habitat (Lutcavage and Musick 1985). Individuals may prefer the shallow seagrass habitats in the Chesapeake Bay and adjacent waters due to the presence of their preferred prey, the blue crab, in this region (Lutcavage and Musick 1985; Keinath et al. 1994). The Kemp's ridley turtle is the second most common sea turtle species that strands in Virginia;

they average 39 strandings per year with a peak in June and in the fall (Barco and Swingle 2014) (Figure 13).

Nesting occurs primarily on a single nesting beach at Rancho Nuevo on the eastern coast of Mexico (USFWS and NMFS 1992) with a few additional nests in Texas, Florida, South Carolina, and North Carolina (Meylan et al. 1990; Weber 1995; Godfrey 1996; Foote and Mueller 2002). Kemp's ridley nesting in Virginia is extremely rare. Only two Kemp's ridley nests have been recorded in Virginia: one on Dam Neck Naval Base in June 2012 and one on False Cape State Park near the North Carolina/Virginia border in July 2014 (R. Boettcher, VDGIF, unpublished data) (Figure 14).

Occurrence in the Naval Air Station Oceana - Dam Neck Annex Action Area

Kemp's ridley turtles have been recorded in southeastern Virginia throughout the year (Figure 13). Strandings have been recorded in or near the NASO-DNA Action Area during spring, summer, and fall (Figure 13). One Kemp's ridley nest was recorded in the Action Area on 15 June 2012 (Figure 14). This was the first documented Kemp's ridley nest in Virginia. The nest was left *in situ*, and a total of 71 hatchlings emerged in mid-August (VDGIF data).

Occurrence in the Virginia Army National Guard - Camp Pendleton Action Area

Kemp's ridley turtles have been recorded in southeastern Virginia throughout the year (Figure 13). Strandings have been recorded in or near the VAARNG-CP Action Area during spring, summer, and fall (Figure 13). No Kemp's ridley turtle nests or false crawls have been recorded in the Action Area (Figure 14).

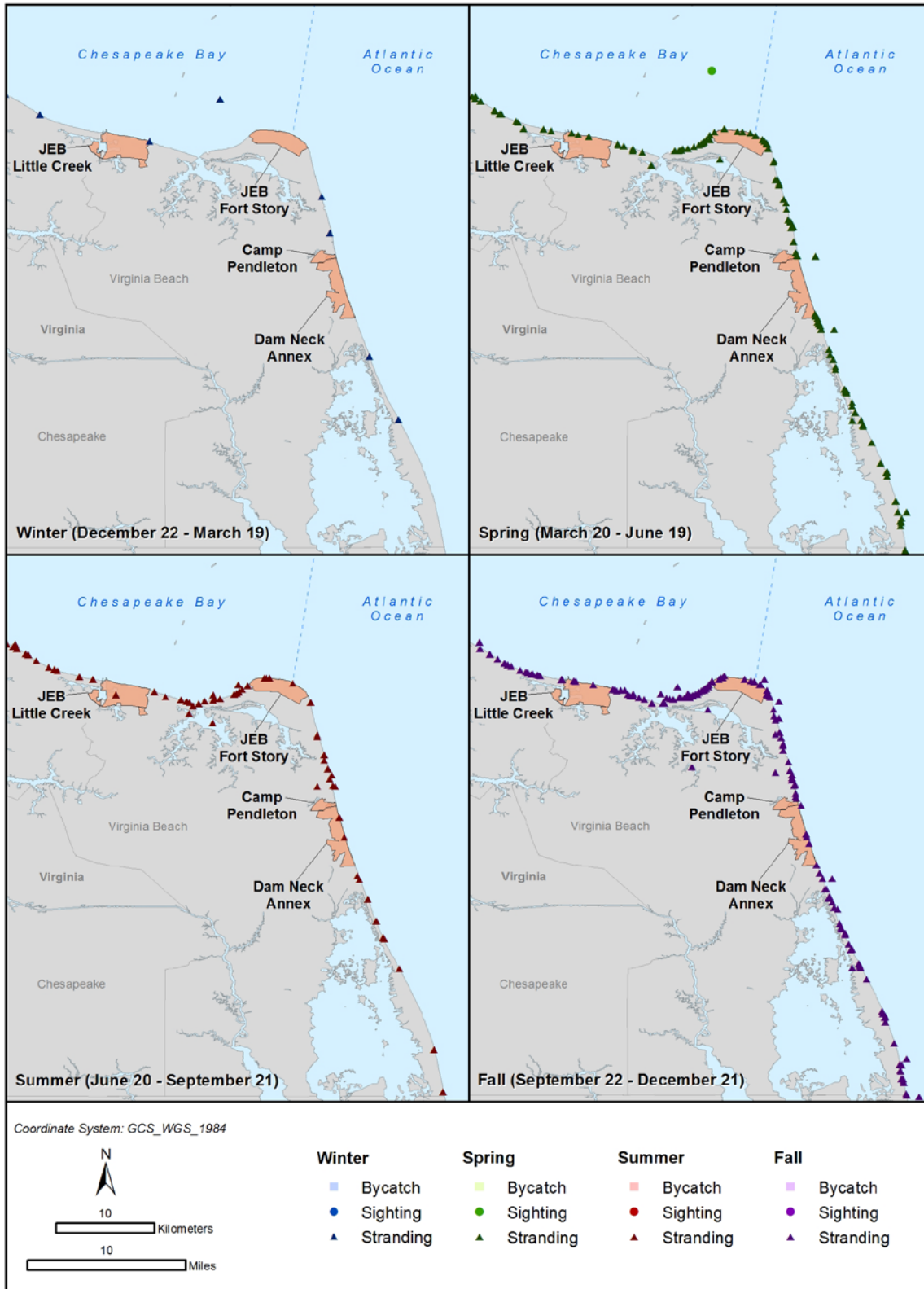


Figure 13. Sighting, stranding, and incidental fisheries bycatch records of the Kemp's ridley turtle near the Action Area. Source data: Refer to Appendix C

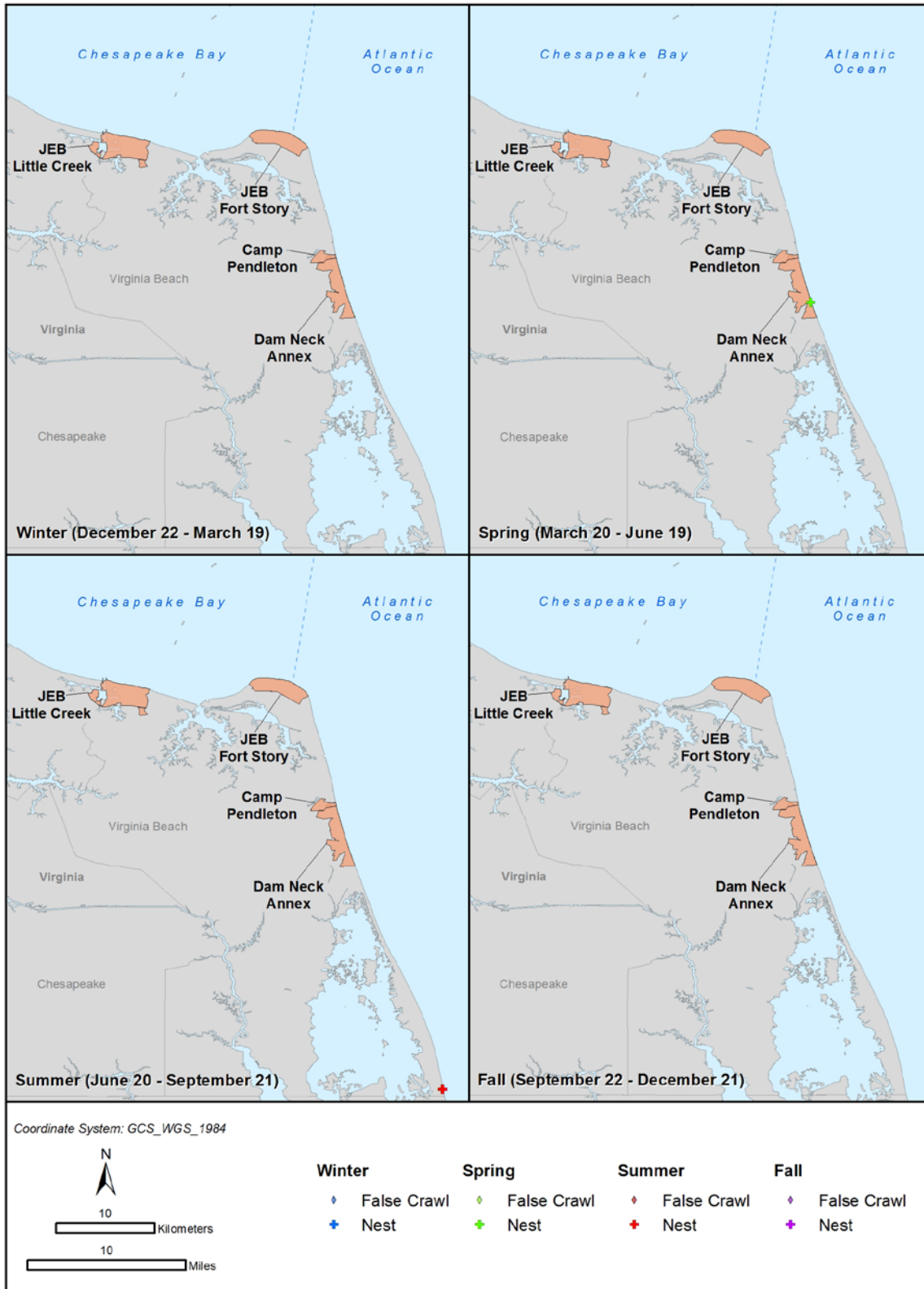


Figure 14. Nests and false crawls of the Kemp's ridley turtle near the Action Area. Source data: Refer to Appendix C.

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4.0 ENVIRONMENTAL BASELINE OF AFFECTED AREA

4.1 NAVAL AIR STATION OCEANA - DAM NECK ANNEX

The facilities, including the Action Area, at NASO-DNA are used to support the mission of the Installation to provide quality education and training to sailors in specified combat systems operation and maintenance, to provide specialized skills training, to provide training systems support to operational and systems commands, and to perform other functions and tasks as directed by higher authority (DON 2015a). These facilities are also used by command tenants of the installation as well as commands stationed at other installations. Training, testing, and evaluation facilities operated at NASO-DNA include a helicopter pad, weapons compound, and Beach and Dune Training Areas. The Marine Air Control Squadron (MACS)-24 operate a compound and radar tower in the northeastern portion of the installation. Also, an explosives test facility is located adjacent to the northern beach. Other training activities that occur on the northern beach include training, testing and evaluation in special warfare, ordnance, overland assault, beach assault, and tactical air operations radar. Amphibious landing exercises using Landing Craft Air Cushions (LCACs) and other amphibious vehicles can occur up to four times per month and involve one to four amphibious vehicles maneuvering onto and across the beach, foot traffic across the beach and dunes, and support personnel digging foxholes to establish a beachhead.

The Action Area consists of the beach and dune areas of the installation. The beaches on NASO-DNA are divided into three nest management zones depending on their use, training or recreation, and the intensity that occurs on training beaches (see Figure 6). Red zones, which include the Beach and Dune Training Areas, have ground disturbing training activities such as LCACs, explosive ordnance disposal, and ATV training and have restricted access at all times (DON 2015a). Red zones occupy approximately the northern quarter of NASO-DNA with the exception of a portion of the northern-most area of the beach which has a spillover of recreational uses from VAARNG-CP.

The yellow zones are firing range safety fans that have restricted access and are closed during small-arms firing training at ranges located inland from the dunes. Green zones are recreational beaches used by military personnel and families and have minimal access restrictions.

Beach and dune environments are important to the unique training environment at NASO-DNA and remain an ongoing natural resources challenge that has been addressed by various shoreline stabilization projects (DON 2015a). Training exercises can result in accelerated beach and dune erosion and the loss of significant ecological communities (DON 2015a). Other periodic disturbances include physical training occurring early in the morning and during daylight hours three to four times per week; daily security patrols; trash pickup at recreational beaches each morning from April to November; daily (from May to September) swimming, surfing, beachcombing, kayaking, fishing, and volleyball at recreational and fishing beaches; and the maintenance of buried communication cables at the south end of the beach every few years (DON 2015a).

4.1.1 Previous Sea Turtle Management Actions

NASO-DNA has undertaken actions in the past for the management of sea turtles. In 2003, NASO-DNA requested formal consultation on a beach replenishment project at NASO-DNA and the potential effects on the loggerhead turtle. The USFWS issued the final Biological Opinion on 8 October 2003 that the action, as proposed, was not likely to jeopardize the continued existence of the loggerhead turtle. In 2008, NASO-DNA and BBNWR entered into a nest relocation agreement that in which BBNWR staff would determine if a nest is present and relocate the nest if necessary. The USFWS issued a Biological Opinion in 2011 on the BBNWR Sea Turtle Management Program, including nest relocations from other areas within Virginia Beach, and determined that the program was not likely to jeopardize the continued existence of the loggerhead or green sea turtles (USFWS 2011). On 25 May 2012, the Biological Opinion was amended to include NASO-DNA.

4.1.2 *Lighting Survey*

Artificial illumination on or near the beaches of NASO-DNA can deter adult females from emerging from the water, affect nest site selection, disrupt the seaward orientation of adult females after nesting, and disrupt the seaward orientation of hatchlings after emergence from the nest (Witherington and Bjorndal 1991; Witherington 1992; Witherington and Martin 2003; Tuxbury and Salmon 2005; Brei et al. 2014; Rivas et al. 2015). Lighting surveys, following the USFWS protocols and guidelines recommended in the Florida Marine Research Institute's technical report (Witherington and Martin 2003), were conducted on NASO-DNA from April to October 2015 to identify artificial lighting sources that emit light that is visible from the beaches of this installation (DON 2015). The lighting survey report from these surveys can be found in Appendix B.

4.1.2.1 Methodology

Lighting surveys included both daytime and nighttime surveys that were conducted within the pre-nesting season, the nesting season, and the post-nesting/hatching season (DON 2015b). Daytime surveys allowed the surveyors to familiarize themselves with the areas to be surveyed at night and to identify the likely sources of light to be investigated at night. Nighttime surveys were conducted to document light sources that are visible on NASO-DNA beaches with the potential to impact sea turtles and to classify them as either direct or indirect light sources. The pre-nesting season survey collected the baseline data of light sources with a direct, indirect, or potential to impact sea turtles. The remaining surveys conducted during the nesting season and the post-nesting/hatching season documented any changes or additions to light sources not identified during the pre-nesting or other follow-up surveys.

Prior to the first surveys, desktop analyses were conducted to identify potential light sources on the installation and to create a map for use during surveys. The map was used by the surveyors to orient themselves while on the beach and assist in locating light sources. Daytime surveys occurred on 1 and 3 April 2015 along the beach face and behind the rear dunes. If allowed, photographs of potential light sources were taken for referral purposes and for inclusion into reports.

The pre-nesting season nighttime surveys were conducted on 14 and 15 April 2015. These surveys occurred within 2 to 14 days following a full moon and were started after 2100 as specified in the USFWS protocols. Nighttime surveys consisted of at least two surveyors walking the beach at night above the water line in the swash zone. Both direct and indirect light sources were identified. Identification included the classification of the type of light source and GPS coordinates or map location of the actual light source. Survey forms were completed to document building number, parking area, or other identifiers of the location on the installation. The number of lights, type, color, and potential for disruption (as reviewed in Witherington and Martin [2003]) were also recorded.

Nesting season surveys were conducted on 5 and 12 June 2015 to document any changes or additions to light sources, particularly as a result of new construction and from the change in beach length from the beach replenishment that was completed in April. These dates complied with the phase of the moon and time specified in the USFWS protocols. Maps generated from the pre-nesting nighttime survey data were used to identify new and changed impacts. The beach was surveyed first and then followed by the survey behind the dunes to locate light sources identified from the beach. All light sources that were identified were documented.

The post-nesting/hatching season survey had to be accomplished on two separate dates. On 11 September 2015, the southern two-thirds of the NASO-DNA beach were surveyed. The remaining northern portion of the beach was surveyed on 10 October 2015. Both survey dates were within the survey window specified in protocols and were started after 2100.

4.1.2.2 Results

NASO-DNA has artificial lighting that reaches the beach both directly and indirectly. A total of 236 direct, indirect, and other light sources that were not on during surveys but are expected to have an impact were

identified during surveys on NASO-DNA. Most of the artificial light sources identified (101 light sources) have a direct impact on the beach. An additional 54 light sources were identified as indirect sources because they either constituted a glow that could be seen above the dunes or illuminated structures, such as building walls, which were visible from the beach. A total of 81 light sources were categorized as either "Direct-if on" or "Indirect-if on". Those classified as "Direct-if on" were not on at the time of nighttime surveys, but the fixtures could be seen from the beach. Those classified as "Indirect-if on" were not on during the nighttime surveys and were classified due to factors such as: their height and proximity to the beach, they were located near similar light sources that were classified as indirect, or it was apparent that they would likely illuminate structures that were visible from the beach. The majority of light sources identified on NASO-DNA are on elevated fixtures such as street, parking lot, and sports field lights. These sources rise above the dunes and scatter light over a wide area. Other sources included wall-mounted area and flood lights located on upper levels of buildings and areas of concentrated light sources that created localized sky glow. Seventy-six lights identified at NASO-DNA have high-pressure sodium lamps considered to be highly disruptive to sea turtles (Witherington and Martin 2003). An additional 61 lights were identified as having white, broad-spectrum lamps considered to be extremely disruptive. General recommendations from the lighting survey report (DON 2015b) are included in this BA in Section 2.3 above and specific recommendations are included in the survey report (Appendix B).

4.2 VIRGINIA ARMY NATIONAL GUARD - CAMP PENDLETON

The facilities and land of VAARNG-CP are used to support training for the VAARNG, Virginia Air National Guard, out-of-state National Guard units, and other government agencies. The majority of training is limited to those months between Labor Day and Memorial Day due to the installation's close proximity to Virginia Beach, a popular tourist location in the summer months. Training that occurs on VAARNG-CP includes weapons firing certification, classroom training, field artillery drivers training and, for the Air Guard units, construction equipment drivers training. Weapons firing certification is limited to small caliber weapons (e.g., 5.56-mm, 9-mm, .38-caliber, and 12-gauge shotgun). The weapons firing certification range is located immediately behind the dunes. No training activities occur on VAARNG-CP beaches.

The beach at VAARNG-CP is open for use by active duty, Guard and Reserve, and retired military personnel for recreational use such as swimming, beachcombing, and fishing. From Memorial Day to Labor Day, the City of Virginia Beach leases 600 ft of the beach and an adjacent parking area from Camp Pendleton for use by surfers who are restricted from using the public beaches of the main resort areas north of the installation. Other periodic disturbances include daily security patrols and trash pickup each morning between Memorial Day and Labor Day.

Manipulation of the beach and dunes at VAARNG-CP likely occurred during construction of the adjacent firing range (VAARNG 2004). Damage to dune vegetation has been widespread from pedestrian and vehicular traffic at the northern and southern limits of the installation beach. The VAARNG-CP INRMP proposes dune vegetation replanting to stabilize the dune system in those areas where vegetation has been removed (VAARNG 2004).

4.2.1 *Lighting Survey*

Artificial illumination on or near the beaches of VAARNG-CP can deter adult females from emerging from the water, affect nest site selection, disrupt the seaward orientation of adult females after nesting, and disrupt the seaward orientation of hatchlings after emergence from the nest (Witherington and Bjorndal 1991; Witherington 1992; Witherington and Martin 2003; Tuxbury and Salmon 2005; Brei et al. 2014; Rivas et al. 2015). Lighting surveys, following the USFWS and guidelines recommended in the Florida Marine Research Institute's technical report (Witherington and Martin 2003), were conducted on VAARNG-CP to identify artificial lighting sources that emit light that is visible from the beach of this installation (DON 2015b). The lighting survey report from these surveys can be found in Appendix B.

4.2.1.1 Methodology

Lighting surveys included both daytime and nighttime surveys that were conducted within the pre-nesting season, the nesting season, and the post-nesting/hatching season. (DON 2015b). Initial pre-nesting season surveys were accomplished to document light sources that are visible on VAARNG-CP beaches with the potential to impact sea turtles and classify them as either direct or indirect light sources. The remaining surveys conducted during the nesting season and the post-nesting/hatching season to document any changes or additions to light sources not identified during previous surveys. All nighttime surveys were conducted within 2 to 14 days following a full moon and was started after 2100 hours as specified in the USFWS protocols.

Prior to the first surveys, desktop analyses were conducted to identify potential light sources on the installation and create a map for use during surveys. The map was used by the surveyors to orient themselves while on the beach and assist in locating light sources. The daytime survey occurred 3 April 2015. The purpose for the daytime survey was to allow surveyors to identify potential light sources that would be reexamined during nighttime surveys. These surveys occurred both along the beach face and behind the rear dunes. If allowed, photographs of potential light sources were taken for referral purposes and for inclusion into reports.

The pre-nesting season nighttime surveys was conducted on 15 April 2015. The nighttime survey consisted of at least two surveyors walking the beach at night above the water line in the swash zone. Both direct and indirect light sources were identified. Identification included the classification of the type of light source and GPS coordinates or map location of the actual light source. Survey forms were completed to document building number, parking area, or other identifiers of the location on the installation. The number of lights, type, color, and potential disruption (as reviewed in Witherington and Martin [2003]) were also included in the survey forms.

The post-nesting/hatching season survey was accomplished on 10 October 2015 starting at 0030 hours. The beach survey began on the northern portion of VAARNG-CP beach leased to the City of Virginia Beach and was completed at the installation boundary with NASO-DNA. Surveyors used maps generated from previous surveys to identify any changes that may have occurred from previous surveys. Any lights that were identified from beach surveys were located and characterized by observed impact, type of fixture, type of light, and specific location of the light source.

4.2.1.2 Results

Three light sources on VAARNG-CP are visible from the beach, one direct and two indirect. The direct light source consisted of a small, solar-powered LED flood lamp mounted on one of the fence post that illuminates a small US flag mounted on an adjacent post and the indirect sources are two wall-mounted area lights that illuminate the top wall and roof peak of the restroom facility on the parking lot leased to the City of Virginia Beach. The other light sources visible from VAARNG-CP beaches included the off-base residential areas on the northern edge of the base and the top of the radar dome located in the MACS-24 compound on NASO-DNA. General recommendations from the lighting survey report (DON 2015b) are included in this BA in Section 2.3 above and specific recommendations are included in the survey report (Appendix B).

5.0 EFFECTS OF THE ACTION

5.1 NEST RELOCATION

Nest relocation is a management technique used to protect nests that may be destroyed by environmental factors, such as erosion or repeated tidal inundation, or permitted human activities, such as military training activities, recreational uses, and beach nourishment during the nesting season. The relocation of eggs can be an effective conservation method for sea turtle populations where clutches would otherwise be lost and where populations require intervention (Pintus et al. 2009); however, nest relocation should only be conducted as a last resort when the nest is presumably doomed and only in cases where *in situ* protection is not possible because relocation may cause negative impacts to eggs and hatchlings (Wyneken et al. 1988; Mortimer 1999; NMFS and USFWS 2008; Sieg et al. 2011). While it has been reported in the southeastern US that no significant differences were detected between the hatch and emergence success of *in situ* and relocated loggerhead clutches (Bimbi 2009; McElroy 2009), other studies suggest relocated sea turtle nests had significantly lower hatch and emergence success than *in situ* nests (Eckert and Eckert 1990; Herrera 2006; Pintus et al. 2009; Sieg et al. 2011; Revuelta et al. 2014). Nest relocations can result in movement-induced mortality of embryos and adverse changes to embryonic development and hatching success due to changes in the egg chamber environment. The proposed nest relocation has the potential to affect sea turtles in the Action Area. The potential direct and indirect effects of nest relocations on sea turtles are discussed below.

5.1.1 *Movement-induced Mortality*

Nest relocating that is unnecessary or improperly executed can result in movement-induced mortality of embryos (Limpus et al. 1979). The manipulation of eggs during extraction, transport, and relocation of clutches exposes the eggs to rotational or vibrational movements which can negatively affect embryonic development and directly damage the eggs. Egg mortality increases with more severe handling and longer intervals between oviposition and movement (Miller and Limpus 1983). The embryonic membranes of older eggs are easily torn if the eggs are rotated or jarred (Mortimer 1999). Traditional protocols for nest relocation suggest that eggs should be moved within 12 hours of deposition (Limpus et al. 1979; Mortimer 1999); however, more recent studies of translocated loggerhead turtle nests indicate that careful (avoiding egg rotation) delayed translocation up to 96 hours after the eggs are laid does not negatively affect hatching success, incubation period, or hatchling size and mass (Abella et al. 2007). Movement-induced mortality may also be reduced via short-term cold exposure which slows or suspends development in turtles; cooling the eggs to 10 to 14°C (50 to 57°F) immediately following laying has been shown to prevent movement-induced mortality of loggerhead turtle embryos during the first 72 hours of incubation (Miller and Limpus 1983).

5.1.2 *Adverse Changes to Embryonic Development and Hatching Success*

Embryonic development and hatching success are influenced by the environmental conditions of the nest. Even though strict measures may be taken to develop suitable relocated nests, man-made nests may be of poorer quality compared to natural turtle nests and are likely to have different features than those chosen by the nesting female (Pintus et al. 2009). Compared to natural nests, relocated nests may have different substrate characteristics, such as grain size, density, compaction, organic content, and color, which may alter the nest environment leading to adverse effects on embryonic development and hatching success, particularly hatchling fitness and the natural sex ratios of embryos (Crain et al. 1995; Fisher et al. 2014; Revuelta et al. 2014). Embryos are vulnerable to extremes in three main environmental factors: moisture (including substrate humidity and salinity), gas exchange, and temperature (Ackerman 1980; Miller and Limpus 1983; Mortimer 1990; Georges et al. 1994; Ackerman 1997; Carthy et al. 2003).

Nests relocated into sand that is deficient in oxygen or moisture can lead to embryo mortality and the reduced behavioral competence of hatchlings. Eggs absorb water vapor from the surrounding sand soon after oviposition and increase in weight. Maintaining this initial mass is critical; eggs cannot survive to hatching if they lose more than 40 percent of this initial mass (Miller et al. 2003). Weight changes in the eggs are influenced by the hydrologic conditions of the beach, including salt and organic material and

substrate (Ackerman 1997). Optimum moisture levels are necessary for healthy embryo development and hatching success. Embryos exposed to wet conditions during development have longer incubation periods and grow to larger hatchling size than those exposed to drier conditions; however, high moisture levels can destroy entire clutches (McGehee 1990). The rate and growth of embryos is also related to the respiratory gas exchange between the eggs and the surrounding beach (Ackerman 1980). Gas diffusion is influenced by the water content and particle size of the sand (Ackerman 1980; Miller et al. 2003). Oxygen demand is higher near the end of incubation than during early developmental stages; therefore, inundation of the nest near the end of incubation could destroy the entire clutch (Miller et al. 2003). Maximum growth and hatching success occur when the respiratory environment of the clutch is similar to the oxygen levels of a natural nest. In addition, females build their nests in a way that equalizes gas exchange for all the eggs in the clutch; therefore, nest relocation must include measures to recreate as closely as possible the environment of the original nest (Ackerman 1980).

In addition to changes in the oxygen and moisture content, relocated nests may have different thermal conditions than *in situ* nests (Bimbi 2009; Pintus et al. 2009; Tuttle and Rostal 2010). This change in the overall temperature regime of the nest can cause skewed sex ratios (Morreale et al. 1982; Godfrey et al. 1997; Pintus et al. 2009; Sieg et al. 2011). Differences in sand type and shading of turtle nests affect the thermal environment of the embryos. In addition, changes in metabolic heating of the clutch can affect sex ratios (Broderick et al. 2001; Sieg et al. 2011). Metabolic heating is the difference between the sand temperature and the egg clutch incubation temperature due to metabolizing embryos and is influenced by clutch size, position in the nest, and number of live versus decomposing embryos (Broderick et al. 2001).

Incubation temperature has significant developmental effects on sea turtles, including affecting sexual differentiation and also affecting traits, such as locomotor abilities, that influence survival (Fisher et al. 2014). Sexual differentiation of sea turtle embryos is determined by egg incubation temperature, usually during the middle third of development (Limpus et al. 1985). Within fluctuating beach temperatures, the sex is determined by the proportion of development at a temperature and not by the duration of exposure to the temperature (Georges et al. 1994). The pivotal temperature varies between populations within a species (Limpus et al. 1985). In loggerhead turtles, the pivotal temperature is around 29°C (84°F) (Mrosovsky 1988; Wibbels 2003). According to LeBlanc et al. (2012), temperatures at or below 26°C (79°F) produce 100 percent males, temperatures at or above 30.5°C (86.9°F) produce 100 percent females, and temperatures falling between this range produce mixed sex ratios. Temperature also affects success of the clutch with high incubation temperatures causing an increase in embryonic mortality (Ackerman 1997; Broderick et al. 2001; Godley et al. 2001). Turtle embryos generally survive mean incubation temperatures up to 35°C (95°F), but leatherback and olive ridley (*Lepidochelys olivacea*) turtle embryos may be less tolerant of high incubation temperatures than green and loggerhead turtle embryos (Howard et al. 2014).

Hatchling sex ratios are important because they represent the pools from which future sex ratios will arise (TEWG 2009); therefore, any shifts in hatchling sex ratios can affect future generations of turtles if changes are extreme enough to impact productivity (TEWG 2009). The potential effects of clutch relocation at a population level are unknown but could be profound, particularly if fewer males are produced (Pintus et al. 2009). The largest US nesting subpopulation of loggerheads in Florida is known to produce mostly female hatchlings (TEWG 2009); however, beaches north of Florida seem to be important for the production and recruitment of male turtles into the overall western North Atlantic population (LeBlanc et al. 2012). For example, even during the warmest nesting seasons, more males were produced from nests in Georgia than nests farther south of this region (LeBlanc et al. 2012). Proper conservation techniques in this region should be implemented to facilitate the necessary recruitment of male loggerhead turtles into the overall western North Atlantic population (LeBlanc et al. 2012).

5.2 CUMULATIVE EFFECTS

Cumulative effects are those effects to ESA-listed species of future state, local, and/or private actions that are reasonably certain to occur on or near the Action Area. Future federal actions that are not related to the proposed action are not considered because they require separate Section 7 consultation.

5.2.1 Naval Air Station Oceana - Dam Neck Annex

Cumulative effects of actions likely to impact sea turtles on or near the Action Area include continued development of beaches adjacent to NASO-DNA and vessel interactions. Continued coastal development and the chronic pollution associated with development threaten sea turtles worldwide. Coastal development and urbanized coastal areas introduce threats to sea turtles and their habitats such as direct mortality, destruction of nesting beaches, light pollution, alteration of nearshore habitat, sedimentation, eutrophication, and the introduction of heavy metals and other contaminants (Horrocks and Scott 1991; Lutcavage et al. 1997; Witherington and Martin 2003; Witherington et al. 2006; Mortimer and Donnelly 2008; Kamel and Delcroix 2009; NMFS et al. 2011; Gallaway et al. 2013). All of these threats have the potential to affect sea turtles in the vicinity of NASO-DNA. In areas of high human population with a high volume of recreational and commercial boat traffic and active coastal ports, such as the Virginia Beach area, propeller strikes and vessel collisions pose a significant threat to sea turtles (NMFS 2009).

5.2.2 Virginia Army National Guard - Camp Pendleton

Cumulative effects of actions likely to impact sea turtles on or near the Action Area include continued development of beaches adjacent to VAARNG-CP and vessel interactions. Continued coastal development and the chronic pollution associated with development threaten sea turtles worldwide. Coastal development and urbanized coastal areas introduce threats to sea turtles and their habitats such as direct mortality, destruction of nesting beaches, light pollution, alteration of nearshore habitat, sedimentation, eutrophication, and the introduction of heavy metals and other contaminants (Horrocks and Scott 1991; Lutcavage et al. 1997; Witherington and Martin 2003; Witherington et al. 2006; Mortimer and Donnelly 2008; Kamel and Delcroix 2009; NMFS et al. 2011; Gallaway et al. 2013). All of these threats have the potential to affect sea turtles in the vicinity of VAARNG-CP. In areas of high human population with a high volume of recreational and commercial boat traffic, such as the Virginia Beach area, propeller strikes and vessel collisions pose a significant threat to sea turtles (NMFS 2009).

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6.0 DETERMINATION OF EFFECTS

6.1 NAVAL AIR STATION OCEANA - DAM NECK ANNEX

A determination of may affect but not likely to adversely affect has been made for the leatherback and hawksbill sea turtles from the implementation of the NASO-DNA Sea Turtle Management Program. As discussed in Sections 3.2.1.5 and 3.2.4.5, leatherback and hawksbill sea turtles have been recorded in the waters off of NASO-DNA, but no nests of either species have been documented on Virginia beaches. Leatherback sea turtles primarily nest on isolated mainland beaches in tropical and temperate oceans (NMFS and USFWS 1992) and to a lesser degree on some islands, such as the Greater and Lesser Antilles. The densest nesting on the US Atlantic coast occurs in Florida (Stewart and Johnson 2006) with sporadic nesting in Georgia, South Carolina, and North Carolina (Rabon et al. 2003). Reports of hawksbill sea turtles in the waters off the Virginia coast are rare with only four recorded sightings since 1991 (see Section 3.2.4.5). Hawksbill sea turtles nest in the Caribbean along the Yucatán Peninsula, Mexico; smaller nesting assemblages are found in Belize, Nicaragua, Panama, Venezuela, Cuba, Antigua, and the Grenadines (NMFS and USFWS 1993). While hawksbill sea turtles are found in Virginia waters and strandings have been documented on Virginia beaches, nesting along the continental US is restricted to southern Florida and the Florida Keys (Dodd 1995).

Based on the known potential impacts of nest relocation and the previous confirmed records of nests on Virginia beaches, it is determined that the proposed action may affect and is likely to adversely affect the loggerhead, green, and Kemp's ridley sea turtles. All three of these species have previously nested on Virginia beaches, and both loggerhead and Kemp's ridley turtles have nested on NASO-DNA beaches. A total of two loggerhead nests were recorded on NASO-DNA in 1992 and 2002, and one Kemp's ridley nest was recorded at NASO-DNA in 2012. Although the conservation measures to be implemented (see Section 2.2) do include the monitoring of nesting sea turtles and nests, nest protection, and careful protocols for nest relocations to increase the potential for successful nesting and hatching of sea turtles over that of not taking any management actions, relocation of turtle nests does pose the potential for nest failure and may cause incidental takes of these turtle species. Based on this determination, NASO-DNA requests initiation of formal consultation pursuant to Section 7 of the ESA.

6.2 VIRGINIA ARMY NATIONAL GUARD - CAMP PENDLETON

As discussed in Section 2.1.2, VAARNG-CP has a verbal agreement in which NASO-DNA would conduct beach patrols. NASO-DNA beach patrols survey the VAARNG-CP beach to the leased property boundary and use binoculars to survey the remaining beach. In the event that a crawl or potential nest is located, the patrol will contact the NASO-DNA NRM who, in turn, contacts the VAARNG-CP NRM. Notification is passed up to the VAARNG-CP command staff. The VAARNG NRM also ensures that the USFWS, VDGIF, and the VAST are notified as appropriate. The VAARNG-CP NRM will consult with these agencies to determine the appropriate actions and who will be responsible for relocation and to where the nest would be moved or for nest management if the nest is left *in situ* or relocated on VAARNG-CP. Nest management and relocation activities would be done in accordance with the 2015 Virginia Sea Turtle Nesting Handbook (Virginia Bureau of Wildlife Resources 2015).

A determination of may affect but not likely to adversely affect has been made for the leatherback and hawksbill sea turtles from sea turtle management actions on VAARNG-CP. As discussed in Sections 3.2.1.5 and 3.2.4.5, leatherback and hawksbill sea turtles have been recorded in the waters off of VAARNG-CP, but no nests of either species have been documented on Virginia beaches. Leatherback sea turtles primarily nest on isolated mainland beaches in tropical and temperate oceans (NMFS and USFWS 1992) and to a lesser degree on some islands, such as the Greater and Lesser Antilles. Reports of hawksbill sea turtles in the waters off the Virginia coast are rare with only four recorded sightings since 1991 (see Section 3.2.4.5). Hawksbill sea turtles nest in the Caribbean along the Yucatán Peninsula, Mexico; smaller nesting assemblages are found in Belize, Nicaragua, Panama, Venezuela, Cuba, Antigua, and the Grenadines (NMFS and USFWS 1993).

Based on the known potential impacts of nest relocation and the previous confirmed records of nests on Virginia beaches, it is determined that the proposed action may affect and is likely to adversely affect the loggerhead, green, and Kemp's ridley sea turtles. All three of these species are documented as having previously nested on Virginia beaches. A loggerhead nest was confirmed on a VAARNG-CP beach in August 2015 (R. Boettcher, VDGIF, unpublished data) and loggerhead and Kemp's ridley turtles have nested on adjacent NASO-DNA beaches. Although the conservation measures to be implemented (see Section 2.1) do include the monitoring of nesting sea turtles and nests, nest protection, and careful protocols for nest relocations to increase the potential for successful nesting and hatching of sea turtles over that of not taking any management actions, relocation of turtle nests does pose the potential for nest failure and may cause incidental takes of these turtle species. Based on this determination, VAARNG-CP requests initiation of formal consultation pursuant to Section 7 of the ESA.

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APPENDICES

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Appendix A

Standard Operating Procedures for Sea Turtles, Naval Air Station Oceana – Dam Neck Annex

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STANDARD OPERATING PROCEDURES
FOR SEA TURTLES
Naval Air Station Oceana - Dam Neck Annex
VIRGINIA BEACH, VIRGINIA

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Acronyms

ATV = All-Terrain-Vehicle

BBNWR = Back Bay National Wildlife Refuge

CLEO = Conservation Law-enforcement Officer (“Game Warden”)

DNA = Dam Neck Annex

ESA = Endangered Species Act

GPS = Global Positioning System

INRMP = Integrated Natural Resources Management Plan

NASO = Naval Air Station Oceana

NEST = Network for Endangered Sea Turtles

NMFS = National Marine Fisheries Service

NRM = Natural Resources Manager

PPE = Personal Protective Equipment

SOP = Standard Operating Procedures

USFWS = United States Fish & Wildlife Service

VA = Virginia

VAANG-CP = Virginia Army National Guard – Camp Pendleton

VAST = Virginia Aquarium Stranding Team

VDGIF = Virginia Department of Game and Inland Fisheries

VMSM = Virginia Marine Science Museum (now know as the Virginia Aquarium & Marine Science Center)

Introduction

This document provides the standard operating procedures (SOP) associated with managing Naval Air Station Oceana's (NASO) sea turtle program.

There are 5 species of sea turtles known off of the coast of NASO and NASO Dam Neck Annex (DNA), in southeastern Virginia: Green (*Chelonia mydas*); Hawksbill (*Eretmochelys imbricata*); Kemp's ridley (*Lepidochelys kempii*); Leatherback (*Dermochelys coriacea*); and Loggerhead (*Caretta caretta*). Of these 5 species 3 are known to have successfully nested along the coast of southeastern Virginia: Loggerhead, Kemp's ridley, and Green. Both the Loggerhead and the Kemp's ridley have been documented as nesting on NASO DNA. Leatherback sea turtles are known to have nested in North Carolina, but have yet to be documented nesting in Virginia. All 5 species of turtles have been documented as strandings in southeastern Virginia.

The NASO shoreline does not have typical suitable nesting habitat, but could have random stranding occurrences, particularly associated with tidal wash-up during storm events. The NASO DNA coastline (~4 miles) provides suitable nesting habitat and annually reports sea turtle strandings.

NASO and United States Fish & Wildlife Service (USFWS) Back Bay National Wildlife Refuge (BBNWR) work cooperatively to manage the sea turtle program at NASO DNA. The guiding documents associated with this cooperative working partnership are the Endangered Species Act (ESA), the NASO DNA Integrated Natural Resources Management Plan (INRMP) mandated by the Sikes Act (available upon request), the BBNWR Biological Opinion as amended on 25 May 2012 (Appendix A), and the 2008 NASO & BBNWR nest relocation agreement (Appendix B).

NASO staff and authorized associates perform daily sea turtle patrols to locate nests, crawls, and strandings at NASO DNA and Virginia Army National Guard-Camp Pendleton (VAARNG-CP) during the sea turtle nesting season. For nests located on NASO DNA, NASO and BBNWR biologists collaboratively determine if a nest should be left in place (in situ) or relocated. Relocated nests are buried on the closest adjacent land suitable site available to the originating nest location or to an established beach front nursery site on NASO DNA or BBNWR. The nests are protected by a predator enclosure that allows for unattended hatching and release of hatchlings. Nests are checked daily and are more closely monitored when the estimated hatching date approaches.

Nests located on VAARNG-CP property are collaboratively managed between BBNWR and VAARNG-CP biologists. NASO staff will notify both BBNWR and VAARNG-CP biologists if a crawl is located on their property.

All observed turtle strandings on NASO DNA and VAARNG-CP will be reported to the VA Aquarium Stranding Team (VAST).

Lighting assessments starting in 2015 are planned to be completed every 5 years (appendix J) to identify and address on installation lighting concerns associated with sea turtles.

Projects, training, and other activities on NASO DNA are reviewed to determine potential impacts to sea turtles and guidance is provided to minimize and or avoid identified concerns (appendix L)

Turtle Patrols

General Information

Morning patrols for nesting sea turtle crawls and nests, as well as for marine mammal and sea turtle strandings are conducted from 15 May through 31 Aug on NASO DNA and VAANG-CP. NASO Natural Resources staff and other authorized individuals conduct the patrols.

Patrollers attend a training session on turtle patrol procedures and crawl recognition (Appendix C). In addition to the patrol procedures training, ATV safety training presented by a Navy designated safety trainer is required for all volunteers, interns, and staff who will be operating an ATV or utility vehicle (refresher training required every 5 years). Patrols are done by ATV, or other four/all-wheel drive vehicle as approved by the installation Natural Resources Manager (NRM).

Appendix D provides a map of the NASO DNA patrol area. Due to Military Mission requirements the North end of NASO DNA is patrolled 1st (north of the building 127 beach access).

Patrollers arrive on site no-later-than 30 minutes prior to sunrise as identified by the Sunrise/Sunset table (Appendix E). If patrols start before daylight, headlights of vehicles will be covered with red filters before proceeding onto the beach. Patrollers first scout the beach along the water's edge looking for turtle crawls and strandings. Patrollers then return along the middle beach looking for crawls and high tide line strandings. Due to the narrow beaches and potential for nesting Piping plover, patrollers do not patrol above high tide line. If a stranded sea turtle or a crawl is sighted, procedures outlined in crawl and nest procedures section of this SOP are followed.

While on patrol, patrollers concurrently scout for and identify any unauthorized vehicles, temporary artificial lighting or other beach activities that may interfere with turtles. If such items are identified patrollers should notify base security, the conservation law-enforcement officer/"Game Warden" (CLEO), and the installation NRM. Security or the CLEO will escort any unauthorized vehicles, with headlights turned off, from the beach and will address any other concerns as appropriate referring to the appropriate Executive Order 11989, ESA, the Coastal Zone Management Act, or other regulatory document as appropriate.

At the completion of each patrol, the patroller records patrol information in the Sea Turtle Patrol Log (Appendix F). BBNWR employees respond as soon as possible to nest/crawl reports made by or relayed to BBNWR staff, volunteers, visitors, and partnering agencies.

Equipment and Supplies

- All-Terrain-Vehicle (ATV)
 - The patroller is responsible for wearing appropriate personal protective equipment (PPE). PPE includes but is not limited to: eye protection, safety vest, helmet, gloves, hearing protection, closed toed shoes, long shirt, long pants, and scarf under the helmet (for personal hygiene when sharing helmets). **A helmet must be worn ANY time an ATV is operated.**
 - Before patrol begins individuals should inspect the ATV and ensure:
 - ATV has adequate fuel, oil, and brake fluid levels. If not then those fluids should be filled appropriately.
 - ATV has adequate tire pressure for patrolling on the beach, if not adjust tire pressure accordingly.
 - ATV's nuts, bolts, toolbox, wiring, etc. are adequately secured.
 - ATV lights and gauges are working appropriately.
 - ATV lights if on beach before daylight are covered with red film/lens.
 - After patrol is completed individuals should inspect the ATV and ensure:
 - ATV is rinsed off daily after exiting the beach to minimize damage to the equipment from salt and sand.
 - ATV is refueled after each usage, if fuel gauge drops below ½ full.
 - ATV did not become damaged during patrol and all equipment/controls are in full working order.
 - ATV is stored and locked in the Natural Resources ATV storage shed behind Building 127.
 - ATV issues are documented on the patrol log and reported to the Natural Resources Manager.
- Turtle Patrol Log Book
 - Includes:
 - Data Sheets
 - Access & Notification Procedures (Contact List)
 - Copy of appropriate SOPs
 - Crawl and Turtle Identification Guide
 - Patrol Calendar
 - Brochures
- ATV Toolbox
 - Ensure before leaving on patrol that all required supplies/equipment are present and replace used items once patrol is completed)
 - Pens & Pencils
 - Latex gloves
 - Goggles
 - Hearing Protection
 - Helmet
 - Safety Vest
 - Tire gauge
 - Bright colored wire flag markers to flag off nest
 - Bags for trash and other various uses
 - First aid kit

- Paper towels
- Large hook to drag dead stranding to high beach
- “Do Not Cross” tape and pink tape to flag off turtle crawl/nest
- Digital camera
 - Check Battery Status after each patrol. If Low swap battery out with charged battery kept by Natural Resources Manager.
- GPS unit with extra batteries
- Binoculars
- Fluorescent orange spray paint (used for remarking previously spray painted turtles whose paint has degraded to a point where it is or will quickly become hard to identify that that turtle has already been reported and recorded)
- Storage Shed
 - ATV
 - Fuel (kept in appropriately marked Navy Authorized Storage Container)
 - Oil (kept in appropriately marked Navy Authorized Storage Container)
 - Restocking Supplies for ATV Toolbox
 - Response Equipment (Signs, Cages, Posts, Post-hole Pounder, Auger, Wire, Fencing, ATV Loading Ramp, Spot-light with Red-cap, live stranding Cooler, towels, live stranding shade tent/umbrella, Shovels, Rakes, Nuts & Bolts, foldable chairs, etc.).

Sea Turtle Strandings

All stranded turtles on NASO DNA and VAANG-CP are reported to the VA Aquarium Stranding Team (VAST), formerly the Virginia Marine Science Museum (VMSM), at 757-385-7575 (during business hours 0830-1630) or at 757-385-7576 (during afterhours for live stranding emergencies) .

Notifications regarding strandings found elsewhere in Virginia Beach, VA are referred to BBNWR and VAST.

Notifications regarding strandings found in North Carolina are referred to the North Carolina Aquarium’s Network for Endangered Sea Turtles (NEST) team at 252-441-8622.

See Appendix G for details regarding all marine animal stranding reporting procedures.

Dead Strandings

The procedures for dead strandings found on NASO, NASO DNA and VAARNG-CP are as follows:

- 1) If turtle is already spray painted, the turtle is not reported.
- 2) If spray paint is not seen on turtle, report turtle to the VAST at 757-385-7575 and the NRM at 757-433-3461. Ensure you relay day, time of finding, base name, location (preferably GPS point and physical location description), your name and contact information. If sea turtle is in the surf drag it up onto the beach so that it does not wash away before VAST arrives on the scene. Be sure to document on

the datasheets and notify VAST that the turtle was originally located in the surf and dragged up onto the beach.

- 3) Assist, as needed, the VAST with access to the stranding.
- 4) Assist, as needed/as able, the VAST with data collection and removal of the stranding.
- 5) Complete Turtle patrol log & appropriate other datasheets, include location description, GPS location, and note if pictures were taken (pictures should be taken and sent to the installation NRM). All other data will be obtained and recorded by the responding VAST personnel on a standard National Marine Fisheries Service (NMFS) sea turtle stranding form.

Live Strandings

The procedures for live strandings found on NASO, NASO DNA and VAARNG-CP are as follows:

- 1) If it is a hatchling, VAST and installation NRM is contacted. The turtle is kept in a moist dark environment until further instructions are given.
- 2) If the turtle is injured, VAST and installation NRM is contacted. The turtle's nose and eyes are kept moist and the body kept shaded, while the patroller awaits further instructions.
- 3) If the turtle is uninjured determine if it is a stranding or a nesting attempt. If it is a nesting attempt follow procedures in crawl and nest procedures section of this SOP. If it is a stranding, VAST and installation NRM should immediately be contacted. The patroller awaits further instructions.
- 4) If the turtle is in the water, no attempt is made to catch it. If the turtle appears to be in distress, VAST and installation NRM is contacted. As much information as possible is collected and recorded on the appropriate logs and is reported to VAST.
- 5) Assist, as needed, the VAST with access to the stranding.
- 6) Assist, as needed/as able, the VAST with data collection and removal of the stranding.
- 7) Complete Turtle patrol log & other appropriate datasheets, include location description, GPS location, and note if pictures were taken (pictures should be taken and sent to the installation NRM). All other data will be obtained and recorded by the responding VAST personnel on a standard NMFS sea turtle stranding form.

Note: If a live stranding is found while conducting nesting sea turtle patrol, immediately call in the stranding to VAST and the installation NRM with all appropriate information. After notifying VAST and installation NRM, continue and complete the nesting turtle patrol. After completing the turtle patrol collect live stranding supplies from the storage shed and proceed back to the turtle to provide the turtle appropriate protection until VAST can arrive on the scene. If the turtle is a hatchling, you should collect it on the spot and place it in the hatchling cooler with moist sand (no standing water) and continue on your patrol, be sure to let VAST know where to meet you to pickup the hatchling. [If

another natural resources staff member is available, they can be called in to assist with either completing the patrol or taking care of the live stranding situation.]

Crawl and Nest Procedures

General Information

A crawl is the entry and/or exit flipper and drag markings/impressions left in the sand from a sea turtle exiting and entering back into the Ocean, crawling up and off of the beach. The crawl area includes the entry, and exit crawl and any nesting area.

The nesting area is the disturbed area (“body cavity”) created by the turtle as she digs a hole, deposits and buries eggs, and turns away from the dunes towards the ocean for reentry. Usually there is mounded sand, as well as a flattened area. Sometimes sand disturbance from turning looks like a nesting area. In this case, hard sand usually with unbroken layers of dark sand can be found underneath the softer, disturbed sand. A crawl without any evidence of an attempt to dig a hole is termed a “false crawl.” A crawl that contains a nesting area that does not contain eggs is termed a “false nest.”

When a nesting or crawling turtle is encountered, usually spotted by a crawl observed in the ATV path, patrollers/responders immediately extinguish the headlights and park the ATV at a safe distance from the turtle. Patrollers should take extreme care to not startle turtle(s) and to stop anyone else from entering into the turtle nesting/crawling area. Patrollers should keep a good distance away from the turtle until the turtle has either engaged in egg laying or is returning to the surf. Patrollers cordon off the area from access, record the time the turtle was first spotted, GPS the nest location, determine whether the individual is carrying tags and record any tagging information or identifying characteristics, and take pictures from a distance (only if no flash is required or a picture can be taken utilizing an infrared lens, **NO WHITE LIGHT FLASHES**).

Patrollers report the nesting activity immediately to BBNWR and the installation NRM, and then continue all other required notifications. Other notifications may include but are not limited to range control, security, VA Department of Game and Inland Fisheries (VDGIF) sea turtle program manager, Command Duty Officer, Public Affairs Officer, Installation Environmental Program Director, Public Works Officer, etc.

When a sea turtle crawl is found, BBNWR employees will respond as quickly as possible following notification. All crawl and nest sightings are recorded on the Nest and Crawl Data Sheet (Appendix H).

Once appropriate notifications have been made, area marked, and immediate need data collected the patroller should complete the remainder of the patrol to determine if any other potential nesting activity occurred on base. If the turtle is in the process of digging a body cavity, she will most likely attempt to nest. Once active egg laying begins, to save time place a marker (survey flag) at least one foot behind the cavity to indicate the position of the nest, before continuing patrol. If additional nesting activity is identified, the same process should be followed as for the original nest. The patroller should request

additional support to aide in protecting crawls and nests until BBNWR staff can get on site to obtain appropriate biological data. **No one is allowed to enter into the nest/crawl area until authorization has been given by USFWS or the installation NRM.**

BBNWR, in support of an agreement with the Virginia Aquarium (formerly the Virginia Marine Science Museum), retains four hatchlings from the first successful loggerhead sea turtle nest they manage. These hatchlings are transferred to the Virginia Aquarium and used in an exhibit for about one year. After that time, they are transported by boat to the Gulf Stream and released.

BBNWR, in support of an agreement with Warnell School of Forestry and Natural Resources at the University of Georgia, collects a single egg from nests. These eggs are used as part of the “Genetic Mark-Recapture of the Northern Recovery Unit (GA, SC, NC [and VA]) and Mitochondrial Genomics for Characterizing Genetic Structure of Loggerhead Turtles” project/study. **The project duration is from 01 June 2010 to 31 May 2013.** Detailed information regarding this project is available upon request.



Crawl Procedures

BBNWR and Virginia Department of Game and Inland Fisheries (VDGIF) will be notified if a crawl is found on property.

BBNWR employees will respond immediately to reports of crawls and/or nests.

BBNWR Procedures are as follows:

- 1) Upon notification of a crawl, BBNWR staff will collect required equipment and supplies to respond to the site. Equipment will be utilized for biological data collection, protecting the nest and if required relocating the nest.
- 2) The perimeter of the entire nesting area (including incoming and outgoing tracks) is marked with wire flags. *(may be completed in advance by Navy staff)*
- 3) If necessary, the area is cordoned off with flagging to keep the public off of the tracks and possible nesting area. *(may be completed in advance by Navy staff)*
- 4) The data required in Section I, II, and III of data sheet is collected (Appendix H). This includes the date, weather conditions, names of observers, and crawl measurements. Track width measurements are taken from the lower, wetter portions of the beach where flipper impressions are more noticeable. Time of emergence from the ocean and return is estimated based on tide marking and tide tables.
- 5) A GPS location for the nest area is obtained.
- 6) The crawl is photographed. A small dry-erase board noting the date, crawl number, location, and so forth is included in every photo.
- 7) BBNWR biologist will make a determination if the site is a false crawl, false nest, or if a nest is present. BBNWR biologist will examine any nest body cavities by carefully digging out any body cavities to determine if eggs are present. (See Nest Procedures Section of this SOP for additional details.)
 - a. The BBNWR biologist will closely examine any circular, indented or mounded areas within the nesting area for front flipper impressions to

determine how the turtle was positioned when she laid the clutch of eggs before stepping near or inside it.

- b. If flipper impressions are found, the area directly opposite them will be targeted as the most probable nest location and will be excavated first.
- c. If impressions are not found, the flattened circular area at the end of the tracks will be targeted, followed by other flattened areas.
- d. The nest will be carefully excavated by hand to ensure eggs (if present) are not damaged. The observer will usually find a small, soft section of sand, unlike the surrounding harder sands. Eggs are usually a few inches below this soft, 2"-3" opening, so extreme care must be taken.

Nest Procedures

The BBNWR biologist and installation NRM will jointly make a determination regarding the status of the nest [nest relocation or left in place (In Situ)].

Appendix K depicts the Sea Turtle Nest Management Zones for NASO DNA.

VDGIF will be notified of any nest relocation or excavation efforts.

This determination is made by examining many factors associated with the nest location, such as: height on the beach (preferably close to the toe of the dunes), above average high tide line (regular inundation by water will result in embryonic mortality); width of the beach; amount of public use; located in a military training area; area susceptible to erosion; and sloughing escarpment (susceptible to being buried too deep). If the nest is at risk from several wash-overs during high tide, and/or the beach has a lot of public use the nest will be relocated. If the nest is located well above the high tide line, and in an area with a low amount of public use, then the nest will be left in situ, unless there are other extenuating circumstances. If, for any reason, the BBNWR Biologist or installation NRM determines that the nest will be in danger of destruction if left in place, the nest will be relocated to a safer location on the closest available suitable adjacent land.

In Situ Nests

Nests located in undisturbed, wide, high, beach areas adjacent to the toe of the dunes, will be left in situ. Each nest will be protected from predators by a wire predator enclosure.

The nest will be surrounded by informational signs, wire, flagging, and reflectors to educate the public, deter human disturbance and alert permittees driving on the beach.

The nest will be checked daily to ensure no unauthorized disturbance of the nest has been made, to determine if hatching has commenced, and to document any signs of predatory disturbance and plant or pest invasion. No later than ten days before the estimated hatch date, nest sitting/monitoring procedures will be implemented (Appendix I). Nest sitting is the process where individuals watch over the nest nightly until the nest has been confirmed via excavation that no further hatching will occur from that particular nest.

Individuals conducting nest sitting are called nest sitters. The nest sitters help protect emerging sea turtle hatchlings from predators as the turtles make their way to the ocean.

Two to three weeks after the hatchlings have emerged and no more signs of hatching are present, the nest will be excavated and data will be collected. In situ nests threatened by hurricanes or storms with expected beach erosion may be relocated to the next approved most suitable adjacent ocean front beach property.

BBNWR procedures are as follows:

- 1) Once eggs have been determined present and the nest identified to stay in place, the depth from beach surface is measured (using a board placed level with the sand surface, over the nest), to the top of eggs, with a tape measure.
- 2) The nest is then covered back up ensuring sand is placed back over the eggs in the same order as removed (moist sand first).
- 3) Eggs are left in place to naturally hatch out.
- 4) Once all data has been recorded, the tracks will be raked over.
- 5) The nest will be excavated two to three weeks after the majority of hatchlings have emerged. Hatchlings may continue to emerge for two weeks after initial emergence. Data on remaining unhatched eggs including developmental stage will be recorded. Dead hatchlings and infertile eggs will be frozen in the BBNWR biology freezer.

Relocated Nests

Excavating Nests

If it is determined necessary to move a nest, it will be relocated to either a suitable ocean front beach nursery site on NASO DNA or to the nearest approved suitable adjacent land to the originating nest location. If conditions change at NASO DNA and there are no suitable nest relocation sites available on the installation or on immediately adjacent land owner property nests will be relocated to a designated nursery site at BBNWR.

- 1) The BBNWR biologist will closely examine any circular, indented or mounded areas within the nesting area for front flipper impressions to determine how the turtle was positioned when she laid the clutch of eggs before stepping near or inside it.
- 2) If flipper impressions are found, the area directly opposite them will be targeted as the most probable nest location and will be excavated first.
- 3) If impressions are not found, the flattened circular area at the end of the tracks will be targeted, followed by other flattened areas.
- 4) The nest will be carefully excavated by hand to ensure eggs (if present) are not damaged. The observer will usually find a small, soft section of sand, unlike the surrounding harder sands. Eggs are usually a few inches below this soft, 2"-3" opening, so extreme care must be taken
- 5) Before the eggs are removed, the depth from beach surface is measured (using a board placed level with the sand surface, over the nest), to the top of eggs, with a tape measure.
- 6) Using excavated sand from the original nest, a 2" layer of sand will be placed in the bottom of a cooler.
- 7) Keeping exposed eggs shaded with an umbrella, the BBNWR biologist will remove them individually from the nest being careful not to rotate the eggs. They will be placed into the cooler with a 1" border of sand between the eggs and cooler. The eggs will be placed in the cooler in a methodical and consistent manner with note taken of the order. The number of eggs in each layer will be counted and recorded. Eggs will be packed in such a manner that they are not

- touching and with two inches of sand between each layer of eggs. With large nests, a second cooler will be needed.
- 8) After all eggs are removed, the "bottom nest depth," (the depth from board level with sand surface, to bottom of empty nest) is measured. The length and width of the nest cavity at the widest and longest points is also measured.
 - 9) Once all eggs are placed in the cooler, extra sand from the nest is placed over them, and also into a separate container. This sand will be used to surround the reburied eggs at the nursery site.
 - 10) Once all data has been recorded, the tracks will be raked over and the nest cavity refilled
 - 11) Eggs will be kept at a moderate temperature, out of direct sunlight, and jolting or shifting will be avoided during the trip to the nursery.

Items Needed for Nest Response/Relocation

BBNWR equipment for nest response/relocations (Navy equipment is identified under the Equipment and Supplies section of this SOP):

- Coolers (3)
- Aluminum wire (40 feet)
- In-situ predator exclosure
- Relocation predator exclosure
- Shovels (3)
- Umbrellas (2)
- Measuring tape (40 meter)
- Post hole diggers (2)
- Dry erase board and markers (2)
- Rake
- Digital camera and extra batteries
- Extra hand-held radio and cellular phone
- Pen and notepad
- Nest and Crawl data sheet
- Black indelible marker (to mark nest # on cage)
- Wire flags
- BBNWR Sea turtle nest box
- BBNWR Sea turtle patrol box

Nest Relocation

BBNWR procedures:

- 1) At the designated relocation site a hole is dug with a shovel that will allow the reconstruction of the original nest dimensions with sand from the originating nest.
- 2) The bottom and sides of reconstructed nest cavity will be filled with sand from original nest and compacted firmly. Dry sand will be prevented from entering the cage while the shape and size of the original nest is recreated as closely as possible. The remainder of the relocated nest cavity is filled with the extra sand brought from the original nest.
- 3) The same person who removed the eggs from the original nest will transfer the eggs from the cooler(s) to the nest-cage. **THE EGGS WILL NOT BE ROTATED**

- or packed tightly. Eggs will be placed into the nest-cage in the reverse order in which they were removed from the original nest. For example, the first egg put in the cooler will be the last one to go into the cage.
- 4) For any eggs that are broken how the break occurred is recorded, and a copy of the nest data sheet is included in the freezer with the specimens.
 - 5) Once the nest is in place and fully buried a trench will be dug around the nest cavity in which to place and secure the predator enclosure cage. This is the same cage utilized for in situ nests. The cage allows hatchlings to hatch and be released without human assistance. The nest number will be affixed to the top of the cage.
 - 6) Once predator enclosure is in place, for nests not located in a nursery site a large post with sea turtle information and protection notices will be placed on all 4 sides of the nest, approximately 1-2 feet away from the cage. If a nursery site is established the nursery site will be posted and cordoned off, as such each individual nest will not receive posts and signs.
 - 7) The Nest and Crawl Data Sheet is completed and placed in the turtle nest binder in the office with photos of the nest and crawl.
 - 8) Once data collection is completed, all foot prints/tracks leading from the beach into the dunes are smoothed out with grass rakes and/or boards to reduce the chance of curious members of the public following the tracks from the beach to the nest.

Nest Monitoring

After an appropriate length of incubation (40 days for Kemps Ridley and 50 days for Loggerhead and Green sea turtle nests), **nests will be monitored** via 2 daytime nest checks and overnight “nest sitting,” in approved zones (figure 1). Day time checks will be made once in the morning and once in the afternoon. Nest sitting will occur from 8PM to 5AM. Day and night checks are looking to initially identify a cone shaped depressions in the center of the nest and for evidence of prior/undocumented emergence. The time a depression is first seen is recorded on the Hatching Data Sheet, as well as on the original Nest Data Sheet.

The majority of nests hatch out at night. Nest sitters prepare the path to the surf, count the hatchlings and protect the hatchlings from predators such as gulls, raccoons, ghost crabs and foxes.

See Appendix I for detailed Standard Operating Procedures for Nest Monitoring.

Release of Hatchlings and Nest Excavation

When hatchlings begin emerging, Navy and BBNWR personnel will be contacted immediately. Hatchlings from in situ nests will be counted and observed.

The emergence time will be recorded on the Hatching Data Sheet.

The hatchlings will be allowed to crawl to the ocean on their own. It is very important that the hatchlings make this journey without assistance. Observers will frighten off any potential predators, if necessary.

The nest will be excavated two to three weeks after the majority of hatchlings have emerged. Hatchlings may continue to emerge for two weeks. The final judgment lies with Refuge Biologist. Data on remaining unhatched eggs including developmental stage will be recorded. Dead hatchlings and infertile eggs will be frozen in the biology freezer located in the brick building.

See Appendix I for detailed SOP for nest monitoring and hatchling release procedures.

Appendix A
Biological Opinion



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Ecological Services
6669 Short Lane
Gloucester, Virginia 23061

MAY 25 2012

Mr. W. David Noble
Director, Environmental Planning and Conservation
Department of the Navy
Navy Region Mid-Atlantic
1510 Gilbert Street
Norfolk, Virginia 23511-2737

Attn: Ben McGinnis, Environmental Planning and Conservation

Re: Section 7 Consultation on Repairs to
the Shoreline Protection System at
Naval Station Oceana, Dam Neck
Annex, Virginia Beach

Dear Mr. Noble:

On November 3, 2012, the U.S. Fish and Wildlife Service (Service) delivered our response to the Biological Assessment (BA) prepared by the Navy for the referenced project and its effects on the federally listed endangered roseate tern (*Sterna dougallii dougallii*) and the federally listed threatened Atlantic piping plover (*Charadrius melodus*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and seabeach amaranth (*Amaranthus punilus*) in accordance with section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA). In our November 3, 2012 response, the Service concurred with the Navy's determination of may affect, but is not likely to adversely affect for the roseate tern and seabeach amaranth. The Service requested that the Navy address concerns regarding proposed management for loggerhead sea turtles, green sea turtles, and piping plovers.

In a letter dated April 20, 2012, the Navy requested the Service's concurrence with the determination of may affect, but is not likely to adversely affect for the loggerhead sea turtle, green sea turtle, and piping plover based on modifications made by the Navy to their Integrated Natural Resource Management Plan (INRMP). Additionally, the Navy requested the Service's concurrence with a no effect determination for nesting federally listed endangered leatherback sea turtle (*Dermochelys coriacea*), hawksbill sea turtle (*Eretmochelys imbricate*), and Kemp's ridley sea turtle (*Lepidochelys kempii*). The Service concurs with the Navy's no effect determination for these three species of sea turtle because no records of nesting attempts by these species have been documented in Virginia.

Regarding loggerhead and green sea turtles, the Navy's INRMP includes a Sea Turtle Monitoring Protocol section, which sets criteria for daily monitoring of nesting sea turtles and nests, nest protection, and nest relocations. The Navy has agreed to leave nests in situ rather than

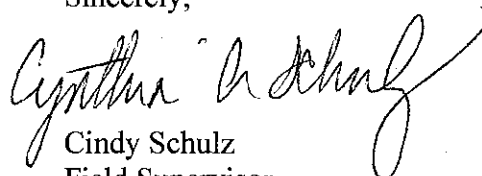
relocating nests, only moving nests when operational uses of the beach would result in the take of a nest. In such cases, the Navy will coordinate with the Service's Back Bay National Wildlife Refuge (NWR). All nest relocations by the Navy will be conducted in accordance with the methods outlined in the July 13, 2011, biological opinion issued to Back Bay NWR (copy enclosed) that provides ESA compliance for such activities at False Cape State Park, Back Bay NWR, Sandbridge Beach, Virginia Beach Resort Area, and Fort Story.

The Service does not concur with the Navy's determination of may affect, but is not likely to adversely affect for nesting loggerhead and green sea turtles, because take of turtles may occur. However, this letter amends the Loggerhead Sea Turtle Nest Monitoring and Management on Back Bay NWR biological opinion issued by the Service on July 13, 2011, to add Naval Station Oceana, Dam Neck Annex. This letter will be appended to that biological opinion and maintained as part of the decision document and administrative record. The biological opinion, this amendment, and the criteria in the INRMP together provide ESA compliance for the Navy related to monitoring of nesting sea turtles and nests, nest protection, and nest relocations for both loggerhead and green sea turtles that may occur at Naval Station Oceana, Dam Neck Annex.

The Navy has included in their INRMP guidelines for migratory bird monitoring and management. The INRMP includes protocols to ensure surveys and daily observations during sea turtle nesting periods will include monitoring for both piping plover and the federal candidate red knot (*Calidris canutus rufa*). There are no records of piping plovers nesting on beaches south of the Chesapeake Bay, where the species is considered to be an uncommon transient. Because it is unlikely that the piping plover will utilize this area and the monitoring protocols will be implemented, the Service concurs with the Navy's determination of may affect, but is not likely to adversely affect for piping plovers.

If you have any questions, please contact Mike Drummond of this office at (804) 693-6694, extension 122, or via email at mike_drummond@fws.gov.

Sincerely,



Cindy Schulz
Field Supervisor
Virginia Ecological Services

Enclosure

cc: Back Bay NWR, Virginia Beach, VA (Attn: Kathy Owen)
VDGIF, Richmond, VA (Attn: Amy Ewing)

Mr. Noble

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VDGIF, Wachapreague, VA (Attn: Ruth Boettcher)
VDCR, DNH, Richmond, VA (Attn: René Hypes)



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Ecological Services
6669 Short Lane
Gloucester, Virginia 23061

JUL 13 2011

Memorandum

To: Project Leader, Back Bay National Wildlife Refuge
(Attn: Geralyn Mireles, Wildlife Biologist)

From: Supervisor, Virginia Ecological Services *Cynthia A. Schuy*

Subject: Biological Opinion on the Back Bay National Wildlife Refuge Sea Turtle Management Program, Virginia Beach, Virginia

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the subject project and its effects on the federally listed threatened loggerhead sea turtle (*Caretta caretta*) and green sea turtle (*Chelonia mydas*). The Service's Back Bay National Wildlife Refuge (BBNWR) proposes to conduct sea turtle nest management activities on BBNWR and adjacent properties along the Atlantic coast beaches extending from the Virginia/North Carolina border to the mouth of the Chesapeake Bay. This biological opinion is submitted in accordance with section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA). Formal consultation was initiated on January 27, 2011.

This biological opinion is based on the BBNWR Comprehensive Conservation Plan (CCP) (Service 2010), emails, telephone conversations, a sea turtle management meeting, and other information provided by the Service, Virginia Department of Game and Inland Fisheries, and others. A complete administrative record of this consultation is on file in this office.

CONSULTATION HISTORY

- 08-03-10 BBNWR requested section 7 consultation on their revised CCP.
- 08-03-10 to 9-13-10 The Virginia Field Office (VAFO) and BBNWR coordinated on a management plan to review and revise sea turtle and beach management on BBNWR.
- 09-13-10 VAFO and BBNWR completed review of BBNWR CCP and completed informal consultation. BBNWR and VAFO committed to conducting a meeting and evaluation of sea turtle management prior to the 2011 sea turtle nesting season to review and revise sea turtle management and complete formal section 7 consultation, if necessary.

- 01-19-11 VAFO held a sea turtle management meeting which included BBNWR and other agencies conducting sea turtle nest management and beach management in Virginia.
- 02-02-11 VAFO received draft intra-Service section 7 consultation form on BBNWR sea turtle management.
- 02-02-11 VAFO and BBNWR reviewed and revised sea turtle nest management protocol to 06-15-11 and intra-Service consultation form.
- 06-15-11 VAFO received final revisions of the nest management protocol and intra-Service consultation from BBNWR.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed activity is to continue monitoring and managing loggerhead sea turtle nests within all sea turtle nesting areas including the beaches of BBNWR, the Virginia Beach resort area, Fort Story, the City of Sandbridge, and False Cape State Park (FCSP). These management practices will continue until the loggerhead sea turtle is no longer listed. If nests of other sea turtle species are found, including the green sea turtle, the same protocol will be followed. Activities within sea turtle nesting habitat include crawl and nest searches as well as nest relocations.

A limited number of permit holders drive vehicles on the beach at BBNWR. Permits are issued to continue traditional ingress and egress along the BBNWR beach between the permittee's residence and their full-time employment in the Norfolk-Virginia Beach area. These permits are not transferrable and will be terminated when the current permit holder is no longer able to drive, or when alternate access becomes available during the permit period. Permittee access on BBNWR beach is prohibited between 12:00 am and 5:00 am from May 1 – September 30, to reduce negative impacts on sea turtles.

Monitoring Methods -

Turtle crawl and nest searches - Morning patrols for turtle crawls and nests are conducted from about June 1 through August 31. FCSP employees patrol BBNWR and FCSP, while BBNWR staff and volunteers are responsible for the north mile of BBNWR and Sandbridge Beach. A BBNWR volunteer patrols the Fort Story and Virginia Beach resort area beaches. Personnel use ATVs for the surveys, but vehicles may be used on the beaches where permitted beach driving is allowed.

When a turtle crawl is found, BBNWR staff determine whether the crawl resulted in a nest. The presence of a "body pit" in a sea turtle crawl usually indicates the turtle attempted to lay eggs. BBNWR biologists closely examine the body pit for indented impressions and/or mounded areas that indicate the location of the female's front flippers. This dictates her position when the eggs

were deposited. If flipper impressions are found, the area directly to the rear is targeted as the most probable nest location and is carefully excavated by hand first. The fingertips are used to probe the sand for a small, soft spot, unlike the surrounding more densely packed sand. This indicates the nest location. If flipper impressions are not found, the flattened circular area at either end of the tracks is targeted. Eggs are usually a few inches below this soft, 2-3 inch opening, so extreme care is taken. The biologist gently digs by hand into the body pit to locate the egg chamber and determine if eggs are present (Service 2007). The location and date of the crawl will be recorded, whether a nest is found or not.

Nest relocation - The construction of dunes on FCSP and BBNWR beaches in the 1930s resulted in blockage of overwash and dune blowout areas which otherwise would have allowed nesting sea turtles access to higher beach elevations. Current turtle nesting is limited to lower elevation sections of the beach which are susceptible to extensive saltwater inundation, beach erosion and complete nest loss during monthly high tides, "northeaster" storms, and hurricane activity in the mid-Atlantic. Other potential threats including vehicular beach traffic and public use activity also exist on these beaches.

The following risk analysis is performed by BBNWR biologists to determine if a nest needs to be relocated. If the answer to either of the two questions below is affirmative, the nest is relocated:

- Is the nest/body pit located below the estimated mean high tide lines -- as evidenced by the wrack lines and reference to tidal conditions when personnel survey the beach?
- Is the nest in an area where there is a likelihood that vehicles will run over the nest with signage and markers installed, or that there is a likelihood that intense artificial lighting will result in hatchling disorientation?

Once nests are determined to be present, biologists wear nitrile gloves prior to handling any eggs. This minimizes potential harm to the handlers (i.e., salmonella) and to the eggs (human carried bacteria, temperature change, etc.).

Before eggs are removed, the depth from beach surface to the top of eggs is measured. Using excavated sand from the original nest, a 2 inch layer of moist sand is placed in the bottom of a cooler (Sill et al. 2000). Keeping exposed eggs shaded with an umbrella, BBNWR staff remove eggs individually from the nest, being careful not to rotate them in the process. Eggs are placed into the cooler with a 1 inch border of sand between the eggs and the sides of the cooler. The eggs are placed in the cooler in a consistent and methodical manner with note taken of the order. The number of eggs in each layer are counted and recorded. Eggs are packed in such a manner that they are not touching and with 2 inches of sand between each layer of eggs. Usually two coolers are used. After all eggs are removed, the distance from the beach surface to the bottom of the nest depth is measured (Boulon 1999, Service 2007). The length and width of the nest cavity at the widest and longest points is also measured. Once all eggs are placed in the cooler, extra sand from the nest is placed over them and into a separate container. This sand is used to surround the reburied eggs at the nursery site located on BBNWR behind the primary dune. Once all the data has been recorded, the nest cavity is refilled and the crawl brushed out with

rakes and shovels. Eggs are kept out of direct sunlight; jolting or shifting is avoided during the trip to the nursery (Mortimer 1999).

At the designated nursery site a vertical shaft large enough for the predator-proof cage is dug with a spade/shovel. The predator-proof cage is placed in the hole with the middle rib of cage at least an inch above the sand as long as bottom and top nest depths are near the original nest's depths (Service 2007). The same person who removed the eggs from the original nest transfers the eggs from the coolers to the nest cage. The eggs are not rotated or packed tightly (Jones and Musick 1988, Mortimer 1999). Eggs are placed into the nest cage in the reverse order in which they were removed from the original nest (i.e., the first egg put in the cooler will be the last one to go into the cage). The bottom and sides of the cage are filled with sand from the original nest. Dry sand is not allowed to enter the cage through the mesh while the shape and size of the original nest is recreated as closely as possible. The remainder of the relocated nest cavity is filled with the extra sand brought from the original nest. The top of the predator-proof cage is secured with three 6-inch pieces of aluminum wire, and the nest number is written on the top. For any eggs that are broken, the cause of break is recorded on a copy of the nest data sheet. The sheet is then bagged with the specimen and placed in the biology freezer at BBNWR. The Nest and Crawl Data Sheet is completed and filed at BBNWR. Digital photos of the nest and crawl are downloaded and catalogued. This information and more is included in the 2007 "Back Bay NWR Sea Turtle Nest Standard Operating Procedures."

In situ nest management - Nests that are identified and left in situ are marked with reflectors, signs identifying the site as a sea turtle nest, and flagging tape placed in the immediate vicinity of the nest (within 9.8 feet [ft]) to help prevent nests from being run over by vehicles or inadvertently disturbed. A predator guard, constructed of galvanized fence wire with a rectangular mesh size of approximately 2 inches by 4 inches is used. A trench is excavated around the nest, and the fence material is placed over the nest with flaps placed in the trenches and re-buried to prevent excavation by predators. In situ nests are monitored daily near the hatch window to determine if they are successful, and after all hatching is anticipated to be completed, the nests are excavated and the number and condition of hatched eggs, unhatched eggs, and young turtles are counted.

Action Area - The "action area" is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The Service has determined that the action area for this project consists of the beaches of BBNWR, FCSP, the Virginia Beach resort area, Fort Story, and Sandbridge.

STATUS OF THE SPECIES AND CRITICAL HABITAT RANGEWIDE

The loggerhead sea turtle was listed as threatened in the U.S. in 1978 (NMFS and Service 1991a) and the green sea turtle was listed as endangered in 1978 (NMFS and Service 1991b). In March 2010, the Service and NMFS published a proposed rule in the Federal Register to recognize nine distinct populations of loggerhead sea turtles worldwide. Under this proposed rule, the loggerhead sea turtle population that would be affected by the proposed actions is the north

Atlantic population and it is proposed to be listed as endangered (72 FR 12598). There is designated critical habitat outside of Virginia for the green sea turtles, but none has been designated for the loggerhead sea turtle.

Species/Critical Habitat Description and Life History – This account emphasizes loggerhead and green sea turtle nesting and breeding biology, which is the subject of this biological opinion. Additional information about the life history of these sea turtle species and their habitat use, behavior, and survival at sea can be found in other documents, including the loggerhead and green sea turtle recovery plans (National Marine Fisheries Service [NMFS] and Service 1991a, b, respectively), loggerhead and green sea turtle five-year status reviews (NMFS and Service 2007a, b, respectively), and other sources (National Research Council 1990).

The loggerhead is smaller, with a mean carapace length of 3 ft and a mean mass of 293 pounds (NMFS and Service 2008), compared to 3.35 ft and 300 pounds for the green sea turtle (National Research Council 1990). Green sea turtles nest primarily in the tropics and are rarer nesters at higher latitudes, while loggerheads have significant nesting populations outside the tropics (National Research Council 1990).

Life History and Population Dynamics - Loggerhead females are believed to reach sexual maturity at a minimum age of 30 years (Snover 2002). At the start of the breeding season, they migrate from foraging areas on the continental shelf to mating areas in the waters near their nesting beaches (Schroeder et al. 2003). Reproductive females exhibit the desire to return to their birthplace to lay their eggs (Miller et al. 2003). Females may be inseminated by multiple males (Bollmer et al. 1999). After mating, males return to their foraging areas while females remain in the waters near their natal beaches to emerge onto their nesting beaches to lay eggs. The following account of nesting biology is a synopsis of Miller et al. (2003).

Loggerhead females tend to nest on high wave energy, sandy ocean beaches. Gravid females emerge from the wash zone and crawl toward the dune line until they encounter a suitable nest site, typically on open sand at the seaward base of a dune, but sometimes in vegetation. The female clears away surface debris with the front flippers, creating a "body pit," then excavates a flask shaped nest cavity with her hind flippers. Loggerheads lay an average of 112 eggs per nest. After laying, the female covers the nest with sand using all four flippers. Once the nest covering phase is complete, she crawls back into the sea. Individual females may nest 1 to 6 times per nesting season, at intervals of 12-16 days, during the late spring to late summer. Intervals between nesting shorter than 10 days indicate that the previous nest attempt was likely aborted due to disturbance. Mature loggerheads nest every two to three years, on average (Schroeder et al. 2003). Nest incubation period (from laying to hatching) depends on temperature and ranges from 48 to 90 days at the extremes. Emergence of hatchlings from the nest cavity usually occurs within four days of hatch, but may take up to two weeks longer. Hatchling emergence from nests usually occurs at night when temperatures are lower and diurnal predators are inactive. Hatching success typically approaches 80 percent; after hatchlings leave the beaches, they typically fall prey to a variety of predators, including birds, fish, and sharks (National Research Council 1990).

Within the Northwest Atlantic, the majority of loggerhead sea turtle nesting activity occurs from April through September, with a peak in June and July (Williams-Walls et al. 1983, Dodd 1988, Weishampel et al. 2006). Nesting occurs within the Northwest Atlantic along the coasts of North America, Central America, northern South America, the Antilles, Bahamas, and Bermuda, but is concentrated in the southeastern U.S. and on the Yucatán Peninsula in Mexico on open beaches or along narrow bays having suitable sand (Sternberg 1981, Ehrhart 1989, Ehrhart et al. 2003, NMFS and Service 2008).

Sex ratio of hatchlings depends on temperature during incubation. Below 84° Fahrenheit (29° Celsius), more males are produced than females and above that temperature more females are produced (Carthy et al. 2003). Furthermore, fluctuating incubation temperatures often produce more females than stable temperatures, and temperature, hydration, and gas exchange during incubation can determine hatchling size, early swimming behavior, growth rate, and hatchling robustness (Carthy et al. 2003). Newly emerged hatchlings immediately head for the sea, most likely orienting toward the water by moving toward the brightest horizon and away from dark silhouettes (Lohmann and Lohmann 2003). Sea turtles are most negatively sensitive to blue and green light and loggerheads in particular are averse to yellow light (Witherington and Martin 1996). Once in the sea, hatchling loggerheads swim into the waves and eventually enter the open ocean, where they will spend the first 6.5 to 11.5 years of their lives primarily at the top of the water column, until finally moving to foraging areas on the continental shelf (Bolten 2003).

Green sea turtles nest in two, three, or four year intervals, and may lay as many as nine clutches within a nesting season (NMFS and Service 1991b). Clutch size varies from 75-200 eggs, and incubation ranges from about 45-75 days (NMFS and Service 1991b).

Nesting habitat - Less is known about factors that cue nest site selection than about anthropogenic disturbances that discourage nesting (Miller et al. 2003). Typical nesting areas are sandy, wide, open beaches backed by low dunes, with a flat, sandy approach from the sea (Miller et al. 2003). Nesting is nonrandom along the shoreline, but studies of the physical characteristics associated with nests versus random or non-nesting sites on the beach have produced varying results. Some factors found to determine nest selection are beach slope (3 of 3 studies), temperature (2 of 3 studies), distance to ocean (1 of 3 studies), sand type (2 of 2 studies), and moisture (1 of 3 studies), although the results were occasionally contradictory (Miller et al. 2003). Other factors examined but not found to be significant were sand compaction, erosion, pH, and salinity. Although the process of nest site selection is not well understood, a successful nest must be laid in a low salinity, high humidity, and well-ventilated substrate that is not prone to flooding or burying due to tides and storms and where temperature is optimal for development (Miller et al. 2003).

Status and Distribution – Approximately 58,000 loggerhead nests were estimated in the U.S. Atlantic in 1983 (NMFS and Service 1991a) and between 53,000 and 92,000 nests from 1989 to 1998 (Turtle Expert Working Group 2000). Within the northern subpopulation (north Florida to Virginia), studies in South Carolina and Georgia have documented a decline in number of nests

(Ehrhart et al. 2003). Based on genetic evidence, male loggerheads disperse freely among sites within the U.S. Atlantic population, while females are faithful to their natal sites (Bowen et al. 2005). Because sex ratio is determined by temperature during incubation (Miller et al. 2003), the northern part of the U.S. Atlantic population, apparently provides a disproportionate number of males to the larger population (Mrosovsky et al. 1984a, Hanson et al. 1998, Hawkes et al. 2007).

“Analyses of historic and recent abundance information by the Marine Turtle Specialist Group (MTSG) indicate that extensive population declines for the green sea turtle have occurred in all major ocean basins. The MTSG analyzed population trends at 32 index nesting sites around the world and found a 48-65 percent decline in the number of mature females nesting annually over the past 100-150 years. The two largest nesting populations of green turtles are found at Tortuguero, on the Caribbean coast of Costa Rica, and Raine Island, on the Great Barrier Reef in Australia, where an annual average of 22,500 and 18,000 females nest per season, respectively. In the U.S., green turtles nest primarily along the central and southeast coast of Florida; present estimates range from 200 - 1,100 females nesting annually” (NMFS 2008). In the southeast U.S., the majority of green turtle nesting occurs in Florida. The green turtle nesting population of Florida appears to be increasing based on 19 years (1989-2007) of index nesting data from throughout the state (http://research.myfwc.com/features/view_article.asp?id=27537).

Factors Affecting the Species – Numerous factors affect sea turtle growth, survival, and behavior while at sea from when they leave natal beaches as hatchlings until they mature and return to beaches to breed. These factors are discussed in detail in the 5-year status reviews for the two turtle species (NMFS and Service 2007a, b). The discussion herein is limited to factors affecting turtle nesting. Threats to loggerhead sea turtles on the nesting grounds are similar to those faced by green sea turtles. The following threats affect both species, though there may be some differences in susceptibility between the species.

Weather and tides - Storm events may erode beaches and destroy nests or cause nest failure due to flooding or piling of eroded sand on the nest site. Beach erosion due to wave action may also decrease the availability of suitable nesting habitat (Steinetz et al. 1998), leading to a decline in nesting rate on a particular beach. Sea level rise, often in combination with human development along beaches, is contributing to erosion, changes in beach characteristics, and more intensive management of many beaches.

Predation - Predation of eggs and young by mammals, birds, and ghost crabs may eliminate up to 100 percent of the nests and any hatchlings that emerge on beaches where predation is not managed (National Research Council 1990). This is a natural phenomenon that has always affected sea turtle populations, but due to reduced turtle population sizes, reduced turtle habitat availability, and unnatural population increases of nest predators in some areas, predation is a significant threat to remaining breeding populations and is actively controlled through predator exclusion and predator control on most beaches where turtles nest.

Human activities - Crowding of nesting beaches by pedestrians can disturb nesting females and prevent laying (NMFS and Service 2008). Furthermore, the use of flashlights and campfires may

interfere with sea-finding behavior by hatchlings. Beach driving, including pedestrian traffic and vehicle use, and beach cleaning pose a risk of injury to females and live stranded turtles, can leave ruts that trap hatchlings attempting to reach the ocean (Hosier et al. 1981, Cox et al. 1994), can disturb adult females and cause them to abort nesting attempts, and can interfere with sea-finding behavior if headlights are used at night (NMFS and Service 2008). Driving directly over incubating egg clutches can cause sand compaction, which may decrease hatching and emergence success and directly kill pre-emergent hatchlings (NMFS and Service 2007a). Artificial lighting on structures may affect turtle behavior in a similar manner (Witherington and Martin 1996). Beach cleaning can directly destroy nests. Poaching is a problem in some countries and occurs at a low level in the U.S. (NMFS and Service 2007a). An increased human presence may also lead to an increase in the presence of domestic pets that can depredate nests and an increase in litter that may attract wild predators (National Research Council 1990).

The rate of habitat loss due to erosion and escarpment formation may be increased during shoreline stabilization efforts, either through renourishment (Dolan et al. 1973) or placement of hard structures such as sea walls or pilings (Bouchard et al. 1998). Vehicle traffic may alter the beach profile leading to steeper foredunes (Anders and Leatherman 1987), which may be unsuitable for nesting. Improperly placed erosion control structures such as drift fencing can act as a barrier to nesting females. Non-native and/or invasive vegetation may be introduced in conjunction with beach development, which can overrun nesting habitat, make the substrate unsuitable for digging nest cavities, invade nests and desiccate nests, or trap hatchlings.

Reduced nesting success on constructed/augmented beaches could result due to sand compaction, escarpment formation, and changes in the beach profile. Sand compaction has been shown to negatively impact sea turtles, particularly concerning beach nourishment projects. Placement of very fine sand and/or the use of heavy machinery can cause sand compaction on nourished beaches (Nelson et al. 1987, Nelson and Dickerson 1988). Significant reductions in nesting success (i.e., false crawls occurred more frequently) have been documented on severely compacted nourished beaches (Nelson and Dickerson 1987, Nelson et al. 1987), and increased false crawls may result in increased physiological stress to nesting females. Sand compaction may also increase the length of time required to excavate nests and result in increased physiological stress (Nelson and Dickerson 1988).

ENVIRONMENTAL BASELINE

Status of the Species/Habitat Within the Action Area – Sea turtle nesting has regularly occurred within the action area since the 1970s. Since 1970, 93 nests have been recorded, ranging from 0-7 nests per year. The majority of nests have occurred on BBNWR and FCSP (49 and 28, respectively, BBNWR 2011). Up to 8 false crawls have also been recorded among all the sites within a year (2002; BBNWR 2011), and a total of 45 false crawls have been recorded.

Since monitoring began, 9 nests have been left in situ, and most of these occurred from 2003 to 2005, when BBNWR staff tested and evaluated in situ hatch success of nests. The majority of nests left in situ failed to hatch, presumably as a result of tropical storms causing prolonged

inundation and beach erosion, but at least one nest left in situ hatched successfully at a rate comparable to nests placed in the hatchery. Most nests have been relocated to a sea turtle hatchery on BBNWR, located behind the primary dune. Hatch success of the hatchery-produced young is high, generally ranging from 80 to 95 percent.

In 2010, preliminary genetic analysis of 9 sea turtle nests in Virginia was conducted in conjunction with a larger study of the population genetics of the northern recovery unit of loggerhead sea turtles. The 9 nests were laid by 4 different females, 2 of which also nested in North and South Carolina within the same year, as well as individuals that had not been recorded nesting outside of Virginia (Nairn and Shamblin 2011).

At BBNWR there is an artificial dune system that creates a narrow beach with a high primary dune. This combination creates poor quality nesting habitat due to the high probability of erosive washovers, egg exposure to saltwater and air, or entombment. Beaches in Sandbridge, Virginia Beach oceanfront, and other sites are generally larger, but are also subject to high levels of human activity, extensive illumination, and human traffic. Beaches at several sites are periodically renourished to maintain them in a condition to support public recreation.

Factors Affecting Species Environment Within the Action Area – The artificial dunes on BBNWR and FCSP result in narrow beaches that lack the upper beach zones and at high tides water is generally at or near the base of the dunes. The upper beach berm to dune transitional habitat, and all associated plants and animals, are generally lacking.

Beach driving results in ruts, compaction of sand, and disturbance of beach flora and fauna, and further contributes to the degraded condition of upper beach habitat. Vehicle operation on the beach may also reduce beach stability and result in increased levels of sand transport both on and off of the beaches of BBNWR and FCSP.

Human recreational use of the beaches, including grooming of the most heavily used recreational beaches in the City of Virginia Beach, result in highly disturbed beaches that lack natural beach contours, and may be more compacted than natural beaches. These areas also generally lack vegetation, and the beaches lie immediately in front of heavily developed hotel/resort areas. These areas are generally illuminated, and lack most characteristics of suitable sea turtle nesting beaches, with the exception of a broad beach profile that is maintained through periodic beach renourishing. Direct disturbance of sea turtles is also likely to occur on beaches that have high levels of human use or vehicle operation.

Beach renourishment may result in unsuitable beach conditions, including unnatural profiles, beach sand composition that is different from natural beaches in color, density, compaction, drainage, and other characteristics. These beaches may be suitable for sea turtle nesting, but may result in differences in nest success, hatchling gender, and hatchling fitness.

EFFECTS OF THE ACTION

Adverse Effects – The effects to sea turtles from nest relocation are not well studied, and vary depending on the specific practices involved in relocation. Because it is not practical to monitor the long-term survival or success of hatchling turtles, the specific effects of nest management action on BBNWR on hatchling turtles are not known.

Many studies indicate reduced hatch success of relocated sea turtle nests. Handling alone can result in damage to embryos by disrupting membrane attachment and result in reduced hatch success (Limpus et al. 1979, Parmenter 1980). Differences in the moisture regime, temperature regime, and gas exchange between nest sites selected by turtles and sites where nests are relocated also have the potential to affect hatch success (Ackerman 1980, McGehee 1990).

Movement of sea turtle nests to a hatchery site alters sex ratios of sea turtles compared to those that would occur in natural nests as a result of different incubation temperatures (Harvey and Slatkin 1982; Limpus et al. 1982; Mrosovsky et al. 1984a, b; Dalrymple et al. 1985; Dutton et al. 1985; Standora and Spotila 1985). The use of a hatchery site that is more far-removed from the beach likely generally results in warmer incubation temperatures than those which would occur at natural nest sites, and this would tend to increase the proportion of female hatchlings (Mrosovsky et al. 1984a, b). However, because the sex ratios that would naturally occur are expected to vary among years and sites depending on weather conditions, date that the nest is laid, nest depth, soil conditions, and other factors, it is not possible to determine how the sex ratio at the hatchery site would differ from what would occur naturally. Additionally, it is not possible to determine what biological, demographic, or genetic effects to the population may result from altered sex ratios, except that differences should be expected, and we presume that the naturally occurring sex ratios and the variation in those ratios over time, are appropriate to maintain the sea turtle populations.

As a result of the refinement of methods and implementation of a detailed protocol to excavate, transport, and re-bury turtle nests that are relocated by BBNWR personnel, hatch success rates are generally comparable to those that may occur naturally. Similarly, the identification and routine use of a carefully selected hatchery site at BBNWR has apparently reduced the adverse effects to turtle embryos and hatching success.

Emerging research on the homing abilities of sea turtles continues to indicate a strong tendency for sea turtles to return to their natal beaches to nest. However, to date, the cues that sea turtle hatchlings use to allow them to return to natal beaches are unknown. Irwin et al. (2004) have measured distorted magnetic fields within sea turtle egg enclosures similar to those used by BBNWR. Based on evidence that sea turtles navigate at sea using magnetic fields Lohmann et al. (1999) and Irwin et al. (2004) speculate that magnetic fields may be an important mechanism for imprinting on natal beaches, and distortion in magnetic fields may affect homing behavior and the ability to return to natal beaches.

Condition of hatchling turtles may be more important than hatch success in terms of the likelihood of survival and recruitment of young turtles. Hatchling size in some turtle species is related to the water balance of eggs while in the nest, with larger young generally resulting from eggs that occurred in wetter conditions (Janzen et al. 1995). While the relationship of hatchling size to nest environment during development has not been well studied in sea turtles, larger young may be more likely to survive (Janzen et al. 1995).

Manual release of hatchlings from the enclosed egg chamber used at the BBNWR hatchery may result in higher than normal susceptibility to predation. Release of hatchlings during daytime hours can result in higher predation, and release of hatchlings en masse may also increase predation vulnerability by attracting predators to the group of young being released. Under natural conditions, night-time emergence and emergence of relatively small numbers of individuals over time (particularly at more northerly latitudes) may result in reduced risk of loss of all young.

Additionally, holding hatchlings after emergence may result in expenditure of energy attempting to escape, interference with normal behaviors, and elevated levels of stress that may detrimentally affect the physiological condition of hatchlings. After release into the ocean, this may result in reduced likelihood of survival and reduced probability of reaching nursery areas.

While the risk of catastrophic loss of clutches cannot be estimated, relocating turtle nests to a common hatchery area increases the likelihood of catastrophic loss resulting from accidents, adverse environmental conditions, and disease and predation.

It is uncertain whether the effects of intensive nest management discussed above occur, and to what degree they affect hatchling survival. The types of effects may vary depending on the environmental conditions within the specific nesting season, and the specific conditions that each nest is subjected to during management activities and relocation. The combination of these factors results in highly uncertain effects to the sea turtle population. While hatch success has often been used as a proxy to assess reproductive success, the factors discussed above may reduce recruitment, affect population demography, and affect future use of turtle nesting beaches in the action area. For the purposes of this analysis and in the absence of specific information that would allow us to consider the expected magnitude and severity of effects that may result, we make the conservative assumption that all of these factors affect hatchling sea turtles to a degree that cumulatively results in significantly reduced survival and recruitment probability.

Beneficial Effects – Monitoring and in situ nest protection provides good information on the sea turtle nesting effort within the action area. Nest marking and predator protection reduce the potential for anthropogenic impacts including disruption of nests and predation that may result from artificially abundant predators. The educational component of the monitoring aids in improving beach visitor consideration of sea turtle nesting in the vicinity of recreational areas. While unknown, the controlled conditions of the turtle hatchery likely result in higher nest success rates than would occur if turtle nests were left in the wild, but it remains unclear whether the greater productivity results in improved recruitment of juvenile sea turtles.

Interrelated and Interdependent Actions - An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. The Service is not aware of any such actions associated with this project.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Cumulative effects likely to adversely impact nesting sea turtles include management of beaches by private individuals and municipalities, and use of beaches for recreational purposes. Management and use of beaches degrades the habitat quality for nesting sea turtles and minimizes the likelihood of successful nesting and hatching of young. Shoreline development adjacent to beaches, primarily along the developed Virginia Beach oceanfront and Sandbridge, results in disturbance of adult female sea turtles attempting to nest, minimizing the likelihood of successful nesting.

CONCLUSION

After reviewing the status of the loggerhead and green sea turtle, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed BBNWR sea turtle nest management program is not likely to jeopardize the continued existence of the loggerhead and green sea turtles. No critical habitat has been designated for this species within the action area; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by BBNWR so that they become binding conditions of any grant or permit issued to any applicant, as appropriate, for the exemption in action 7(o)(2) to apply. BBNWR has a continuing duty to regulate the activity covered by this incidental take statement. If BBNWR (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, BBNWR must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service anticipates incidental take of all sea turtle nests that are relocated within the action area. While there is potential for some individual hatchlings to survive and recruit into the breeding population, the degree of uncertainty in the expected effects that relocation has on sea turtles requires expectation of loss of all relocated nests. Because the decision to relocate nests is dependent on the specific location, setting of the nest, and determination of BBNWR personnel, all nests that occur in any year may be relocated.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or adverse modification or destruction of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of nesting sea turtles.

- Conduct sea turtle monitoring and management to minimize anthropogenic intervention and maximize protection of nests.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the ESA, BBNWR must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

The proposed action includes appropriate measures to avoid and minimize adverse effects to sea turtles, and no additional terms and conditions are needed to implement the reasonable and prudent measures.

The following relates to reporting requirements:

- Care must be taken in handling any dead specimens of proposed or listed species that are found to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the ESA. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective. Upon locating a dead specimen, notify the Service's Virginia Law Enforcement Office at 804-771-2883, 5721 South Laburnum Avenue, Richmond, Virginia 23231, and the Service's Virginia Field Office at 804-693-6694 at the address provided above.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to further minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

BBNWR should work with other beach owners and managers in the region to implement beach management programs for sea turtles that include efforts to minimize threats to sea turtle nesting such as artificial lighting, beach grooming, and vehicle operation on beaches.

BBNWR should develop a beach management plan that allows for overwash and natural beach processes in at least limited areas of BBNWR that will allow for sea turtle nesting. If sea turtle nest relocation continues, identify an alternate hatchery location on the beach that will allow for natural and unassisted emergence.

For the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the

amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions, please contact Tylan Dean of this office at (804) 693-6694, extension 166, or via email at tylan_dean@fws.gov.

cc: VDGIF, Wachapreague, VA (Attn: Ruth Boettcher)
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Appendix B

NASO & BBNWR Nest Relocation Agreement



DEPARTMENT OF THE NAVY

NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO:

5090

Ser 00/202

May 29, 2008

Mr. Jared Brandwein
Refuge Manager
U.S. Fish and Wildlife Service
Back Bay National Wildlife Refuge
4005 Sandpiper Road
Virginia Beach, VA 23456-4325

SUBJECT: RELOCATION OF SEA TURTLE NESTS FROM NAVAL AIR STATION
(NAS) OCEANA, DAM NECK ANNEX TO BACK BAY NATIONAL
WILDLIFE REFUGE

Dear Mr. Brandwein:

The Navy requests the assistance of the U.S. Fish and Wildlife Service (USFWS) Back Bay National Wildlife Refuge (BBNWR) staff, as an authorized agency for the relocation of endangered species nests, in the relocation of sea-turtle nests found on NAS Oceana, Dam Neck Annex.

Per the NAS Oceana, Dam Neck Annex Integrated Natural Resources Management Plan (INRMP) signed by the U.S. Navy, USFWS, Virginia Department of Game and Inland Fisheries, Navy Natural Resources personnel or trained authorized volunteers will conduct patrols of NAS Oceana, Dam Neck Annex beaches in an attempt to locate endangered loggerhead sea turtle (*Caretta caretta*) nests. The patrol covers approximately four miles and is located north of Sandbridge, and south of Camp Pendleton State Military Reservation. Patrols are to begin May 15, 2008, and end August 31, 2008, of each year.

Loggerhead sea turtles have nested on site. The frequency of nesting is sporadic and infrequent. It has been almost eight years since the last recorded nest was identified on NAS Oceana, Dam Neck Annex.

The high tide line on the majority of the beaches laps at the toe of the dune line. Beaches are also utilized for recreation and military training. These three factors combined lead the Navy Natural Resources Specialist to determine that the beaches are unsuitable for successful nest hatching on-site.

Pending concurrence with the USFWS BBNWR staff, the Navy Natural Resources Specialist recommends that in the event of a sea-turtle crawl on NAS Oceana, Dam Neck Annex, the Navy patroller immediately notify USFWS BBNWR staff of the crawl. The Navy patroller or other Navy representative would then coordinate access for the USFWS BBNWR staff onto NAS Oceana, Dam Neck Annex. USFWS BBNWR staff would then determine if a nest is present and facilitate the relocation. Navy Natural Resources staff will remain onsite to assist as needed.

5090
Ser 00/

Please inform us if you require further information.
Concurrence letters or questions concerning this request should
be directed to my point of contact, Mrs. Michael F. Wright, at
(757) 433-2883 or E-Mail michael.c.farrell@navy.mil.

Sincerely,

A handwritten signature in black ink, appearing to read "M. R. HUNTER", with a long horizontal flourish extending to the right.

M. R. HUNTER
Captain, U.S. Navy
Commanding Officer

From: John_Gallegos@fws.gov
To: [Farrell, Michael C CIV NAVFAC MidLant, Environmental](#)
Cc: Jared_Brandwein@fws.gov; Kathryn_Owens@fws.gov; Leticia_Melendez@fws.gov; elocher11@gmail.com;
Walter_Tegge@fws.gov
Subject: Sea Turtle Nest Relocation from Oceana/Dam Neck Base
Date: Friday, June 06, 2008 11:44:14

Hi Mike,
Got the (your) official request from CO Captain Hunter of Oceana Naval Air Station to have us move sea turtle nests from the Dam Neck Naval Base beach to the nursery at Back Bay NWR. Do you need a response from us on this? Or not? Please let me know.
Thanks!

John G.

John B. Gallegos, Wildlife Biologist
U.S. Fish & Wildlife Service
Back Bay N.W.R.
4005 Sandpiper Road,
Virginia Beach, VA 23456-4347

E-Mail: John_Gallegos@fws.gov
Phone: (757) 721-2412/3896
Fax: (757) 721-6141
<http://backbay.fws.gov>

Wright, Michael F CIV NAVFAC MIDLANT, PWD Oceana

From: John_Gallegos@fws.gov
Sent: Thursday, May 22, 2008 8:14 AM
To: Farrell, Michael C CIV NAVFAC MidLant, Environmental
Cc: jared_brandwein@fws.gov; McGrogan, Lawrence CIV CNRMA ENV, N45; Munley, Michael T CIV NAVFAC MidLant, Environmental; Chamberlain, Terry N CIV; Kathryn_Owens@fws.gov
Subject: Re: Sea-turtle Nest Relocation

Hi Mike,
Likewise, it was nice talking sea-turtle stuff again.
Sure. Our (FWS) policy is that we be contacted about all sea turtle nests in the Virginia Beach area (even the Virginia Aquarium doesn't have authority to relocate sea turtle nests). So, please do contact me or Erica Locher if a nest turns up on Dam Neck Naval Base. Thanks for asking, and looking forward to continuing work with you.

John G.

John B. Gallegos, Wildlife Biologist
U.S. Fish & Wildlife Service
Back Bay N.W.R.
4005 Sandpiper Road,
Virginia Beach, VA 23456-4347

E-Mail: John_Gallegos@fws.gov
Phone: (757) 721-2412/3896
Fax: (757) 721-6141
<http://backbay.fws.gov>

"Farrell, Michael
C CIV NAVFAC
MidLant,
Environmental"
<michael.c.farrel
l@navy.mil>
05/20/2008 02:17
PM

<john_gallegos@fws.gov>
cc
"Chamberlain, Terry N CIV"
<terry.n.chamberlain@navy.mil>,
"McGrogan, Lawrence CIV CNRMA ENV,
N45" <lawrence.mcgrogan@navy.mil>,
"Munley, Michael T CIV NAVFAC
MidLant, Environmental"
<michael.munley@navy.mil>,
<jared_brandwein@fws.gov>
Subject
Sea-turtle Nest Relocation

Hi John:

As always it was a pleasure chatting with you today regarding sea-turtle patrols and nesting.

We are drafting a formal letter per your request; however, this may take a week or so before it is ready for official submission.

In the interim and in the event that we do have a crawl, would it still be okay for us to contact your staff regarding potential nest relocations?

R,

Mike

Michael F. Wright (formerly, Michael C. Farrell) Natural Resources Specialist Environmental Program Division Oceana Public Works Department

Office: 757-433-2883
New Cell: 757-373-8531
Alt. Fax: 757-433-3460

Address:
953 Hornet Dr.
Suite 206
Virginia Beach, VA 23460-2190

Appendix C

Training Materials



Natural Resources: Personnel Training (*Sea-Turtle Nesting & Marine Species Strandings*)

Michael Wright
Natural Resource Specialist
PWD NAS Oceana

Natural Resources Mission



- **Implement and maintain a balanced and integrated program for the management of natural resources on Navy-owned lands in support of the installation mission.**
- **Ensure military readiness and sustainability while complying with natural resources protection laws.**
- **Conserve and manage natural resources entrusted to Navy care.**

Today's Topics



- **Endangered Species, Sea Turtle Nest Surveys**
- **Marine Species Stranding Patrols & Reporting**

Sea Turtle Patrols/Nesting Activity Surveys



- **Dates: 15 May – 31 August**
- **Start Time: 30min prior to sunrise, NLT 0600**
- **Location: NASO DNA & VAANG-CP Beaches**
- **Procedures:**
 - **Turtle Patrol Log Manual**
 - **ATV**
 - Preventative Maintenance
 - Safety (Operation & PPE)
 - **Beach Patrol**
 - **Contacts**

Sea Turtle Patrols/Nesting Activity Surveys



- **Perform a figure 8**

- **Patrol Begins at the Middle of DNA. Continuing North 1st to cover firing range beaches 1st.**

- If Firing Ranges are active do not go past the firing range warning signs, see attached photo(s).

- **Patrol Shoreline First**

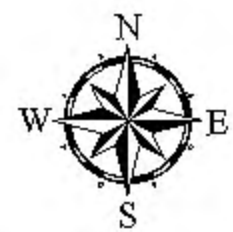
- **Patrol Middle Beach Second**

NASO DNA Sea Turtle Patrol Reference Map (Rev May 2013)

If firing range red flags or lights are flying stop at the 1st tower with these flags or lights and wait for the guard to say or give you the thumbs up to proceed up/down the firing range beach. Active ranges should cease fire to allow you thru and there should not be an extended wait time (5 minutes max). If you have difficulties give Michael Wright a call on her cell phone.

Note: You should be clearing these beaches 1st, you should be completed with the Firing Range, MACS24, and VAANG beaches NLT 0700, unless you locate a crawl.

Ideally, unless something major happens you should be done with your entire patrol by 0730.









0.5

Miles

810

Meters

-  Storage Shed
-  Vehicle Beach Access
-  ATV Beach Access
-  Walkover Beach Access
-  Range Restricted Beach Access
-  Alternate Route

No Alt. Route
as of May 2014

South End of Patrol Area (Sandbridge/Dam Neck Annex border)



North End of Patrol Area (VAANG-CP/Croatan Beach border)



Firing Range Warning Signage



- **Read Sea Turtle Standard Operating Procedures (SOP) Manual and all associated Appendices.**
 - **Sign Signature Page Acknowledging Receipt and Review of the Sea-turtle SOP. Signature page to remain on file at the installation Natural Resource Office, Building 820.**
 - **Note: Face to Face/Classroom training, goes over the SOP and Appendices, but one should read the SOP to ensure they understand the full details.**
 - **If there are any questions, contact the installation Natural Resources Manager.**

• **Identification of Crawls & Sea Turtles:**

- **Attached Photos were provided by the installation Natural Resources Program or from Michael Wright's personal photos.**
- **Photocopies of the sea turtle sections of the following book/guide are utilized in this training presentation to help explain how to identify sea turtles species: "Guide to Marine Mammals and Turtles of the U.S. Atlantic and Gulf of Mexico," published in 1999, authored by Kate Wynne and Malia Schwartz. Copies of the book have been purchased and are available for use.**

Examples of Loggerhead Sea Turtle Crawls

Crawl with Nesting Pit (normal tracks)



False Crawl (Crawl w/no Nest)



Crawl with Nesting Pit (X-cross tracks)



Example of Uncovered Loggerhead Sea-Turtle Nest

Note: Eggs look like white ping-pong balls. Nest typically contains anywhere from 60 to 120+ eggs. A turtle can nest multiple times in a season.



Example of Hatched Loggerhead Sea Turtles ("Hatchlings")

Note: These photos are of hatchlings from a nest just south of NASO Dam Neck Annex (NASO DNA) on the north end of Back Bay National Wildlife Refuge near the community of Sandbridge adjacent and directly south of NASO DNA.

Hatchlings fit in the palm of an average sized human hand. They typically hatch after dark and just before sun-rise and are guided by the light of the moon towards the water. City lights typically interfere with this process and misguide the hatchlings exhausting them and leaving them vulnerable to predation.

During early morning patrols keep an eye out for hatchlings starting in July, in the possible but unlikely event that a nest/crawl was missed during daily patrols.



15June2012 Kemps Ridley Sea Turtle Nesting NASO Dam Neck Annex

Unlike the Green or Loggerhead Turtles, which rarely lay nests during the afternoon daylight hours, it is not uncommon for Kemps Ridley's to lay nests during the day. This turtle was on the beach from ~1430-1530.

Adult Female Turtle Laying Nest:







Adult Turtle Crawl:

Notice the difference in the width of the tracks and the body cavity between the Loggerhead and the Kemps Ridley crawls. Kemps Ridleys (up to ~100 lbs.) are the smallest and Loggerheads (up to ~300 lbs) are the largest sea turtles currently nesting on our beaches.







Adult Turtle Flipper Prints & Closer view of Crawl Prints:



Nest Left In-Situ with Predator Guard/Cage and Signage:

Nests left on site (in-situ), not relocated, are protect with a predator guard to keep out predators such as foxes and racoons during egg incubation. The predator guard is designed to allow the turtles to hatch and work their way to the ocean without being held captive in the cage. Nests relocated to dunal nursery sites have enclosed cages.

In-situ nest are clearly marked and posted to provided general information, to clearly indicate that disturbance of the nest is prohibited and is a violation of Federal Law, and minimize the potential for vehicles to drive over and crush the nest.



Unlike all the other animals in this book, sea turtles are reptiles—taxonomically distant and distinct from marine mammals. They have dry, scaly skin, which is relatively impermeable to water; are ectothermic; and like many reptiles, lay eggs. The most distinguishing characteristic of sea turtles is their shell, a defining trait they share with all turtles. From terrestrial ancestors, marine turtles evolved secondarily to a marine existence. This resulted in a strongly tapered, streamlined shell and powerful, rigid, paddlelike forelimbs that “fly” through the water with amazing speed, without compromising the ability to move on land—an incapable confine for animals that must come ashore to lay their eggs.

Strong swimmers, sea turtles are capable of making deep, repetitive dives to search for food and can remain submerged for long periods of time, such as when resting on the ocean bottom. In fact, sea turtles spend little time at the water surface—often just long enough to take a breath of air—though some sea turtles, such as the leatherback and loggerhead, can be found basking at the water

surface. Basking in the sun may aid in maintaining a body temperature higher than that of the surrounding water, allowing for survival in colder Atlantic waters.

Life History

Sea turtles migrate, sometimes long distances, from foraging grounds to shallow-water nesting grounds to mate, nest, and lay their eggs. The female emerges from the water and digs a flask-shaped nest in the sand with her hind flippers, then lays 50 to 170 (depending on the species) ping-pong ball-shaped eggs. After covering the nest with sand, she returns to the water. She will nest several times in one season. After the nesting season, she migrates back to the foraging grounds. In most species of sea turtles, mature females do not nest every year, remaining instead at the foraging grounds in off years.

Following an 8-to-10-week incubation, the eggs hatch, and the hatchlings dig their way out of the nest, usually emerging at night. They make their way to the water, orienting them-

selves to the brightest horizon (hatchlings disoriented by brightly lit beaches become more vulnerable to hazards such as predation and dessication). Once in the water, they swim rapidly—“swimming frenzy”—until they reach the open ocean, where many species spend the “lost years” living and feeding in floating sargassum. They “reappear” as juveniles in feeding grounds shared with adults or, in some cases, migrate to developmental feeding grounds. But some species, such as the leatherback, spend their entire lives in a pelagic existence, coming inshore only to mate and nest.



Courtesy of CEE



Conservation

Probably the single greatest threat to sea turtle survival in U.S. Atlantic waters is entanglement in active and discarded fishing gear. Sea turtles that become entangled and cannot reach the surface to breathe become increasingly anoxic (oxygen depleted) and comatose. Not all turtles in this condition are dead. Although they are inactive and their heart rate is negligible, recent research shows that they may be able to recover.

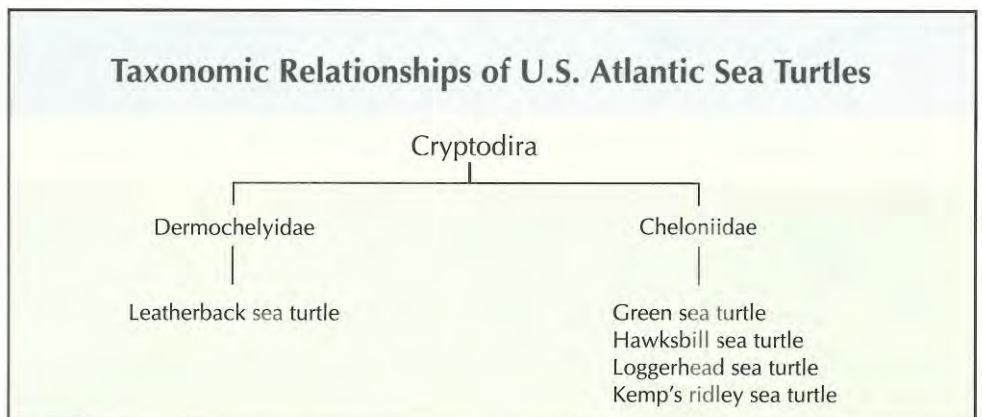
You can help sea turtles found in this condition: Place the turtle in the shade, carapace-up, and keep it moist with seawater until flipper activity resumes. Recovery may take more than 2 hours. Remember: Regulations require that you return the turtle to the water.

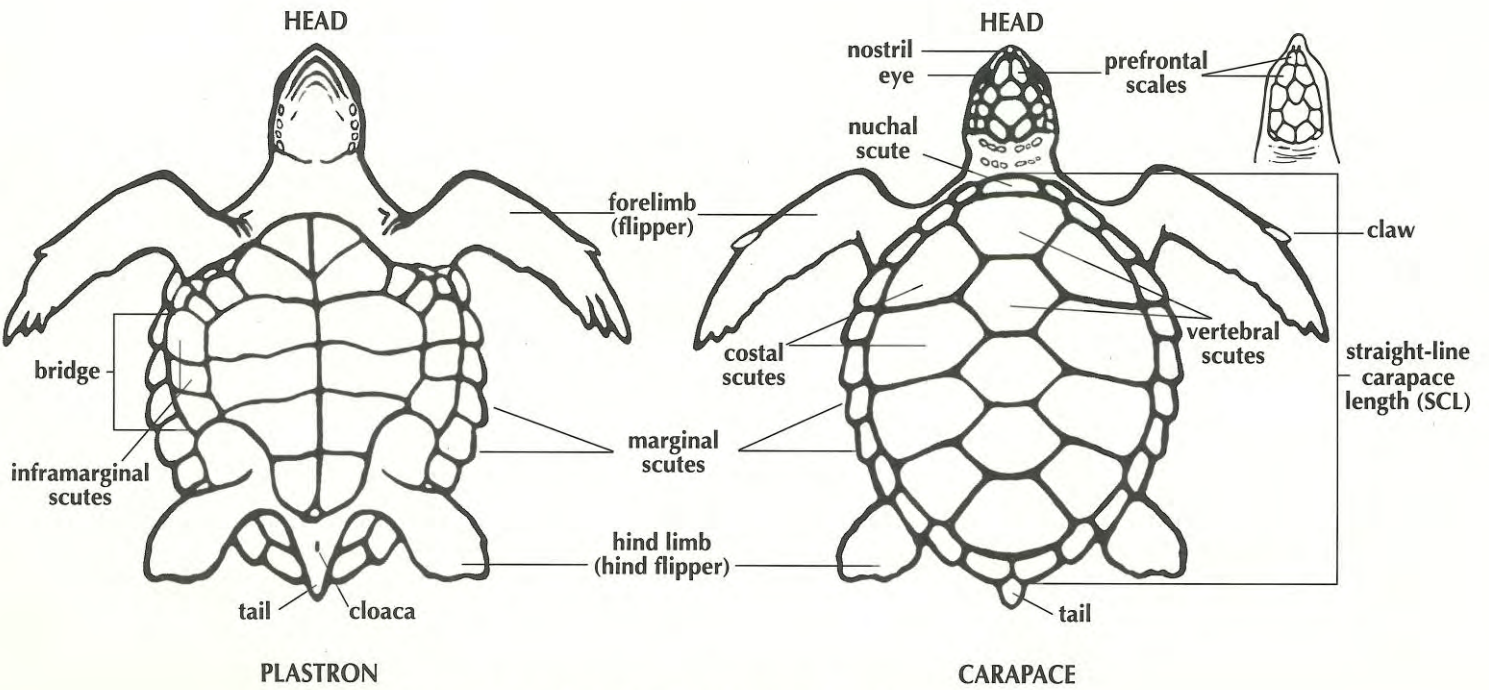
Dermochelyidae

Carapace and plastron lack horny shell scutes, being covered instead by leathery skin. Underlying bones of the shell are almost completely lost, their place taken by a mosaic of thousands of tiny bones imbedded below the leathery skin. Forelimbs are smooth, broad, and paddlelike and lack claws. This family is represented by a single living species, *Dermochelys coriacea*, the leatherback sea turtle.

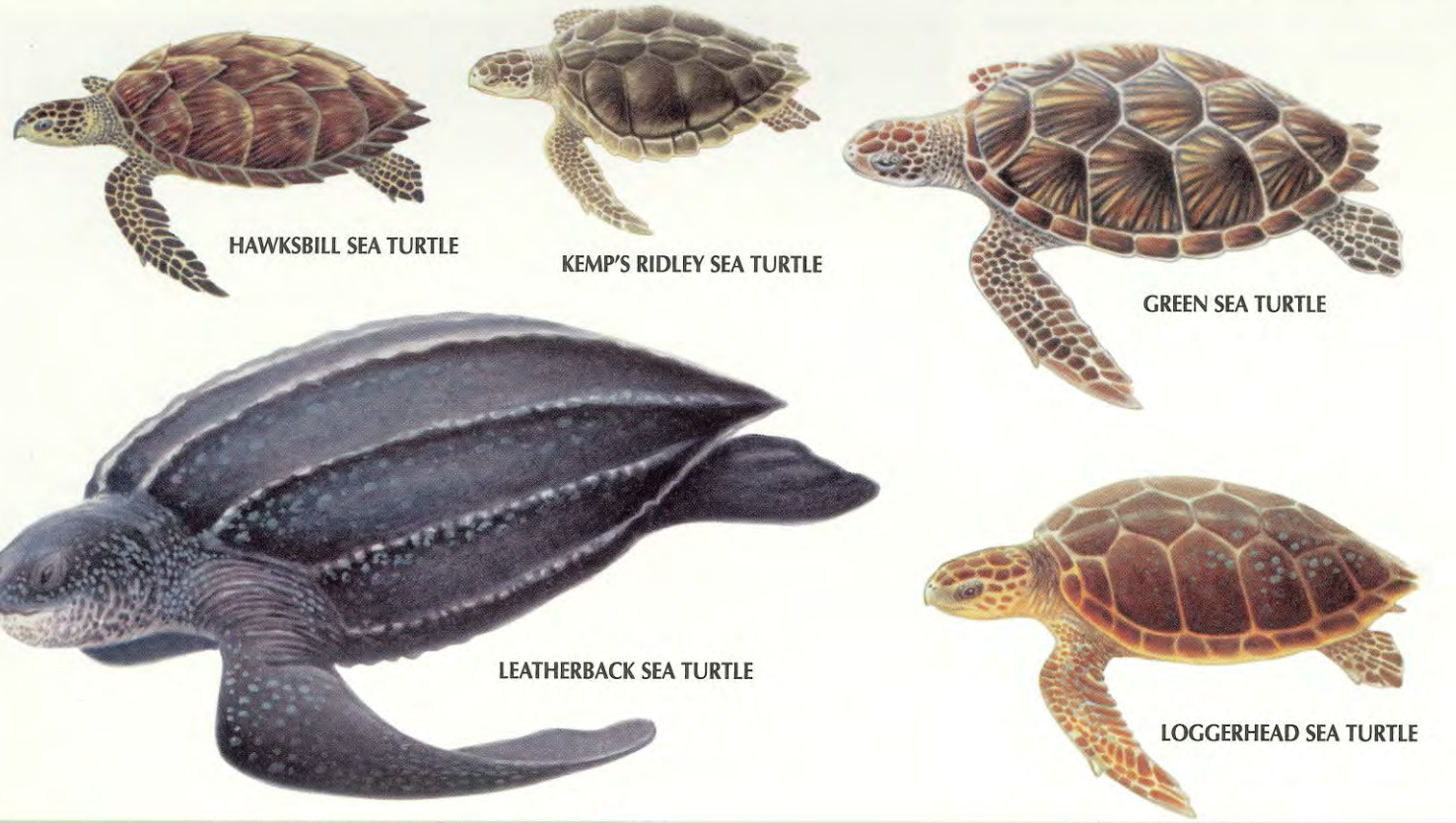
Cheloniidae

Family composed of the “hard-shelled” sea turtles. Shell is covered with horny scutes, variable in number, but usually including 5 vertebral scutes, 4 or 5 pairs of costal scutes, and 3 or 4 pairs of inframarginal scutes. Carapace is oval to heart-shaped. Forelimbs are covered with scales, are paddlelike, with elongated digits and 1 to 2 claws on each forelimb.





Note: Sex of sea turtles is difficult to determine through external morphology.



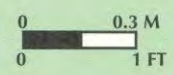
HAWKSBILL SEA TURTLE

KEMP'S RIDLEY SEA TURTLE

GREEN SEA TURTLE

LEATHERBACK SEA TURTLE

LOGGERHEAD SEA TURTLE





SIZE: Adult shell to 1.8 m SCL (6 ft), 727 kg to 1 ton.

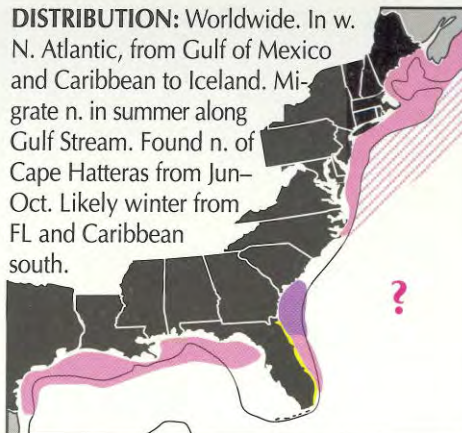
BODY/SHELL: Largest living turtle. **Lacks shell scutes, head and body scales.** Covered by **leathery skin.** Carapace divided longitudinally by 7 ridges; hingeless plastron divided by 5 ridges; head short, blunt, with **2 cusps projecting from upper jaw.** Limbs **clawless.**

COLOR: **Only black marine turtle in Atlantic,** but often spotted with white or pinkish blue on undersides of head, limbs, body.

BEHAVIOR: Solitary at sea, but adults may congregate off nesting beaches or while feeding on jellyfish. Relatively fast swimmers (>10 knots), breach occasionally. Spend majority of time feeding or basking near or at water surface. Most dives <200 m (660 ft), <20 min; but can dive to 1,300 m (4,290 ft).



DISTRIBUTION: Worldwide. In w. N. Atlantic, from Gulf of Mexico and Caribbean to Iceland. Migrate n. in summer along Gulf Stream. Found n. of Cape Hatteras from Jun–Oct. Likely winter from FL and Caribbean south.



HABITAT: Highly pelagic, migratory. Occasionally enter shallow waters of bays and estuaries.

DIET: Primarily jellyfish.

LIFE HISTORY: Courtship and mating thought to occur off nesting beaches. In w. Atlantic, nesting occurs Apr–Nov on e. coast of FL, Caribbean, and s; rarely in TX, GA, SC, NC. Mature females may oviposit >6 times per year, laying 50–170 eggs per clutch. Incubation lasts 53–74 days. Little is known about hatchling, juvenile movements.

STATUS AND HUMAN INTERACTIONS: Endangered. Principal threats in U.S. Atlantic are entanglement in fixed fishing gear, boat collisions, debris ingestion. Threats to eggs and hatchlings include nesting beach alteration and artificial lighting.

Right photo: The leatherback lacks a bony shell. Instead, the shell is covered by a thin, black, leathery skin raised in 7 ridges.

The two cusps on the upper jaw of a leatherback assist in grasping slippery jellyfish prey. ▼

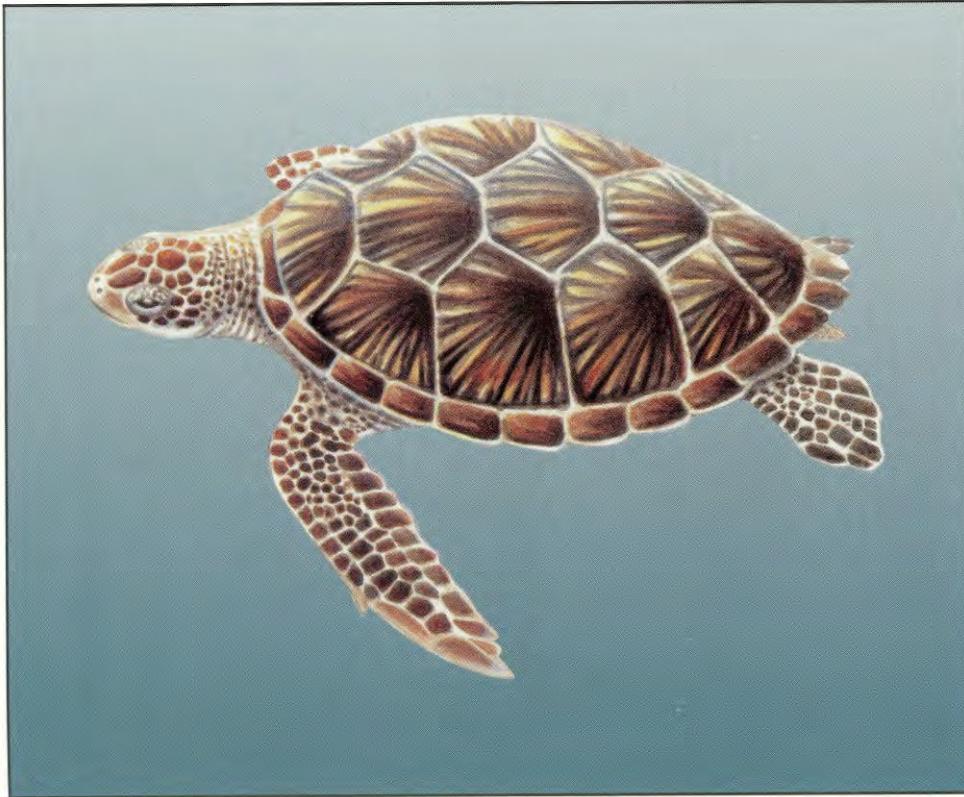


Larry Wood/MCJB



Scott Kraus/NEA

NOTE: Mortality of marine turtles found entangled/entrapped can be reduced: Place turtle carapace-up; keep moist and in shade until flipper activity resumes.



SIZE: Avg adult shell 1 m SCL (3.3 ft); avg weight 150 kg.

BODY/SHELL: Largest hard-shelled sea turtle. **Carapace smooth**, heart-shaped or oval, covered with horny scutes, with **4 pairs costals**, **nuchal scute not touching first costal**. **Head relatively small, rounded, with 1 pair prefrontals**. One claw on each forelimb.

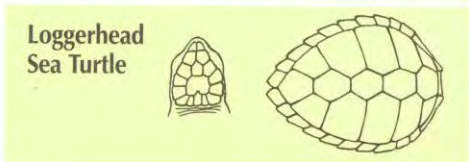
COLOR: Carapace and head olive to brown, some with mottled, radiating, or wavy pattern on scutes; plastron yellowish white. Hatchlings black above, white below.

BEHAVIOR: Can migrate great distances from nesting beaches to foraging grounds.

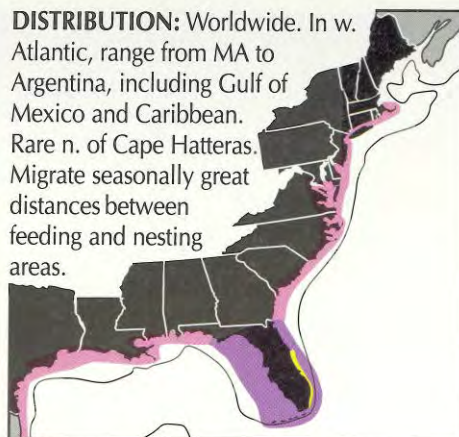
HABITAT: Pelagic as hatchlings (to 0.25 m SCL), then move to benthic feeding grounds; juveniles and adults congregate in relatively shallow, protected waters containing seagrass, macroalgae "pastures;" also coral reefs, worm reefs, rocky bottoms.



CAN BE CONFUSED WITH:



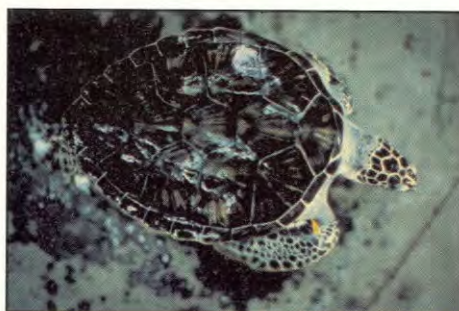
Greens can be distinguished by their smooth carapace and only 1 pair of prefrontal scales between the eyes. Note that carapace color is highly variable. ▶



DIET: Pelagic-stage hatchlings and juveniles eat molluscs, jellyfish, crustaceans. Diet shifts to seagrasses, macroalgae as juveniles mature and move inshore.

LIFE HISTORY: Mating occurs off nesting beaches close to shore. Mature females nest Mar–Oct (peak May–Jun). U.S. nesting occurs on tropical beaches in FL, Puerto Rico, U.S. Virgin Islands. Females oviposit avg 2–3 times per season, laying 100–150 eggs per clutch. Incubation lasts 45–60 days.

STATUS AND HUMAN INTERACTIONS: Breeding population endangered in FL; threatened elsewhere. Historically exploited for eggs, meat. In U.S. Atlantic, degradation of nesting and feeding habitats, boat collisions, fishing gear entanglement, and disease are serious problems.



Tom Doty/CETAP

NOTE: Mortality of marine turtles found entangled/entrapped can be reduced: Place turtle carapace-up; keep moist and in shade until flipper activity resumes.



SIZE: Avg adult shell 0.92 m SCL (3 ft), can reach 1.2 m; avg adult weight 115 kg.

BODY/SHELL: Carapace covered with horny scutes, with **5 pairs costals, nuchal scute touches first costal; 3 pairs inframarginals present on bridge.** Head large, broad, with 2 pairs prefrontals; jaws powerful for crushing prey. Two claws on each forelimb.

COLOR: Carapace and head yellow-orange to reddish brown, often covered by barnacles, fouling organisms; plastron yellowish to light brown. Hatchlings light brown to almost black.

BEHAVIOR: Hatchlings engage in "swimming frenzy" for about 20 hrs after hatching, carrying them offshore. May live in sargassum rafts until reach approx 0.45 m SCL. Juveniles, adults tend to congregate at same nearshore feeding grounds each year. Loggerheads may hibernate in winter.

HABITAT: Pelagic as hatchlings, then migrate to nearshore waters. Adults, juveniles inhabit subtropical continental shelf and coastal waters (bays, lagoons, river mouths).



Loggerhead Sea Turtle

CAN BE CONFUSED WITH:

Kemp's Ridley Sea Turtle

Hawksbill Sea Turtle

Green Sea Turtle

DISTRIBUTION: Worldwide. In w. Atlantic, from Newfoundland to Argentina, including Gulf of Mexico and Caribbean. Migrate n. over continental shelf in summer; found n. of Cape Hatteras May–Oct. Retreat s. in winter.

DIET: Primarily benthic feeders on crustaceans, molluscs.

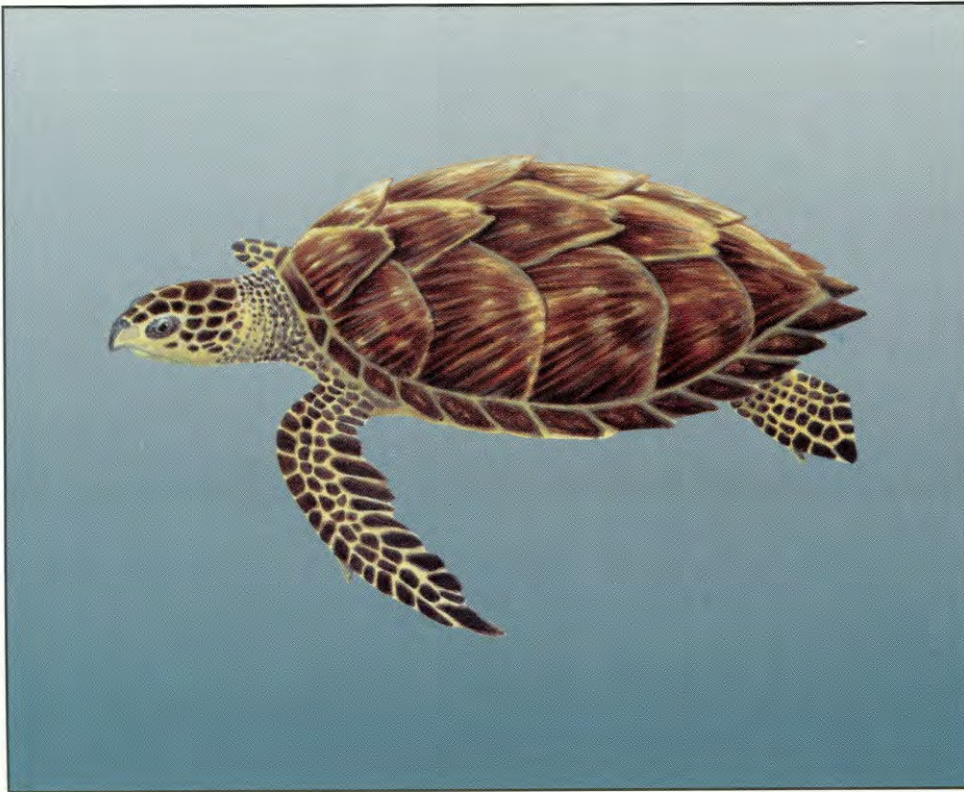
LIFE HISTORY: Sexes thought to migrate together from foraging sites to nesting beaches, where mating occurs in surface waters. Nest Apr–Sep (peak Jun–Jul) on temperate beaches from s. NJ to FL; major U.S. nesting area is e. FL. Mature females may oviposit 3–6 times per season, laying 95–150 eggs per clutch. Incubation lasts 49–71 days.

STATUS AND HUMAN INTERACTIONS: Threatened. In U.S. Atlantic, greatest known mortality is entanglement in towed or fixed fishing gear. Boat collisions are also a serious problem. Threats to eggs, hatchlings include nesting beach degradation (development, erosion control, etc.) and artificial lighting.



Tom Dohy/CETAP

NOTE: Mortality of marine turtles found entangled/entrapped can be reduced: Place turtle carapace-up; keep moist and in shade until flipper activity resumes.



SIZE: Avg adult shell 0.66–0.86 m SCL (2.2–2.8 ft); avg weight 82 kg.

BODY/SHELL: Carapace shield-shaped, covered with **thick, horny, overlapping scutes, with 4 pairs costals, nuchal scute not touching first costal.** Head narrow with 2 pairs prefrontals, **beak-like snout.** Two claws on each forelimb.

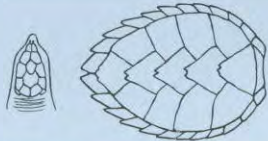
COLOR: Carapace pattern “tortoiseshell,” with radiating brown, black, amber streaks; head scales dark brown with yellow margins; plastron yellow.

BEHAVIOR: Migrate between feeding and nesting grounds. Adults, large juveniles capable of making deep dives (>100 m) to forage on deep-water sponges.

HABITAT: Pelagic as hatchlings and juveniles (to 0.25 m SCL), then move to feeding grounds in rocky or coral reef waters in the tropics, subtropics. Pelagic and benthic habitats poorly understood. Juveniles favor shallow waters, adults may forage in deeper waters.

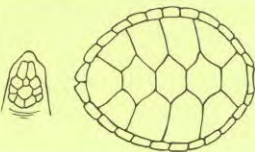


Hawksbill Sea Turtle

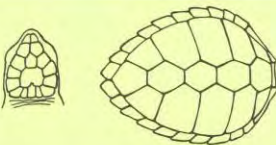


CAN BE CONFUSED WITH:

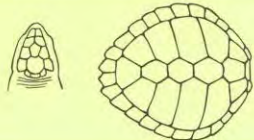
Green Sea Turtle



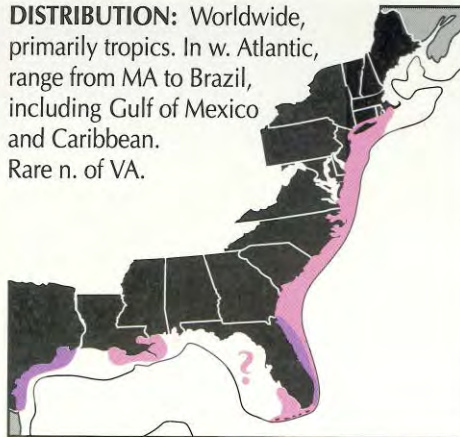
Loggerhead Sea Turtle



Kemp's Ridley Sea Turtle



DISTRIBUTION: Worldwide, primarily tropics. In w. Atlantic, range from MA to Brazil, including Gulf of Mexico and Caribbean. Rare n. of VA.



DIET: Primarily sponges and benthic invertebrates.

LIFE HISTORY: Nesting occurs year-round. In w. Atlantic, nest on beaches in Caribbean, C. and S. America. Rare nesting in FL. Mature females oviposit avg 4–6 times per season, laying 140–160 eggs per clutch. Incubation lasts 47–77 days.

STATUS AND HUMAN INTERACTIONS: Endangered. Highly exploited worldwide for tortoiseshell, and more recently, whole stuffed turtles. In U.S. Atlantic and Caribbean, degradation of coral reefs and nesting beaches remains a serious problem.



Rob Nawojchik/MA

NOTE: Mortality of marine turtles found entangled/entrapped can be reduced: Place turtle carapace-up; keep moist and in shade until flipper activity resumes.

The bird-like “beak” of the hawksbill aids in feeding from crevices and hard surfaces, such as coral reefs.



SIZE: Smallest sea turtle; adult shell 0.58–0.80 m SCL (1.9–2.6 ft); weight 40–50 kg.

BODY/SHELL: Carapace heart-shaped, covered with horny scutes, with **5 costals, nuchal scute touches first costal; 4 inframarginals with pores present on bridge.** Head broad, but pointed, with 2 pairs prefrontals; jaws powerful and strongly ridged. One claw on each forelimb.

COLOR: Carapace light olive to gray; head and limbs gray; plastron white. Hatchlings dark gray to black.

BEHAVIOR: Adults found at feeding grounds primarily in the Gulf of Mexico. Juveniles feed in nearshore waters along the East Coast and Gulf; migrate s. for winter. Some remain too long, are caught in cold water, become cold-stunned, and die.

HABITAT: Pelagic as hatchlings (to 0.20 m SCL), then enter nearshore waters, primarily those with seagrass beds or mud bottoms favored by crabs. Adults, juveniles utilize similar inshore coastal waters.



Kemp's Ridley Sea Turtle

CAN BE CONFUSED WITH:

Loggerhead Sea Turtle

Hawksbill Sea Turtle

Green Sea Turtle

The smallest sea turtle, Kemp's ridley can be distinguished by a heart-shaped carapace and a large, broad head.

DISTRIBUTION: Atlantic, primarily w. N. Atlantic. Range: Nova Scotia to Mexico. Adults and juveniles found year-round in Gulf of Mexico; many juveniles migrate n. along the East Coast in summer, then retreat s. in fall.

DIET: Primarily crabs but also shrimp, molluscs.

LIFE HISTORY: Both sexes migrate to waters off nesting beaches to mate. Ridleys are unique: Females may nest in mass aggregations called "arribadas" (Spanish for "arrival"); they nest during the day; and 99% of all nesting occurs on several beaches near Rancho Nuevo, Mexico. Some single nesting occurs on beaches in Mexico, TX, FL, SC, NC. Nest Apr–Aug (peak Apr–Jun) and oviposit avg 3 times per season, laying avg 103 eggs per clutch. Incubation lasts 48–65 days.

STATUS AND HUMAN INTERACTIONS: Endangered. Egg collection, taking of nesting females, and entanglement in towed fishing gear have decimated the species. Mexican and U.S. law now prohibits taking of eggs and turtles. Entanglement in trawls remains the primary source of mortality despite TED regulations.

NOTE: Mortality of marine turtles found entangled/entrapped can be reduced: Place turtle carapace-up; keep moist and in shade until flipper activity resumes.



Tom Doty/CETAP

Marine Animal Stranding Patrols



- **In conjunction with Sea Turtle Nest Surveys**
 - **Beach Patrol**
 - Site, Sound & Smell
 - Who to Call...
- **Read Marine Species Stranding Reporting Procedures Document and Complete Associated Datasheet.**
 - This document is included as part of the Sea Turtle Program SOP appendices.

Local Natural Resources Contacts



- **Mr. Lawrence McGrogan,**
 - Conservation Law-Enforcement Officer/BST
 - PWD NAS Oceana
 - Office: (757) 433-2151
 - Cell: (757) 635-5436

- **Mr. Mark Edwards,**
 - Biological Science Technician (BST)
 - PWD NAS Oceana
 - Office: (757) 433-2151
 - Cell: (757) 636-4370

- **Ms. Michael Wright,**
 - Natural Resources Specialist (NRS) & TL
 - PWD NAS Oceana
 - Office: (757) 433-3461
 - Cell: (757) 373-8531

Servicing: NAS Oceana, NASO Dam Neck Annex, NALF Fentress, NSA Hampton Roads Northwest Annex, and Navy Dare County Bombing Range.

Appendix D

Map

NASO DNA Sea Turtle Patrol Reference Map (Rev May 2013)









0.5

Miles

810

Meters

-  Storage Shed
-  Vehicle Beach Access
-  ATV Beach Access
-  Walkover Beach Access
-  Range Restricted Beach Access
-  Alternate Route

No Alt. Route
as of May 2014

Appendix E

Sunrise/Sunset Table

Sunrise and Sunset Timetable

Richmond, Virginia

Sunrise-sunset times below are Eastern Standard Time
Add one hour for Daylight Saving Time, if and when in use.

Day	JULY		AUG		SEPT		OCT		NOV		DEC		JAN		FEB		MAR		APR		MAY		JUNE	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
1	4:52	7:35	5:14	7:18	5:40	6:39	6:05	7:53	6:35	5:12	7:06	4:52	7:25	5:02	7:14	5:33	6:41	6:04	5:55	6:33	5:14	7:00	4:50	7:26
2	4:53	7:35	5:14	7:17	5:41	6:38	6:06	5:52	6:36	5:11	7:06	4:52	7:25	5:03	7:13	5:34	6:39	6:05	5:53	6:34	5:13	7:01	4:50	7:26
3	4:53	7:35	5:15	7:16	5:42	6:36	6:07	5:50	6:37	5:10	7:07	4:52	7:25	5:04	7:12	5:36	6:38	6:06	5:52	6:38	5:12	7:02	4:49	7:27
4	4:54	7:35	5:16	7:15	5:42	6:35	6:08	5:49	6:38	5:09	7:08	4:51	7:25	5:05	7:11	5:37	6:36	6:07	5:50	6:36	5:11	7:03	4:49	7:28
5	4:54	7:34	5:17	7:14	5:43	6:33	6:09	5:47	6:39	5:08	7:09	4:51	7:25	5:05	7:10	5:38	6:35	6:08	5:49	6:37	5:10	7:04	4:49	7:28
6	4:55	7:34	5:18	7:13	5:44	6:32	6:09	5:46	6:40	5:07	7:10	4:51	7:25	5:06	7:09	5:39	6:34	6:09	5:47	6:38	5:09	7:05	4:49	7:29
7	4:55	7:34	5:19	7:12	5:45	6:30	6:10	5:44	6:41	5:06	7:11	4:51	7:25	5:07	7:08	5:40	6:32	6:10	5:46	6:38	5:08	7:06	4:49	7:29
8	4:56	7:34	5:20	7:11	5:46	6:29	6:11	5:43	6:42	5:05	7:12	4:51	7:25	5:08	7:07	5:41	6:31	6:11	5:44	6:39	5:07	7:07	4:48	7:30
9	4:57	7:33	5:20	7:10	5:47	6:27	6:12	5:42	6:43	5:04	7:13	4:51	7:25	5:09	7:06	5:42	6:29	6:12	5:43	6:40	5:06	7:07	4:48	7:30
10	4:57	7:33	5:21	7:09	5:47	6:26	6:13	5:40	6:44	5:03	7:13	4:52	7:25	5:10	7:05	5:43	6:28	6:13	5:41	6:41	5:05	7:08	4:48	7:31
11	4:58	7:33	5:22	7:07	5:48	6:24	6:14	5:39	6:45	5:02	7:14	4:52	7:25	5:11	7:04	5:44	6:26	6:14	5:40	6:42	5:04	7:09	4:48	7:31
12	4:59	7:32	5:23	7:06	5:49	6:23	6:15	5:37	6:46	5:01	7:15	4:52	7:24	5:12	7:03	5:45	6:25	6:15	5:39	6:43	5:03	7:10	4:48	7:32
13	4:59	7:32	5:24	7:05	5:50	6:21	6:16	5:36	6:47	5:01	7:16	4:52	7:24	5:13	7:02	5:47	6:23	6:16	5:37	6:44	5:02	7:11	4:48	7:32
14	5:00	7:31	5:25	7:04	5:51	6:20	6:17	5:34	6:48	5:00	7:16	4:52	7:24	5:14	7:01	5:48	6:22	6:17	5:36	6:45	5:01	7:12	4:48	7:33
15	5:01	7:31	5:25	7:03	5:52	6:18	6:18	5:33	6:49	4:59	7:17	4:53	7:24	5:15	7:00	5:49	6:20	6:18	5:34	6:46	5:00	7:13	4:48	7:33
16	5:01	7:30	5:26	7:01	5:52	6:17	6:19	5:32	6:50	4:59	7:18	4:53	7:23	5:16	6:59	5:50	6:19	6:18	5:33	6:47	4:59	7:14	4:48	7:33
17	5:02	7:30	5:27	7:00	5:53	6:15	6:20	5:30	6:51	4:58	7:18	4:53	7:23	5:17	6:57	5:51	6:17	6:19	5:32	6:48	4:59	7:14	4:48	7:34
18	5:03	7:29	5:28	6:59	5:54	6:13	6:21	5:29	6:52	4:57	7:19	4:54	7:23	5:18	6:56	5:52	6:16	6:20	5:30	6:48	4:58	7:15	4:48	7:34
19	5:03	7:28	5:29	6:57	5:55	6:12	6:22	5:28	6:53	4:57	7:20	4:54	7:22	5:19	6:55	5:53	6:14	6:21	5:29	6:49	4:57	7:16	4:49	7:34
20	5:04	7:28	5:30	6:56	5:56	6:10	6:22	5:26	6:55	4:56	7:20	4:55	7:22	5:20	6:54	5:54	6:13	6:22	5:28	6:50	4:56	7:17	4:49	7:34
21	5:05	7:27	5:31	6:55	5:57	6:08	6:23	5:25	6:56	4:55	7:21	4:55	7:21	5:21	6:53	5:55	6:11	6:23	5:26	6:51	4:56	7:18	4:49	7:34
22	5:06	7:27	5:31	6:53	5:57	6:07	6:24	5:24	6:57	4:55	7:21	4:55	7:21	5:22	6:51	5:56	6:10	6:24	5:25	6:52	4:55	7:18	4:49	7:35
23	5:06	7:26	5:32	6:52	5:58	6:06	6:25	5:22	6:58	4:55	7:22	4:56	7:20	5:23	6:50	5:57	6:08	6:25	5:24	6:53	4:54	7:19	4:50	7:35
24	5:07	7:25	5:33	6:51	5:59	6:04	6:26	5:21	6:59	4:54	7:22	4:57	7:20	5:25	6:49	5:58	6:07	6:26	5:22	6:54	4:54	7:20	4:50	7:35
25	5:08	7:24	5:34	6:49	6:00	6:03	6:27	5:20	7:00	4:54	7:23	4:57	7:19	5:26	6:47	5:59	6:05	6:27	5:21	6:55	4:53	7:21	4:50	7:35
26	5:09	7:24	5:35	6:48	6:01	6:01	6:28	5:19	7:01	4:53	7:23	4:58	7:18	5:27	6:46	6:00	6:04	6:28	5:20	6:56	4:53	7:22	4:50	7:35
27	5:09	7:23	5:36	6:47	6:02	6:00	6:29	5:18	7:02	4:53	7:23	4:58	7:18	5:28	6:45	6:01	6:02	6:29	5:19	6:57	4:52	7:22	4:51	7:35
28	5:10	7:22	5:37	6:45	6:02	5:58	6:30	5:16	7:03	4:53	7:24	4:59	7:17	5:29	6:43	6:02	6:01	6:29	5:18	6:58	4:52	7:23	4:51	7:35
29	5:11	7:21	5:37	6:44	6:03	5:56	6:31	5:15	7:04	4:52	7:24	5:00	7:16	5:30	6:42	6:03	5:59	6:30	5:16	6:58	4:51	7:24	4:52	7:35
30	5:12	7:20	5:38	6:42	6:04	5:55	6:32	5:14	7:05	4:52	7:24	5:01	7:15	5:31			5:58	6:31	5:15	6:59	4:51	7:24	4:52	7:35
31	5:13	7:19	5:39	6:41			6:33	5:13			7:24	5:02	7:15	5:32			5:56	6:32			4:50	7:25		

Apply corrections below to Richmond sunrise-sunset times
to obtain official times at other Virginia locations.

Location	Correction	Location	Correction
Newport News	-5 minutes	Bristol	+19 minutes
Norfolk	-5 minutes	Cape Charles	-6 minutes
Roanoke	+10 minutes	Charlottesville	+4 minutes
Tazewell	+16 minutes	Chincoteague	-8 minutes
Williamsburg	-3 minutes	Danville	+8 minutes
Winchester	+3 minutes	Fredericksburg	0 minutes

Appendix F

Sea Turtle Patrol Log

Appendix G

Stranding Reporting Procedures and Datasheet

STRANDING REPORTING PROCESS

1. Contact the VA Aquarium Stranding Team (757-385-7575, 0830-1630 hours or 757-385-7576 for afterhours live stranding emergencies) for sea turtle, sturgeon, and marine mammal strandings. For fish strandings (such as Sharks, mass non-shark fish strandings, sturgeon, large unusual fish strandings, or any other protected fish species of concern) contact the Virginia Aquarium's Curator of Fishes, Beth Firchau, 757-434-0745.
2. Fill-out the STRANDING REPORT FORM (see below) for on-land or open water identified strandings and Return to your installation Natural Resources Manager (NRM), ASAP.
3. Notify your NRM of the Stranding(s), immediately. If the stranding involves marine mammals or sturgeon provide them the information in the stranding report form. (Michael Wright, 757-373-8531) The NRM will notify the NAVFAC MIDLANT EV22 Subject Matter Expert (SME) and NOAA POCs, as appropriate.
4. The NRM will Call OPNAVINST 3100.6H Reportable Strandings into CNO N45, Washington DC 703-695-5271 (Frank Stone), 703-342-6455 (Bob Gisiner) &/ or the NOC Battalion Watch Captain (703-692-9284); COMLANTFLT 757-836-5221 (Richard "Jene" Nissen); and NAVFAC MIDLANT Core (Jessica Bassi, 757-341-0493).
 - o The following strandings are OPNAVIST reportable events:
 - Any stranding that involves a Northern Right Whale or Beaked Whale.
 - Any stranding that involves a floating whale in open water.
 - Any discovery of a whale stranded ashore.
 - Any mass stranding (two or more animals) of whales, or dolphins that results in coverage by the local or national media.
 - Claims of unusual marine mammal behavior reported in the media, or by National Marine Fisheries Service, a private party or non-governmental entity in which naval operations, exercises or training have been implicated are reportable events.
 - Any other incident involving marine mammals, which have significant media interest and may implicate naval operations at sea are also reportable events. Examples of such marine mammal events might include manatee strandings or mass strandings (two or more) of dolphins, seals, sea lions, otters, etc.
5. If it is determined that an OPREP 3 Navy Blue report is required related to the stranding event the Natural Resources Manager will coordinate with the CDO to complete the initial report.
6. Enter Stranding Report Data into the NASO Natural Resources Access Database.

Note: Regarding Sea turtles, Marine Mammals, Sturgeon and/or other Protected Species, ONLY an individual/organization containing the appropriate Regulatory Issued Permits (e.g., USFWS, NOAA, VAST, VDGIF, VCU, etc.) is legally authorized to relocate/touch these animals. The NASO NRM has obtained a NOAA-NMFS issued permit regarding sturgeon salvage and is inquiring regarding obtaining permits regarding sea turtles with USFWS via VDGIF.

Key Contacts:

- Navy on Scene Coordinator (NOSC) = 757-341-0449(o); 757-636-4378(c)
- Regional Operations Center (ROC) = 757-322-2609(24hrs); 757-322-3093
- NASO Command Duty Officer (CDO) = 757-438-3159 (24hrs)
- NASO Natural Resources Manager (NRM) = 757-433-3461(o); 757-373- 8531(c)
- NASO Conservation Law-enforcement Officer (CLEO) = 757-433-2151(o); 757-635-5436(c)
- NASO Environmental Program Director = 757-433-3437(o)
- NAVFAC MIDLANT Core Marine Animal Media Manager = 757-341-0493(o)
- NAVFAC MIDLANT Core Natural Resources Supervisor = 757-341-0495(o)
- NAVFAC MIDLANT Core Environmental Conservation and Planning Director = 757-341-1988(o)
- NOAA Sturgeon POC = 978-282-8473(o)
- Virginia Aquarium Stranding Team (VAST) = 757-385-7575; 757-385-7576(emergency#)

Note: The ROC and the CDO should be able to assist with locating and getting equipment (if available) for emergency response. Jessica Bassi has developed the NAVFAC MIDLANT Regional Stranding Investigation Assistance Plans (RSIAP), which has received final approvals.

Note: The RSIAP indicates that the CDO will coordinate trying to obtain equipment to assist with marine animal stranding response, when needed. The need would be for large animal (e.g., whales) and mass stranding events (e.g., multiple dolphins stranding at the same time). Heavy equipment that can access and operate on a beach would be needed, primarily fork-lift type vehicles and vehicles that can dig large deep holes for burials.

- MACS-24 has provided emergency assistance previously.
 - Sgt. Leonard Oleson 757-492-6465 x229
 - GySgt Eric Orth 757-492-3878/3891
 - Maj Woodworth 757-492-6465 x234
- NSWDG may be able to assist (CLEO, Lawrence McGrogan may have additional POCs)
 - Keith Crutchfield 757-862-9006(o); 757-619-1145(c)
 - John Puvogel 757-862-9004(o)
 - Ken O'Malley 757-862-9002(o)
 - Sally Torgler 757-862-9001(o)
- VAANG Camp Pendleton CO has indicated that they have a battalion that could assist us upon request with equipment needs
 - SSG Reynaldo Abeng 757-493-3123(o); 757-2024268(c)
 - SFC Randy Carter 434-294-2100(c)
 - LTC Elena M. Scarbrough 757-493-3128(o); 434-480-7465(bb)

STRANDING REPORT FORM

1. Date of incident: _____
2. Time of incident(local vice zulu time): _____
3. Type of incident (turtle, dolphin, whale, seal, shark, sturgeon, other):
-

4. Location of incident(include lat/long; base or property name; and geographical location, floating in Atlantic Ocean nearshore, laying on beach in surf, laying on beach in rack line, laying on beach between the dune and the rack line, etc.) :
_____ / _____

5. Identity of person who discovered event (e.g. military, civilian, other government personnel):

6. Identity of person preparing this report (name, command, job position):

7. Time strandings commenced: _____

8. Time of last stranding: _____

9. Stranded Marine Animal Condition:

Species	Total #	Alive	Dead	Severely Decayed	Necropsy Completed (Yes, No, In Process)

10. Who performed or will be performing the necropsy.

11. Date & Time VA Aquarium Stranding Team was notified:

12. Date & Time VA Aquarium Stranding Team Responded on site:

13. Were Photos Taken, If so by whom, attach photos to report (send digital copies to the installation Natural Resources Manager):

14. Additional Notes:

15. Below Space Left Open for Additional Notes or Drawings:

REGIONAL STRANDING
INVESTIGATION ASSISTANCE PLAN

BETWEEN

NORTHEAST REGION, NATIONAL MARINE FISHERIES SERVICE OF THE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
DEPARTMENT OF COMMERCE
AND
MID-ATLANTIC REGION, UNITED STATES NAVY
DEPARTMENT OF DEFENSE

I. PURPOSE

The purpose of this Regional Stranding Investigation Assistance Plan (RSIAP or Plan) is to implement the National Memorandum of Understanding (MOU) (Attachment 1). The MOU establishes a framework consistent with federal fiscal law requirements whereby the Navy may assist the National Marine Fisheries Service (NMFS) with the Phase 1 and 2 investigations (See attachment (2) for definition of Phase 1 and 2, USE and MTEs) of uncommon stranding events (USE) during major training exercises (MTE) in specific geographical locations through the provision of in-kind services as specified later in this document. This Plan is intended to act as an instrument to more effectively respond to USEs during MTEs, subject to fiscal and procurement law requirements, and consistent with resource availability, military security, logistical feasibility, and operational or installation commitments. Additionally, this RSIAP ensures the optimum efficiency and maximum benefit to the United States by establishing a framework for cooperation and coordination between NMFS Northeast Region and Mid-Atlantic Region, U.S. Navy (the Parties) on marine mammal health and stranding responsibilities. This Plan is necessary and essential to further the mission of the Parties in that it will serve as an umbrella agreement that sets forth the general terms and conditions under which the Parties may seek cooperative programs and activities.

II. BACKGROUND

a. Through a National Coordinator and six regional coordinators, NMFS oversees, coordinates, and authorizes marine mammal stranding responses, associated activities and training to personnel. To respond to strandings, volunteer stranding networks have been established in all coastal states and are authorized through Letters of Authority from the NMFS regional offices.

b. Pursuant to the Atlantic Fleet Active Sonar Training (AFAST), Southern California Range Complex (SOCAL), Hawaii Range Complex (HRC), Mariana Islands Range Complex (MIRC), and Gulf of Alaska (GOA) Marine Mammal Protection Act (MMPA) Final Rules, the National MOU was created to establish a framework whereby the Navy can assist NMFS with Phase 1 and Phase 2 Investigations of USEs during MTEs. The National MOU requires completion of

RSIAPs for these areas to further identify regional assets that might be requested by NMFS during a USE. In addition, the National MOU requires each RSIAP to identify high priority species based on the USE species identified below:

(1) Uncommon Stranding Event (USE) – A stranding event that takes place during a major training exercise (MTE) and involves any one of the following:

(i) Two or more individuals of any cetacean species (not including mother/calf pairs), unless of species of concern listed in the next subparagraph found dead or live on shore within a 2-day period and occurring within 30 miles of one another.

(ii) A single individual or mother/calf pair of any of the following marine mammals of concern: beaked whale of any species, dwarf or pygmy sperm whales, melon-headed whales, pilot whales, right whales, humpback whales, sperm whales, blue whales, fin whales, or sei whales.

(iii) A group of 2 or more cetaceans of any species exhibiting indicators of distress.

III. AUTHORITIES

a. NMFS and Navy regions are authorized to enter into RSIAPs pursuant to the Marine Mammal Protection Act, 16 U.S.C. § 1361 et seq., and other authorities, as described in the National MOU (See paragraphs 3 & 5.e. of MOU).

b. The Economy Act, 31 U.S.C. § 1535, which provides that an agency may place an order with a major organizational unit within the same agency or another agency for goods or services if:

(A) Amounts are available;

(B) The ordering agency decides the order is in the best interest of the United States Government;

(C) The agency to fill the order is able to provide or get by contract the ordered goods or services; and

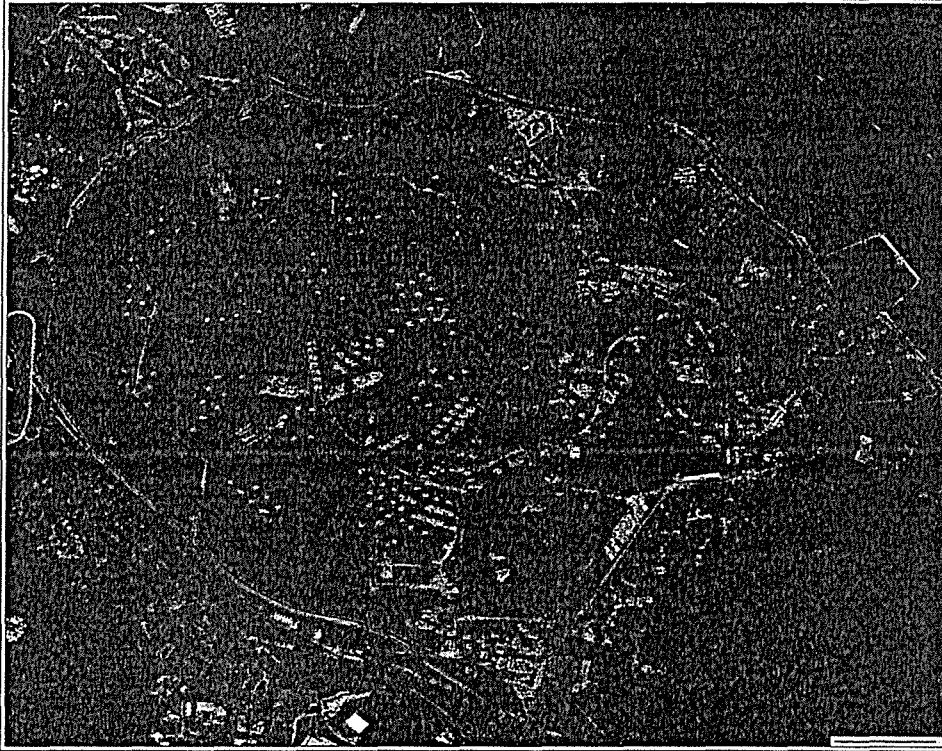
(D) The agency decides ordered goods or services cannot be provided by contract as conveniently or cheaply by a commercial enterprise (payments must be made on the basis of the actual cost of goods or services provided)

IV. SCOPE

a. INSTALLATIONS AND POCs FOR EACH INSTALLATION.

This Regional Stranding Investigation Assistance Plan is intended to address an agreement between Navy Region MIDLANT and NMFS Northeast Region. Navy installations covered by this agreement include the following:

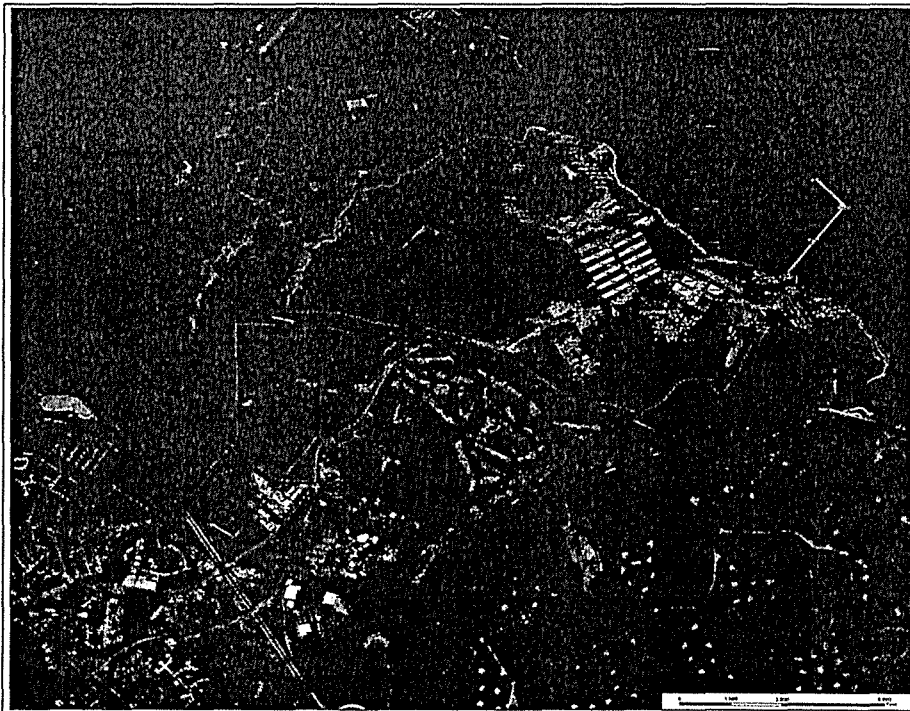
1.



Cheatham
Annex,

Yorktown, VA

POC: Trevor Manning (IEPD), telephone 757-887-4086, e-mail;
trevor.manning@navy.mil and (PWO) LT Trevor Bingham, telephone 757-887-4636,
email; trevor.bingham@navy.mil



2. Naval Weapons Station (NWS) Yorktown, Yorktown, VA
POC: Trevor Manning (IEPD), telephone 757-887-4086, e-mail;
trevor.manning@navy.mil and (PWO) LT Trevor Bingham, telephone 757-887-4636,
email; trevor.bingham@navy.mil

3. Naval Station Norfolk, Norfolk, VA
POC: Sharon Bauman (IEPD), telephone 757-341-0523, email; Sharon.bauman@navy.mil and (Port Ops) LCDR Morris Oxendine, telephone 757-442-0942, email; morris.oxendine@navy.mil



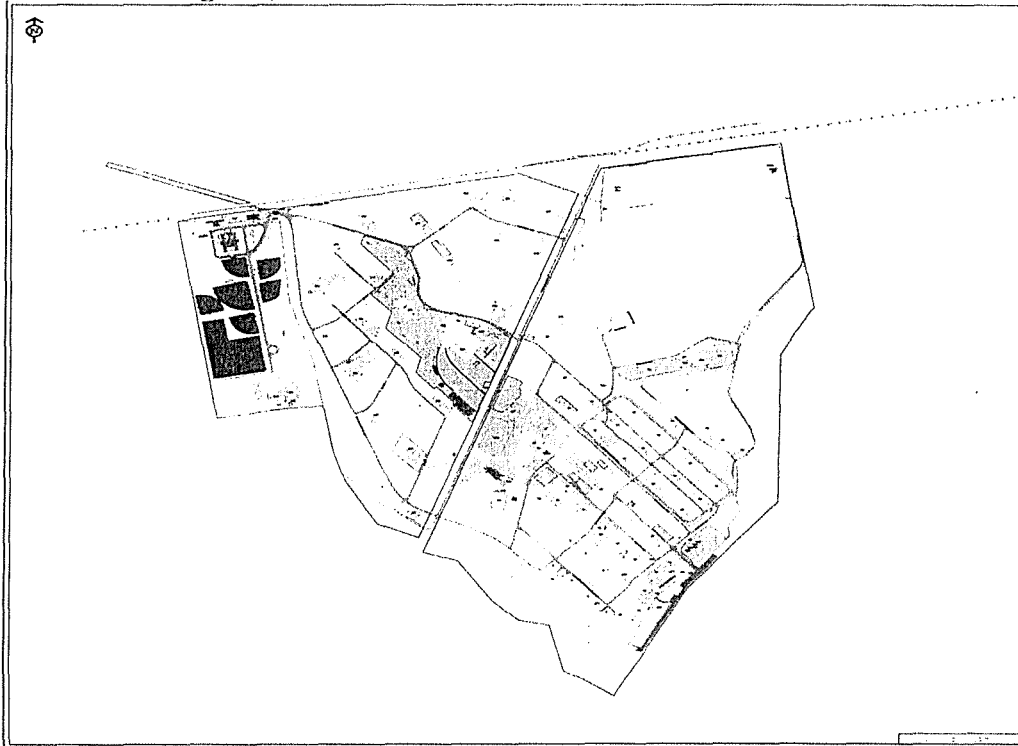
4. Norfolk Naval Shipyard, Portsmouth, VA
POC: Valerie Walker (IEPD), telephone 757 396-8270, email; valerie.walker@navy.mil.



5. Craney Island Fuel Depot, Portsmouth, VA
POC: Caren Hendrickson, telephone 757-445-3113, email;
caren.hendrickson@navy.mil.



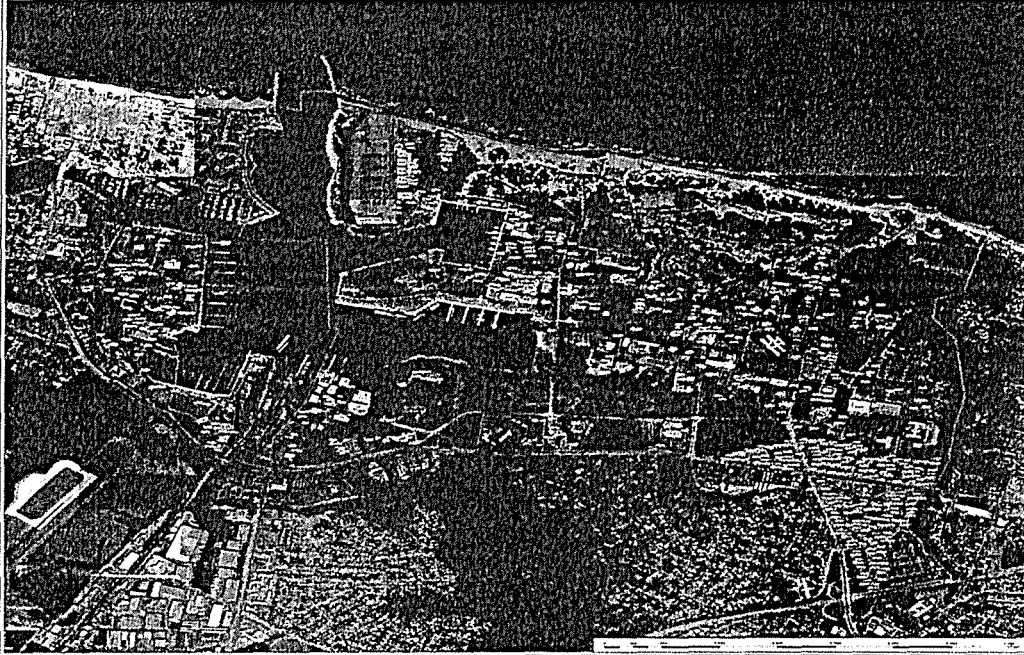
6. St. Julian's Creek Annex, Portsmouth, VA
POC: Valerie Walker (IEPD), telephone 757-396-8270, email;
Valerie.walker@navy.mil



7. Joint Expeditionary Base Little Creek-Fort Story

POC: Sharon Waligora (IEPD), telephone 757-462-5350, email;
Sharon.waligora@navy.mil

Little Creek:



Fort Story:

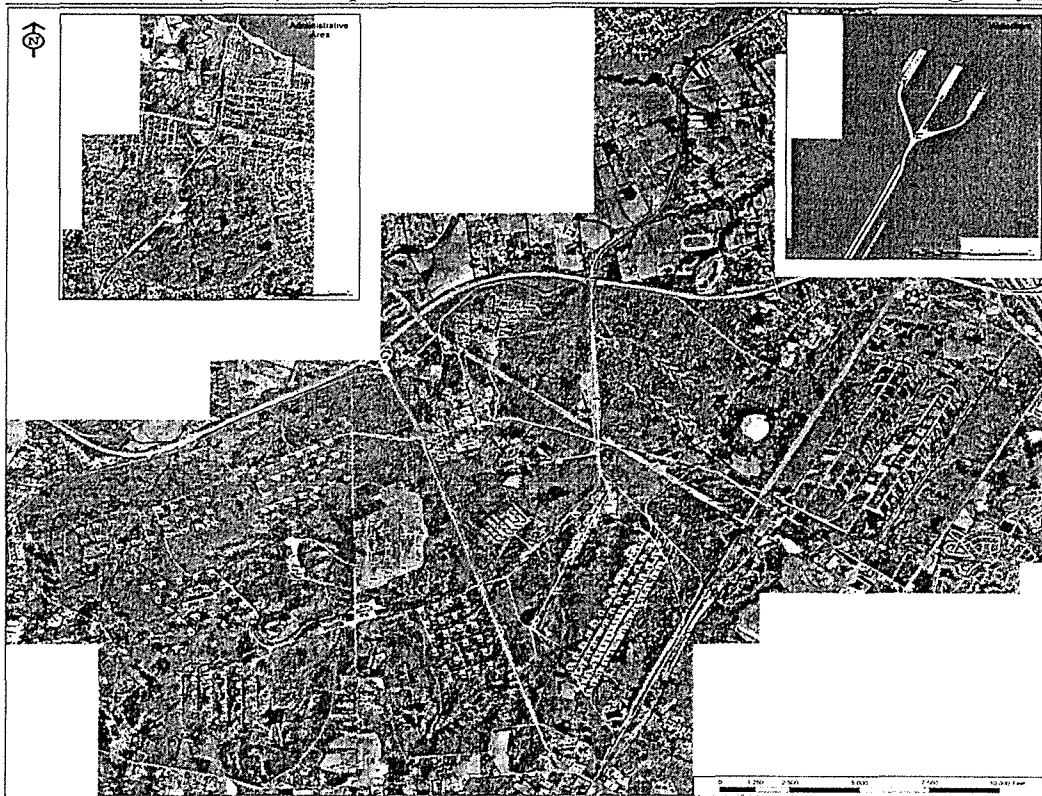


8. Dam Neck Annex, Virginia Beach, VA
POC's: Michael Wright (NRS), telephone 4757-433-3461, cell 757-373-8531, email; Michael.wright@navy.mil and Conservation Law Enforcement Officer (CLEO), telephone 757-433-2151, Cell 757-635-5436



9. Naval Weapons Station (NWS) Earle, Earle, NJ

POC: Eric Helms, telephone 732-866-2540, email; eric.helms@navy.mil and LCDR Matthew Tolhurst (PWO), telephone 732-866-2317, email: matthew.tolhurst@navy.mil



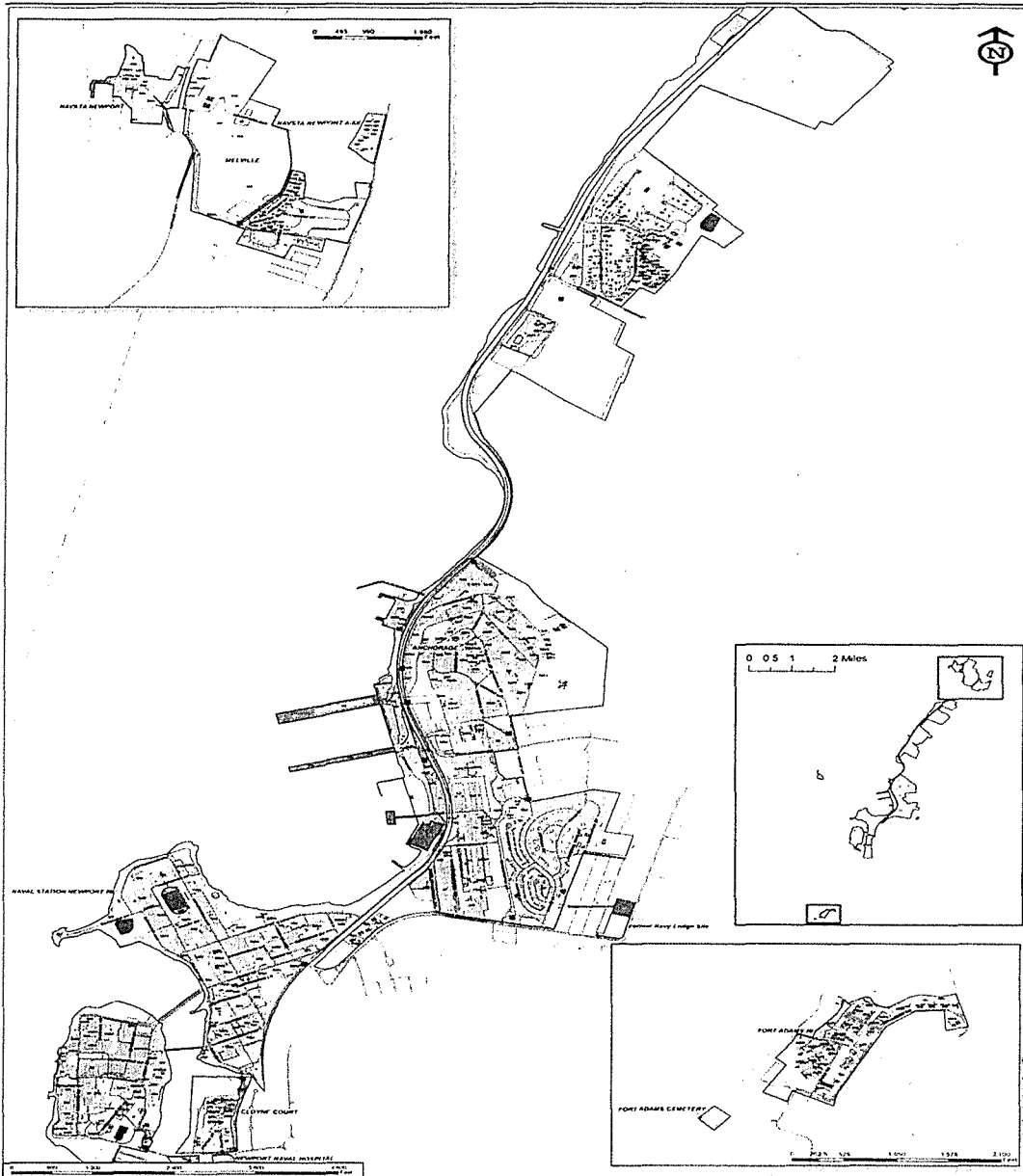
10. Naval Submarine Base New London, Groton, CT

POC: Michael Brown (IEPD), telephone 860-694-3976, email; michael.brown13@navy.mil



11. Naval Station Newport, Newport, RI

POC: Shannon Kam, (NRS), telephone 401 841-6377, email; shannon.kam@navy.mil

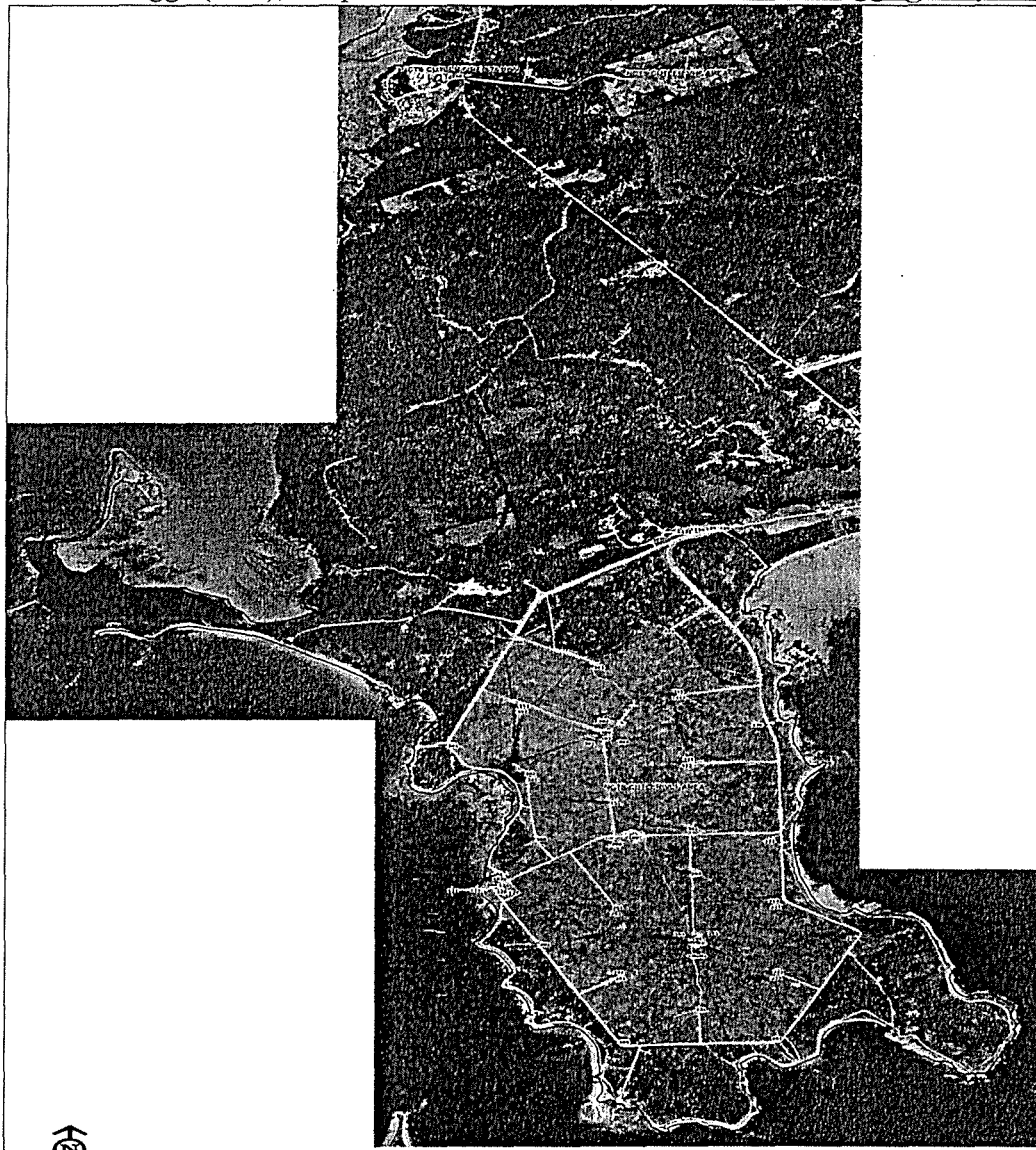


12. Portsmouth Naval Shipyard, Kittery, ME

POC: Ian Trefry (NRM), telephone 207-438-4362, email: ian.trefry@navy.mil and Lisa Joy (IEPD), telephone 207-438-4707, email: lisa.joy@navy.mil.



13. Naval Computer and Telecommunications (NCTAMS) Cutler, Cutler, ME
POC: Ian Trefry (NRM), telephone 207-438-4362, email: ian.trefry@navy.mil and Clifford
"Mark" Staggs (EPS), telephone 207-259-8282, email: clifford.staggs@navy.mil



V. GOALS AND OBJECTIVES

a. The Fleets and NMFS have developed a Stranding Protocol and Communication Plan that includes a flowchart with points of contact if a USE occurs. This is a related but separate requirement that remains unaffected by this document. This Plan is being developed to provide a consistent process for Navy support for Marine Mammal Stranding Investigations and Assistance when there is a USE during a MTE. This process may enable scientists to obtain better data on mechanisms involved in a marine mammal stranding.

b. Subject to the limitations in paragraph VI of this Plan, the Parties agree to cooperate on stranding response and investigations through the use of U.S. Navy and NMFS in-kind services when available. In-kind services by installation may include:

1. Cheatham Annex

- GROUND VEHICLES: Three front end loaders, 3 backhoes, 1 rubber tire excavator, 1 track excavator, and 2 skid steer loaders.
- PERSONNEL: Five equipment operators, as well as escorts to locations of stranding occurrences on the installation.

2. Naval Weapons Station Yorktown

- Same resources as Cheatham Annex.

3. Naval Station Norfolk (NSN)

- PERSONNEL: Operators for equipment listed below.
- BOATS: NSN can provide 1 small service boat.
- GROUND VEHICLES: NSN has four 6K forklifts and 2 pickup trucks.
- ACCESS TO BASE: The IEPD contact will provide Security with the information of who will be responding (agency and/or individual, and an example of a badge, if possible) and security will ensure they obtain access.

4. Norfolk Naval Shipyard (NNSY)

- BOATS: NNSY has limited small boat support through Port Operations.
- ACCESS TO BASE: Base access protocol is to contact the security office. The security POC is Glenn Hawthorne, Security Director, phone 757-396-5131.

5. Craney Island Fuel Depot

- ACCESS TO BASE: Coordinate with installation POC Caren Hendrickson.

6. St. Julian's Creek Annex

- BOATS: NNSY has limited small boat support through Port Operations.
- ACCESS TO BASE: Base access protocol is to contact the security office. The security POC is Glenn Hawthorne, Security Director, phone 757-396-5131.

7. Joint Expeditionary Base Little Creek-Fort Story

- No resources identified at this time.

8. Dam Neck Annex

- The Command Duty Office (CDO) will assist with locating and obtaining equipment. The CDO is manned 24 hours a day and can be reached by telephone at 757-433-2366.

9. NWS Earle

- ACCESS TO BASE: Temporary access can be coordinated on a case by case basis in accordance with the needs of the stranding response.
- BOATS: Vessels and operators are available for sighting animals in the vicinity of the Earle piers. Other small vessels may be available.
- GROUND VEHICLES: Cranes, backhoes, and frontend loaders are available. Personnel transport vehicles are available as well as dump trucks and flatbed trucks.
- PERSONNEL: Heavy equipment operators are available and security personnel are available on a case by case basis.
- OTHER SERVICES AND EQUIPMENT: Lifting straps, chains, and cargo nets available. The installation has a waste disposal contract if dumpsters need to be requested.

10. Subase New London

- GROUND VEHICLES: New London can offer 1 tractor trailer and flat bed truck and one landing craft mechanized (LCM) boat.
- ACCESS TO BASE: Contact Michael Brown, IEPD, for installation access.

11. Naval Station Newport

- Naval Station Newport has a current memorandum of agreement (MOA) with the NMFS NERO (Attachment 2). All protocols specified in the MOU will be adhered to and this MOA provides the following information:
- ACCESS TO BASE: The NMFS will be granted base access to perform necropsies at the Stillwater Basin boat ramp and parking lot, contingent upon ramp operations, and the beaches as a backup necropsy site. NMFS will be allowed to bring a vessel into the installation's restricted waters provided it stays 100 feet from any Navy or Coast Guard vessel. Security must be notified 3 days in advance of NMFS intentions to come onto the installation, except in emergency situations. Installation and/or security POCs will assist NFMS in obtaining the necessary camera and equipment passes.

12. Portsmouth Naval Shipyard

- ACCESS TO BASE: There is a landing site at Jamaica Island Beach and a temporary response set up location can be available at Jamaica Island.
- Anti-Terrorism Office (ATO) may be able to provide tug boat assistance provided mission requirements are not compromised. The Facility Response Team (FRT) has several small vessels available for nearshore operations.
- GROUND VEHICLES: Bob Landry (Transportation), phone 207-438-5557 may be able to secure an excavator, skid-steer, rubber tire crane, flat bed trucks, and/or passenger vans (for personnel transport).
- PERSONNEL: Heavy equipment operators, public relations coordination, enforcement, labor.
- OTHER SERVICES AND EQUIPMENT: Lifting straps, chains, shackles, and life jackets.

13. NCTAMS Cutler

- ACCESS TO BASE: There are landing sites at Davis Beach, Little Holly Cove, and Little Machias Bay Coastline. A temporary response set up location can be available at the old Coast Guard Landing Area, Davis Beach, and Little Holly Cove.
- PERSONNEL: Enforcement and general labor.

c. The Parties agree to share data (as clearance procedures allow) relevant to projects and activities conducted under this plan pursuant to the Atlantic Fleet Active Sonar Training (AFAST), Southern California Range Complex (SOCAL), Hawaii Range Complex (HRC), Mariana Islands Range Complex (MIRC), and Gulf of Alaska (GOA) Marine Mammal Protection Act (MMPA) Final Rules.

d. The Parties recognize that NMFS possesses limited marine mammal stranding response and investigation resources and may not be in a position to fully implement all of the tests and procedures listed as part of Phase 1 and Phase 2 Investigations. If NMFS identifies that specific tests, procedures, or analyses are needed to complete Phase 1 and Phase 2 Investigations, NMFS may request assistance from the Navy to do so. NMFS and the Navy may enter into additional implementing agreements to authorize the Navy to transfer funds to NMFS consistent with federal fiscal law, to support the implementation of the necessary investigational procedures/tests/analyses.

e. As soon as practical, upon completion of a project or activity year, NMFS agrees to provide an accounting of each project's expenditures for projects or activities with applicable statutes, regulations, and policies.

f. The Parties will meet annually in March to discuss the implementation and progress of the prior year(s) projects and activities, provide contact updates, and submit a report documenting data collected supported by this MOU. A template will be developed for submitting the annual report. The plan will be reviewed during the annual meeting for operation and effect.

g. NMFS will work with Navy POCs to ensure Navy personnel providing assistance have knowledge and expertise consistent with NMFS' stranding response protocols, procedures and guidelines.

VI. LIMITATIONS

This RSIAP is meant to serve as a regional framework for cooperation between the U.S. Navy and NMFS for assistance and response related to USEs during MTEs. Actions or activities agreed to in this Plan may not exceed the agreement between the Navy and NMFS in the National MOU. Nothing in this Plan obligates either Party to expend appropriations, provide in-kind services or equipment, or enter into any contract or other obligation. Projects or activities conducted under this Plan must comply with all applicable statutes and regulations, including those statutes and regulations applicable to procurement and the Economy Act, further, the projects or activities are contingent upon resource availability and logistic feasibility and must not negatively affect Navy operational or installation commitments or military security.

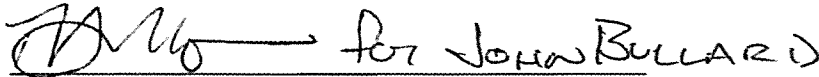
SIGNATURES



Rear Admiral Dixon R. Smith
Commander, Navy Region Mid-Atlantic

1/17/14

Date



NMFS Northeast Regional Administrator

11/21/13

Date



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

Michael F. Wright, Natural Resources Specialist, TL
DoD Partners in Flight Rep. (VA)
NAS Oceana Public Works Department
Environmental Program Division
953 Hornet Dr.
Bldg. 820, Suite 206
Virginia Beach, VA 23460-2190

MAY 29 2015

Dear Mr. Wright:

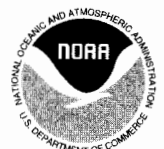
By this letter you are hereby designated to act as the primary contact and Co-Investigator for the DoD Partners in Flight Rep. (VA), Naval Air Station Oceana, Public Works Department, Environmental Program Division, for the Greater Atlantic Regional Fisheries Office under Endangered Species Act scientific research Permit No. 17273 to maximize the use of dead Atlantic (*Acipenser oxyrinchus oxyrinchus*) and shortnose (*Acipenser brevirostrum*) sturgeon parts for research and educational purposes. The Naval Air Station Oceana is acting as a Cooperating Facility under Permit No. 17273. Sturgeon samples may be obtained from individuals authorized to collect them in the course of salvage activities or any U.S. facility authorized to hold captive sturgeon. Sturgeon parts and samples may be used to support law enforcement actions, research studies, and outreach education. This authorization shall be subject to the following conditions:

1. A copy of this permit shall be in your possession during the proposed work.
2. Please read the permit and note the research conditions relating to activities authorized under the permit and detailed reporting requirements.
3. This letter authorizes you to utilize whole sturgeon or parts and pieces resulting from sturgeon salvage incidents for research and education purposes as well as respond to sturgeon salvage incidents.
4. This authorization is in force until August 9, 2018. This permit expires on the date indicated and is non-renewable. This permit may be extended by the Director, NMFS Office of Protected Resources, pursuant to applicable regulations and the requirements of the ESA.

Sincerely,

Jessica A. Pruden
Principal Investigator

Enclosure - Permit No. 17273, Appendices 3a-c
ecc: Mike Payne, F/PR1, Jennifer Skidmore, F/PR1





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

Permit No. 17273
Expiration Date: August 9, 2018
Reports Due: November 9th, annually

PERMIT TO TAKE/COLLECT, RECEIVE/POSSESS, AND IMPORT/EXPORT PROTECTED SPECIES¹ PARTS FOR SCIENTIFIC PURPOSES

I. Authorization

This permit is issued to NOAA Fisheries Northeast Region, Protected Resources Division (hereinafter "Permit Holder"), One Blackburn Drive, Gloucester, MA 01930, [Responsible Party: Mary Colligan], pursuant to the provisions of the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq.*); the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR Parts 222-226).

II. Abstract

The objective of the permitted activity, as described in the application, is to maximize the use of dead Atlantic (*Acipenser oxyrinchus oxyrinchus*) and shortnose (*A. brevirostrum*) sturgeon parts for research and educational purposes. Sturgeon samples may be obtained from individuals authorized to collect them in the course of scientific research, salvage activities, any U.S. facility authorized to hold captive sturgeon, or taken during other authorized activities. Sturgeon parts and samples may be used to support law enforcement actions, research studies (primarily genetics), and outreach education.

III. Terms and Conditions

The activities authorized herein must occur by the means, in the areas, and for the purposes set forth in the permit application, and as limited by the Terms and Conditions specified in this permit, including all attachments and appendices. Any permit noncompliance constitutes a violation and is grounds for permit modification, suspension, or revocation, and for enforcement action.

A. Duration of Permit

1. Personnel listed in Condition C.1 of this permit (hereinafter "Researchers") may conduct activities authorized by this permit through August 9, 2018. This permit expires on the date indicated and is non-renewable. This permit may be extended by the Director, NMFS Office of Protected Resources, pursuant to applicable regulations and the requirements of the ESA.

¹ "Protected species" include species listed as threatened or endangered under the ESA, and marine mammals.



2. Researchers must suspend all permitted activities occurring in the field in the event harassment, serious injury, or mortality² of protected species occurs during specimen collection in the field, or if authorized take³ or receipt/import/export of specimens is exceeded. The Permit Holder must submit a written incident report as described in Condition E.2. The Permits Division may grant authorization to resume permitted activities based on review of the incident report and in consideration of the Terms and Conditions of this permit.

B. Number and Kind(s) of Protected Species, Location(s) and Manner of Taking

1. The table below outlines the number of animals, by species, and the number of parts/specimens authorized to be taken/collected, and the locations and time periods in which these activities may occur.

Table 1: Activities authorized under Permit No. 17273, annually. Specimens may be salvaged from U.S. East coast rivers from Maine to Florida. Sturgeon parts/carcasses of any Distinct Population Segment (i.e., range-wide) may be collected.

SPECIES	PRODUCTION /ORIGIN	LIFESTAGE/ SEX	EXPECTED TAKE	TAKE ACTION	DETAILS
Sturgeon, shortnose	Wild	All	100	Import/export/ receive only	collection, receipt, and transport of dead animals
Sturgeon, shortnose	Captive	All	350	Import/export/ receive only	take action = receipt and transport only
Sturgeon, Atlantic	Wild	All	100	Import/export/ receive only	collection, receipt, and transport of dead animals
Sturgeon, Atlantic	Captive	All	75	Import/export/ receive only	take action = receipt and transport only

² This permit does not allow for unintentional harassment, serious injury, or mortality caused by the presence or actions of researchers in the field when collecting specimens from dead marine mammals. This includes, but is not limited to, harassment, injury, or death of animals attempting to avoid researchers (e.g., a pinniped stampede).

³ By regulation, a take under the MMPA includes the collection of dead animals, or parts thereof.

2. This permit does not authorize the harassment of any protected species.
3. In the case of an unusual mortality event, takes may be increased up to 1,000 animals with written approval from the Director, Office of Protected Resources.
4. Researchers must comply with all provisions specified in Appendix 1 of this permit for biological samples taken/collected, received/possessed, or imported/exported under authority of this permit.
5. Researchers working under this permit may collect visual images (*i.e.*, any form of still photographs, film, video, or other footage) as needed to document the permitted activities, provided the collection of such images in the field does not result in harassment of protected species.
 - a. The Permit Holder may use these images in printed materials (including commercial or scientific publications) and presentations provided the images are accompanied by a statement indicating that the activity depicted was conducted pursuant to Permit No. 17273. This statement must accompany the images in all subsequent uses or sales.
 - b. Annual reports required pursuant to Condition E.3 must note such incidental scientific, educational, or commercial uses of the images.
6. Upon written request from the Permit Holder, approval for photography, filming, or audio recording activities not essential to achieving the objectives of the permitted activities in the field, including allowing personnel not essential to the research (*e.g.* a documentary film crew) to be present, may be granted by the Chief, Permits Division.
 - a. Where such non-essential photography, filming, or recording activities are authorized they must not influence the conduct of permitted activities in any way or result in takes of protected species.
 - b. Personnel authorized to accompany the Researchers during permitted activities for the purpose of non-essential photography, filming, or recording activities are not allowed to participate in the permitted activities.
 - c. The Permit Holder and Researchers cannot require or accept compensation in return for allowing non-essential personnel to accompany Researchers to conduct non-essential photography, filming, or recording activities.

C. Qualifications, Responsibilities, and Designation of Personnel

1. At the discretion of the Permit Holder, the following Researchers may participate in the conduct of the permitted activities in accordance with their qualifications and the limitations specified herein:
 - a. Principal Investigator – Jessica Pruden;
 - b. Co-Investigators – See Appendix 3;
 - c. Research Assistants – any personnel identified by the Permit Holder or Principal Investigator and qualified to act pursuant to Conditions C.2, C.3, and C.4 of this permit.
2. Individuals conducting permitted activities must possess qualifications commensurate with their roles and responsibilities. The roles and responsibilities of personnel operating under this permit are as follows:
 - a. The Permit Holder is ultimately responsible for all activities of any individual who is operating under the authority of this permit. Where the Permit Holder is an institution/facility, the Responsible Party is the person at the institution/facility who is responsible for the supervision of the Principal Investigator.
 - b. The Principal Investigator (PI) is the individual primarily responsible for the taking, import, export and any related activities conducted under the permit. The PI must be on site during any activities conducted under this permit unless a Co-Investigator named in Condition C.1 is present to act in place of the PI.
 - c. Co-Investigators (CIs) are individuals who are qualified to conduct activities authorized by the permit without the on-site supervision of the PI. CIs assume the role and responsibility of the PI in the PI's absence.
 - d. Research Assistants (RAs) are individuals who work under the direct and on-site supervision of the PI or a CI. RAs cannot conduct permitted activities in the absence of the PI or a CI.
3. Personnel involved in permitted activities in the field must be reasonable in number and essential to conduct of the permitted activities. Essential personnel are limited to:
 - a. Individuals who perform a function directly supportive of and necessary to the permitted activity;

- b. Individuals included as backup for those personnel essential to the conduct of the permitted activity; and
 - c. Individuals included for training purposes.
4. Persons who require state or Federal licenses to conduct activities authorized under the permit must be duly licensed when undertaking such activities.
5. The Permit Holder or PI may designate additional CIs provided that a copy of the letter designating the individual, and a copy of the individual's curriculum vitae, is provided to the Permits Division via the online permits system (APPS: <https://apps.nmfs.noaa.gov>) on the day of designation and confirmed by mail. The Permit Holder cannot require or receive any direct or indirect compensation in return for requesting authorization for such person to act as a PI, CI, or RA under the permit.

D. Possession of Permit

1. This permit cannot be transferred or assigned to any other person.
2. The Permit Holder and all other persons operating under the authority of this permit must possess a copy of this permit: when engaged in a permitted activity; when a protected species part is in transit incidental to a permitted activity; and during any other time when any protected species part taken under such permit is in the possession of such persons.
3. A duplicate copy of this permit must be attached to the container, package, enclosure, or other means of containment in which a protected species part is placed for purposes of storage, transit, supervision, or care.

E. Reports

1. The Permit Holder must submit annual, final, and incident reports, and any papers or publications resulting from the research authorized herein to the Chief, Permits Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Room 13705, Silver Spring, MD 20910; phone (301) 427-8401; fax (301) 713-0376. The Permit Holder must submit annual, final, and incident reports, and any papers or publications resulting from the research authorized herein to the Permits Division. Reports may be submitted:
 - through the online system at <https://apps.nmfs.noaa.gov>;
 - by email attachment to the permit analyst for this permit; or
 - by hard copy mailed or faxed to the Chief, Permits Division, at the address listed above.

2. Written incident reports related to harassment, serious injury, or mortality events or to exceeding authorized take or receipt/import/export collection takes, must be submitted to the Chief, Permits Division within two weeks of the incident. The incident report must include a complete description of the events and identification of steps that will be taken to reduce the potential for additional incidents.
3. An annual report must be submitted to the Chief, Permits Division by November 9th for each year the permit is valid (August 9th – August 8th of each year). The annual report describing activities conducted during the previous permit year must follow the format in Appendix 2.
4. A final report must be submitted to the Chief, Permits Division within 180 days after expiration of the permit (February 9, 2019), or, if the research concludes prior to permit expiration, within 180 days of completion of the research. The final report must follow the format in Appendix 2.
5. Research results must be published or otherwise made available to the scientific community in a reasonable period of time.

F. Coordination

1. To the maximum extent practical, the Permit Holder must coordinate collection activities in the field with activities of other Permit Holders conducting the same or similar studies on the same species, in the same locations, or at the same times of year to avoid disturbance of animals.

G. Observers and Inspections

1. NMFS may review activities conducted pursuant to this permit. At the request of NMFS, the Permit Holder must cooperate with any such review by:
 - a. Allowing any employee of NOAA or any other person designated by the Director, NMFS Office of Protected Resources to observe permitted activities; and
 - b. Providing any documents or other information relating to the permitted activities.

H. Modification, Suspension, and Revocation

1. All permits are subject to suspension, revocation, modification, and denial in accordance with the provisions of subpart D [Permit Sanctions and Denials] of 15 CFR part 904.

2. The Director, NMFS Office of Protected Resources may modify, suspend, or revoke this permit in whole or in part:
 - a. In order to make the permit consistent with any change made after the date of permit issuance with respect to any applicable regulation prescribed under section 4 of the ESA;
 - b. In any case in which a violation of the terms and conditions of the permit is found;
 - c. In response to a written request⁴ from the Permit Holder;
 - d. If NMFS determines that the application or other information pertaining to the permitted activities (including, but not limited to, reports pursuant to Section E of this permit and information provided to NOAA personnel pursuant to Section G of this permit) includes false information; and
 - c. If NMFS determines that the authorized activities will operate to the disadvantage of threatened or endangered species or are otherwise no longer consistent with the purposes and policy in section 2 of the ESA.
3. Issuance of this permit does not guarantee or imply that NMFS will issue or approve subsequent permits or amendments for the same or similar activities requested by the Permit Holder, including those of a continuing nature.

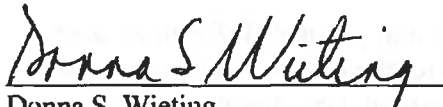
I. Penalties and Permit Sanctions

1. Any person who violates any provision of this permit, the ESA, or the regulations at 50 CFR parts 222-226 is subject to civil and criminal penalties, permit sanctions, and forfeiture as authorized under the ESA, and 15 CFR part 904.
2. NMFS shall be the sole arbiter of whether a given activity is within the scope and bounds of the authorization granted in this permit. The Permit Holder must contact the NMFS Permits Division for verification before conducting the activity if they are unsure whether an activity is within the scope of the permit. Failure to verify, where NMFS subsequently determines that an activity was outside the scope of the permit, may be used as evidence of a violation of the permit, the ESA, and applicable regulations in any enforcement actions.

⁴ The Permit Holder may request changes to the permit related to: the objectives or purposes of the permitted activities; the species or number of animals taken; and the location, time, or manner of taking/collecting, possessing, importing and exporting protected species. Such requests must be submitted in writing to the Chief, Permits Division in the format specified in the application instructions.

J. Acceptance of Permit

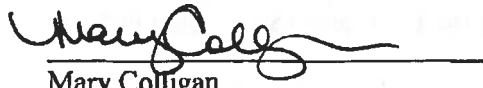
1. In signing this permit, the Permit Holder:
 - a. Agrees to abide by all terms and conditions set forth in the permit, all restrictions and relevant regulations under 50 CFR Parts 222-226, and all restrictions and requirements under the ESA;
 - b. Acknowledges that the authority to conduct certain activities specified in the permit is conditional and subject to authorization by the NMFS Office Director; and
 - c. Acknowledges that this permit does not relieve the Permit Holder of the responsibility to obtain any other permits, or comply with any other Federal, State, local, or international laws or regulations.



Donna S. Wieting
Director, Office of Protected Resources
National Marine Fisheries Service

AUG 09 2013

Date Issued



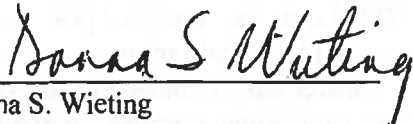
Mary Colligan
Assistant Regional Administrator,
NOAA Fisheries Northeast Regional Office
Responsible Party

8/29/13

Date Effective

J. Acceptance of Permit

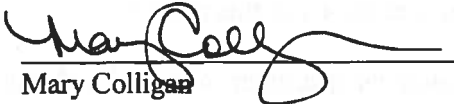
1. In signing this permit, the Permit Holder:
 - a. Agrees to abide by all terms and conditions set forth in the permit, all restrictions and relevant regulations under 50 CFR Parts 222-226, and all restrictions and requirements under the ESA;
 - b. Acknowledges that the authority to conduct certain activities specified in the permit is conditional and subject to authorization by the NMFS Office Director; and
 - c. Acknowledges that this permit does not relieve the Permit Holder of the responsibility to obtain any other permits, or comply with any other Federal, State, local, or international laws or regulations.



Donna S. Wieting
Director, Office of Protected Resources
National Marine Fisheries Service

AUG 09 2013

Date Issued



Mary Colligan
Assistant Regional Administrator,
NOAA Fisheries Northeast Regional Office
Responsible Party

8/29/13

Date Effective

FILE COPY

Appendix 1

Disposition of Biological Samples

1. All biological samples collected or received under the authority of this permit must be maintained according to accepted curatorial standards. The Terms and Conditions of this permit shall remain in effect as long as the biological samples authorized hereunder are maintained under the authority and responsibility of the Permit Holder.
2. Unless other disposition is specified in the permit application, the Permit Holder may retain biological samples not consumed in analysis or otherwise disposed of during or after research or enhancement activities authorized by this permit if the specimens are maintained in a properly curated collection and made available for research or enhancement purposes at the request of the Office Director. Remaining samples may be archived for analysis by the Permit Holder not described in the permit application provided that the project descriptions are provided to the Permits, Conservation and Education Division for inclusion in the permit file. NMFS encourages Researchers to transport any remaining samples to the National Ocean Service (NOS), Marine Forensics Laboratory, 219 Fort Johnson Road, Charleston, South Carolina 29412, phone (843)762-8547, fax (843)762-8700.
3. The Responsible Party [Mary Colligan, Assistant Regional Administrator; One Blackburn Drive; Gloucester, MA 01930; phone (978) 281-9116] must be contacted prior to, and where necessary, approve and authorize the transfer of biological samples to persons not listed in the permit application. Researchers may transfer parts collected or received under this permit for scientific research, curation, or educational purposes to recipients authorized as Co-Investigators by the Responsible Party.
4. Under no circumstances may any endangered species parts collected or obtained under the authority of this permit be bought or sold. Recipients of any biological samples taken under the authority of this permit must adhere to the conditions of this permit.
5. The Permit Holder must maintain a record of all biological specimens obtained under this permit. This record must include the number and type of specimens; a description of each animal from which specimen materials were taken including, species, age, size, weight, sex, reproductive condition; date and location of acquisition; preservative; and circumstances causing death or nature of specimen collection. Where samples are received from facilities (*i.e.*, power plants) documentation regarding the original legal take must also be maintained by the Permit Holder.
6. No animals may be intentionally killed for the purpose of providing specimens under this permit, and no remuneration, either financial or in-kind, can be offered for the taking of animals from the wild. This does not preclude legitimate logistical collection and transportation expenses.

Appendix 2: Protected Species Parts Permit Report Form

Reports may be submitted

- through the online system at <https://apps.nmfs.noaa.gov>
- by email attachment to the permit analyst for this permit
- by hard copy mailed or faxed to the Chief, Permits Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Room 13705, Silver Spring, MD 20910; phone (301)427-8401; fax (301)713-0376.

The following is only an EXAMPLE of the report form. If you do not intend to submit your report online, please contact your permit analyst for an electronic report form to fill out and return.

Date: _____ **Reporting Period:** _____

Permit Number: _____ **Permit Holder's Name:** _____

Contact Name: _____ **Contact Email:** _____

Contact Phone #: _____
(Contact = person submitting report)

Part I: Take Table. Enter information on the actual number of animals from which parts were collected, received, or imported/exported during this reporting period according to the table in your permit. Note: You must complete a table that looks like the Permit Table (Take Table 1 of your permit), with an additional column for you to enter the "actual number of animals taken" in the last permit year. You must contact your permit analyst for an electronic version of this table or use the on-line report system.

Also provide the information in the following table (Table 2). You must contact your permit analyst for an electronic version of this additional table and provide it as an attachment to your report.

Date	Type of activity (e.g., receipt or import)	Species (common and scientific name)	Description of and number of parts (e.g., 2 teeth)	Description of animal from which part was taken (age, size, sex, reproductive condition)	Sample origination (e.g., subsistence hunt); and date and location of collection	Country of origin and authorizing government agency (include NMFS permit number if applicable)	Disposition of part ⁵

⁵ Indicate whether part was consumed in analysis, is curated (if so, how), or was transferred. For transfers to other researchers, include the sample ID, person and location to which the part was transferred, description of secondary use, and how the person was authorized to receive the part from you.

Part II: Narrative. Provide responses to the following, as applicable:

1. Describe any problems or unforeseen events encountered during the permitted activities and any steps taken or proposed to resolve such problems.
2. Describe what measures were taken to minimize incidental effects of permitted activities on animals in the wild, such as disturbance to nearby animals, and the effectiveness of these measures, as applicable.
3. Describe steps taken to coordinate the permitted activities with other permit holders.
4. Summarize any preliminary findings. Did you accomplish the goals of your permitted activities?
5. List titles of reports, publications, etc. resulting from this reporting period. Attach copies of any final documents as available. If these documents are not yet available, indicate when you anticipate that they will be completed and submitted. When reports and publications are available, send to the Chief, Permits Division, and include the permit number in subject line.
6. Note the number and type of non-permitted species harassed or otherwise taken, and the observed effects of such taking.
7. Note any incidental (non-research related) use of photographs, film, or other images (e.g., on websites, in commercial publications or documentaries).
8. Indicate any additional findings, results, or information you would like to report or comment on.
9. Copies of the following must be submitted with this report:
 - a. Foreign collection and export authorizations; and
 - b. Foreign CITES export permits and stamped wildlife declaration forms, and Form 3-177 for each import.

Guidance for Co-Investigators

Thank you for your interest in being a Co-Investigator on permit (File No. 17273) to collect, necropsy, sample, and salvage dead shortnose and Atlantic sturgeon, etc., as specified in the permit and permit application for the purposes of education and scientific research.

During the review of the application we were advised to develop guidance for the many Co-Investigators named on the application. Also, we were asked to name which type of Co-Investigator each of you might be. We divided Co-Investigator activities into the following three categories: Response, Research and Education. Accordingly, this document serves as guidance for all Co-Investigators broken down by type of anticipated activity. See Attachment A to determine which categories you fall under.

I. Response:

Co-Investigators responding to reports of dead shortnose and Atlantic sturgeon are generally natural resource managers, researchers from the various states or Federal services, or researchers from Universities. Dead sturgeon are likely to be found washed ashore or, in some cases, floating. Since dead sturgeon may be located in sensitive areas such as protected islands, wildlife management areas, National refuges, state parks and historical sites, etc., you are urged to work with local officials to gain access to these areas. Be aware and mindful of any sensitive habitats/protected resources you may encounter as you attempt to investigate and/or retrieve a sturgeon carcass. You are advised to seek permission before entering these areas and to obtain additional permits as necessary.

Please be aware that your activities may disrupt other wild animals, including protected species such as other fishes, waterfowl, seabirds and marine mammals. This permit does not allow the harassment of any protected species other than shortnose and Atlantic sturgeon; please be sure to conduct research in such a manner that disturbance of any non-target species does not occur. Information on keeping a safe distance from protected marine wildlife can be found at: <http://www.nmfs.noaa.gov/pr/education/viewing.htm>. Additional guidance for working around wildlife may be obtained at: http://www.watchablewildlife.org/publications/marine_wildlife_viewing_guidelines.htm. Lastly, in some cases, the area may be too sensitive to enter and the Co-Investigator should refrain from responding (i.e., should not disturb nesting piping plovers to access a sturgeon carcass).

All Co-Investigators responding to a dead sturgeon are required to fill out a sturgeon salvage form (Attachment B) or provide data to NMFS for insertion in the form, for each sturgeon carcass you collect/obtain and submit it within 30 days to the appropriate regional contact:

Greater Atlantic Regional Fisheries Office

Jessica Pruden, Shortnose Sturgeon Recovery Coordinator

Phone: 978-282-8482

Fax: 978-281-9394

E-Mail Jessica.Pruden@noaa.gov

Lynn Lankshear

Atlantic Sturgeon Recovery Coordinator

Phone: 978-282-8473

Fax: 978-281-9394

E-Mail Lynn.Lankshear@noaa.gov

Southeast Region

Kelly Shotts, Atlantic and Shortnose Sturgeon Recovery Coordinators

Phone: 727-551-5603

Fax: 727-824-5309

E-Mail Kelly.Shotts@noaa.gov

Please find and review Attachment B, the sturgeon salvage form, as you read the following instructions for filling out form. This is a working document; we appreciate your help in field testing the form and hope you will provide comments for improving it. Comments should be sent to Jessica Pruden (contact information given above). Instructions are based on blocks in the salvage form as pictured below.

- Record investigator's (responding Co-Investigator) contact information.

INVESTIGATORS'S CONTACT INFORMATION	
Name: First _____	Last _____
Agency Affiliation _____	Email _____
Address _____	

Area code/Phone number _____	

- Call appropriate NMFS regional contact identified above to obtain a unique identifier and record it in the top block.
- Record the date sturgeon carcass was first reported to investigator.
- Record the date sturgeon carcass was collected/examined by investigator.

UNIQUE IDENTIFIER (Assigned by NMFS)

DATE REPORTED:

Month Day Year 20

DATE EXAMINED:

Month Day Year 20

- Identify to species (if possible).

SPECIES: (check one)

shortnose sturgeon

Atlantic sturgeon

Unidentified *Acipenser* species

Check "Unidentified" if uncertain. See reverse side of this form for aid in identification.

- Record location where carcass was found.

LOCATION FOUND: <input type="checkbox"/> Offshore (Atlantic or Gulf beach) <input type="checkbox"/> Inshore (bay, river, sound, inlet, etc)	
River/Body of Water _____	City _____ State _____
Descriptive location (be specific) _____	

Latitude _____ N (Dec. Degrees)	Longitude _____ W (Dec. Degrees)

- Determine stage of decomposition at the time of examination. Record carcass condition.
 - Fresh dead = Normal appearance, usually with little scavenger damage; fresh smell (edible); minimal drying and wrinkling of skin, eyes and mucous membranes; eyes clear; carcass not bloated, muscles firm, viscera intact and well-defined; body intact and easily moved.
 - Moderately decomposed = Carcass intact, bloating evident, possible scavenger damage; mild odor; mucous membranes dry, eyes sunken or missing; muscles soft and poorly defined; viscera soft, friable but still intact; body fragile but can usually be moved intact.
 - Severely decomposed = Carcass may be intact, but collapsed; often severe scavenger damage; strong odor; muscles nearly liquefied and easily torn; viscera often identifiable but friable, easily torn, and difficult to dissect; body fragile and comes apart if moved.
 - Dried carcass = Skin may be draped over skeletal remains; any remaining tissues are desiccated.
 - Skeletal, scutes & cartilage = Only pieces of carcass can be found and identified.

CARCASS CONDITION at time examined: (check one) <input type="checkbox"/> 1 = Fresh dead <input type="checkbox"/> 2 = Moderately decomposed <input type="checkbox"/> 3 = Severely decomposed <input type="checkbox"/> 4 = Dried carcass <input type="checkbox"/> 5 = Skeletal, scutes & cartilage
--

Record sex and how this was determined.

SEX: <input type="checkbox"/> Undetermined <input type="checkbox"/> Female <input type="checkbox"/> Male How was sex determined? <input type="checkbox"/> Necropsy <input type="checkbox"/> Eggs/milt present when pressed <input type="checkbox"/> Borescope
--

- Examine externally and record signs of external injury etc (see back of form).

Describe any wounds / abnormalities (note tar or oil, gear or debris entanglement, propeller damage, etc.). Please note if no wounds / abnormalities are found.

- Record length and weight measurements and circle the unit of measurement used. Also indicate if the length and weight measurements were actual or estimates. (i.e., some length measurements of severely decomposed carcasses are estimates because carcass may not be intact).

MEASUREMENTS:	<i>Circle unit</i>
Fork length	_____ cm / in
Total length	_____ cm / in
Length <input type="checkbox"/> actual <input type="checkbox"/> estimate	
Mouth width (inside lips, see reverse side)	_____ cm / in
Interorbital width (see reverse side)	_____ cm / in
Weight <input type="checkbox"/> actual <input type="checkbox"/> estimate	_____ kg / lb

- Examine the fish externally for tags and scan for internal tags. Record any tag information.
- Note: All tag information recorded on this form will be shared with the US Fish and Wildlife Cooperative Sturgeon Tagging Database (NMFS will share tag information with staff at the MD Fishery Resource Office using salvage forms submitted by Co-Investigators).
<http://www.fws.gov/northeast/marylandfisheries/mfrofactsheet.htm>

TAGS PRESENT? Examine for external tags including fin clips? <input type="checkbox"/> Yes <input type="checkbox"/> No		Scanned for PIT tags? <input type="checkbox"/> Yes <input type="checkbox"/> No
Tag #	Tag Type	Location of tag on carcass
_____	_____	_____
_____	_____	_____

- Take photo/video and record where the images will be maintained.

PHOTODOCUMENTATION: Photos/vids taken? <input type="checkbox"/> Yes <input type="checkbox"/> No Disposition of Photos/Video: _____ _____ _____

- If possible/appropriate, necropsy carcass. Record the date the fish was necropsied and the name of the person who conducted the necropsy.
- Record any observations during necropsy and submit this information with the salvage form.

Carcass Necropsied? <input type="checkbox"/> Yes <input type="checkbox"/> No Date Necropsied: _____ Necropsy Lead: _____

- If possible/appropriate, sample carcass. Record what samples were collected, how they were preserved and where they were sent/archived. Please be aware that sturgeon parts and tissues may only be sent to persons/labs that are listed as a CI on this permit.
- All responders are required to sample shortnose and Atlantic sturgeon carcasses for genetic tissue. The tissue sampling and shipment must be coordinated with Julie Carter. Julie Carter will send sampling instructions, chain of custody form and vials for the tissue samples (see also Attachment C for sampling instructions):
 - Julie Carter
 NOS Marine Forensic Branch
 219 Fort Johnson Road
 Charleston, SC 29412
 phone: 843-762-8547
 fax: 843-762-8700
 Email: Julie.Carter@noaa.gov
- Permanently label all samples with a unique identifier assigned by NOAA fisheries. [Call appropriate NMFS regional contact identified above to obtain number – See top right block on salvage form].

SAMPLES COLLECTED? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Sample	How preserved	Disposition (person, affiliation, use)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- Record the final disposition of the majority of the remains.

<p>CARCASS DISPOSITION: (check one or more)</p> <p><input type="checkbox"/> 1 = Left where found</p> <p><input type="checkbox"/> 2 = Buried</p> <p><input type="checkbox"/> 3 = Collected for necropsy/salvage</p> <p><input type="checkbox"/> 4 = Frozen for later examination</p> <p><input type="checkbox"/> 5 = Other (describe)</p> <p>_____</p>
--

- Record any additional comments at the bottom of the front page.

Comments:

- Submit Completed forms to appropriate NMFS regional contact identified above within 30 days of the date the carcass was reported.

Submit completed forms (within 30 days of date of investigation) to: Greater Atlantic Regional Fisheries Office
Contacts – Shortnose Sturgeon Recovery Coordinator (Jessica Pruden, Jessica.Pruden@noaa.gov, 978-282-8482) or Atlantic Sturgeon Recovery Coordinator (Lynn Lankshear, Lynn.Lankshear@noaa.gov, 978-282-8473); **Southeast Region Contacts**- Shortnose and Atlantic Sturgeon Recovery Coordinator (Kelly Shotts, Kelly.Shotts@noaa.gov, 727-551-5603).

Safety:

- Shortnose and Atlantic sturgeon carcasses will be in various stages of decomposition and may harbor diseases, parasites etc. Practice common sense in examining and sampling dead shortnose sturgeon. Wear protective clothing including gloves and a mask. Wash yourself and your gear thoroughly after handling a dead sturgeon.
- Maintain appropriate training, licenses and certificates and use caution in the operation of motorized vehicles (boats, trucks, cars, etc.).
- Safely transfer specimens to authorized researchers, educators, laboratories, etc., following Material Safety Data Sheet (M.S.D.S) protocol for shipment and handling. Please be aware that shortnose sturgeon parts and tissues may only be sent to persons/labs that are listed as a CI on this permit.
- Safely dispose of unused portions of shortnose sturgeon carcasses

Data Access Policy for shortnose sturgeon salvage form

Upon written request, information submitted to National Marine Fisheries Service (NOAA Fisheries) on this form will be released to a requestor provided that the requestor credits the collector of the information and NOAA Fisheries. NOAA Fisheries will notify the collector that these data have been requested and the intent of their use.

II. Research:

Those Co-Investigators interested in research activities may receive sturgeon specimens from responders as they become available. There are many researchers who are also interested in response and in this case will directly use the specimens they collect themselves under the permit.

Anticipated uses for scientific research: morphology; genetics; histopathology; contaminants; age, growth and maturity analyses; cryopreservation of sperm; food habits; parasitology; examination for potential human impacts (oil spill, ship strike, bycatch in fisheries, dredging, blasting, impingement/entrainment etc.) and investigation of unusual mortality events/fish kills.

Researcher responsibilities include the following:

1. Credit contributing responders (i.e. those Co-Investigators that provided the data or specimens) and NOAA Fisheries. Any research published as a result of work performed on samples or information received under this permit must acknowledge the cooperating Co-Investigators, NOAA Fisheries, and the permit number in any publications or other reports resulting from the use of the transferred material/data
2. Share copies of any resultant publications/unpublished reports with Co-Investigators by submitting these reports to the appropriate NMFS regional contact.

Additional research needs may be identified during the 5-year term of the permit. Contact the appropriate NMFS regional contact to relay your research interests. Please be aware that responders are acting on a voluntary basis and there are generally relatively few sturgeon carcasses reported dead each year (~10) so it may take some time to meet your needs.

III. Education:

Many Co-Investigators that are responders and researchers also have an interest in obtaining and maintaining specimens for outreach and education. The permit will authorize the retention and maintenance of sturgeon (whole and parts) for education. The anticipated educational uses follow:

Educational uses: taxidermy; collection of hard parts such as individual scutes, bones and entire cartilaginous skeleton; clear and stain of small fish; casts of sturgeon carcasses, plastomer reproductions, dissection (necropsy) and development of sampling and necropsy procedures and manuals.

Educator responsibilities include the following:

1. As appropriate, credit contributing responders, NOAA Fisheries, and cite the permit number in resultant publications/outreach materials.
2. Share copies of any resultant publications/outreach materials with Co-Investigators by submitting them to the appropriate NMFS regional contact.

Additional educational needs may be identified during the 5-year term of the permit. Contact the appropriate NMFS regional contact to relay your education or outreach interests. Please be aware that responders are acting on a voluntary basis and there are generally relatively few sturgeon carcasses reported dead each year (~10) so it may take some time to meet your needs.

IV: Instructions for Transfer and Shipment of Specimens

Transfer:

Because shortnose and Atlantic sturgeon are listed species under the Endangered Species Act, transfer of specimens must be carefully documented and the persons/labs receiving

specimens must be authorized to have them. Therefore, once specimens are salvaged from a dead sturgeon, they may only be transferred to other Co-Investigators or cooperating diagnostic labs listed on this permit, No 17273 (see Attachment A). Transfer of specimens to Co- Investigators/cooperators must be documented on the “SAMPLES COLLECTED” block of the Sturgeon Salvage Form. All samples must be labeled with the Unique Identifier recorded in the top right block of the salvage form.

Any further transfer of specimens among Co-Investigators/cooperating diagnostic labs (i.e. beyond what was recorded on the salvage form) may be permissible on a case by case basis. You must contact the appropriate NMFS regional contact to arrange for the transfer. NMFS must report annually all sturgeon salvaged and collected under this permit and the disposition of all samples and subsamples.

Shipment:

Follow Material Safety Data Sheet (M.S.D.S) protocol for safe shipment and handling. Double check that all specimens are labeled with the Unique Identifier recorded in the top right block of the Sturgeon Salvage Form.

Include the following documentation with each shipment:

- Copy of Sturgeon Salvage Form
- Copy of the NMFS research permit authorizing the collection of the sample(s)
- Chain of Custody Form (as requested or appropriate)

Place the samples in leak-proof containers/bags; place the documentation on top of the samples. Seal the samples and documents together in the shipping container and send to authorized Co-Investigator(s)/cooperating diagnostic lab(s).

V. Adding Co-Investigators to the permit:

The permit, if issued, is expected to be valid for five years from the date of issuance. Qualified Co-Investigators or Cooperating Diagnostic Labs may be added to this permit on a case by case basis through an authorization provided by the Responsible Party of the permit. Interested persons should contact Jessica Pruden for more information:

Jessica Pruden
Shortnose Sturgeon Recovery Coordinator
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Appendix 2 Permit No. 17273: List of Co-Investigators, their agency affiliation and location, and their anticipated activity type (0=No and 1=Yes for Response, Research, or Education).

#	Co-Investigator last name	Co-Investigator first name	Affiliation	Location	Response	Research	Education	Comments
1	Adams	Robert	NYDEC	Suffern, NY	1	1	1	
2	Balazik	Matthew	Virginia Commonwealth University	Quinton, VA	1	1	1	
3	Bolden	Stephania	NOAA	St Petersburg, FL	1	1	1	Taxidermy, scutes
4	Bonacci	Lisa	NYDEC	East Setauket, NY	1	1	1	
5	Bowers-Altman	Jeanette	NJ DFW	Sicklerville, NJ	1	1	1	
6	Brownell	Prescott	NOAA	Charleston, SC	1	1	1	
7	Bouchard	Deborah	U ME	Orono, ME	0	1	0	
8	Brundage	Hal	Environmental Res. & Consult.	Kennet Square, PA	1	1	1	
9	Burns	Peter	Harvard U	Cambridge, MA	0	1	1	Zooarchaeology (museum)
10	Burnett	Christopher	Normandeau Associates	Indian Point, NY	1	1	0	
11	Carter	Julie	NOAA	Charleston, SC	0	1	1	Archiving genetic tissue
12	Casper	Brandon	U of MD	College Park, MD	1	1	1	
13	Chalupnicki	Marc	USGS Tunison Lab	Cortland, NY	0	1	1	Otolith study
14	Chapman	Demian	Stony Brook University	Stony Brook, NY	1	1	1	
15	Collins	Mark	SC DNR	Charleston, SC	1	1	1	
16	Corbett	Heather	NJ DFW	Port Republic, NJ	1	1	1	
17	Damon-Randall	Kim	NOAA	Gloucester, MA	1	0	1	
18	Darden	Tanya	SC DNR	Charleston, SC	1	1	1	
19	Deshpande	Ashok	NOAA	Highlands, NJ	1	1	1	
20	Draxler	Andrew	NOAA	Highlands, NJ	1	1	1	
21	DuBeck	Guy	GA Dept of Natural Resources	Richmond Hill, GA	1	1	1	
22	Dunton	Keith	Stony Brook University	Stony Brook, NY	1	1	1	
23	Exler	Ross	AKRF, Inc	Hanover, MD	1	1	1	
24	Figel	Chester	Warm Springs Fish Tech. Center	Warm Springs, GA	1	1	1	
25	Fire	Spencer	NOAA NOS	Charleston, SC	0	1	0	
26	Fischel	Helen	Delaware Nature Society	Hockessin, DE	0	0	1	
27	Fisher	Matthew	DE Division Fish and Wildlife	Smyrna, DE	1	1	1	
28	Fox	Dewayne	DE State U	Dover, DE	1	1	1	
29	Friedman	Ed	Friends of Merrymeeting Bay	Bowdoinham, ME	1	0	1	
30	Frisk	Michael	Stony Brook University	Stony Brook, NY	1	1	1	
31	Furman	William	Normandeau Associates	Indian Point, NY	1	1	0	
32	Garman	Greg	Virginia Commonwealth University	Richmond, VA	1	1	1	
33	Hartel	Karsten	Harvard U	Cambridge, MA	0	1	1	Ichthyology (museum)
34	Hattala	Kathy	NY DEC	New Paltz, NY	1	1	1	
35	Hazel	Allan	SC DNR	Charleston, SC	0	1	1	Taxidermy
36	Hightower	Joe	USGS	Raliegh, NC	1	1	1	
37	Hilton	Eric	VIMS	Gloucester Point, VA	1	1	1	
38	Hopler	David	Virginia Commonwealth University	Richmond, VA	1	1	1	
39	Jacobini	Jared	DE Division Fish and Wildlife	Port Penn, DE	1	1	1	
40	Jordaan	Adrian	Stony Brook University	Stony Brook, NY	1	1	1	
41	Kieffer	Micah	USGS	Turners Falls, MA	1	1	1	
42	King	Tim	USGS	Kearneysville, WV	0	1	1	Genetic analyses
43	Kinnison	Michael	U ME	Orono, ME	1	1	1	
44	Krebs	Justin	AKRF, Inc	Hanover, MD	1	1	1	
45	Kynard	Boyd	USGS and UMASS (Emeritus)	Turners Falls, MA	1	1	1	
46	Lichtenwaler	Anne	U ME	Orono, ME	0	1	0	
47	Lipsky	Christine	NOAA	Orono, ME	1	1	1	
48	Luscombe	Bruce Anthony	NPS, Gateway National Rec. Area	Brooklyn, NY	1	0	0	

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49	Lynott	Maggie	VA AQ	VA Beach, VA	1	1	1	
50	Mangold	Mike	US F&W	Annapolis, MD	1	1	1	
51	Matsche	Mark	Maryland DNR	Easton, MD	1	1	1	Health studies, education
52	Mattson	Mark	Normandeau Associates	Indian Point, NY	1	1	0	
53	McIninch	Stephen	Virginia Commonwealth University	Richmond, VA	1	1	1	
54	McKown	Kim	NYDEC	East Setauket, NY	1	1	1	
55	Mierzykowski	Steve	US F&W	Old Town, ME	1	1	1	Contaminants
56	Minkkinen	Steve	US F&W	Annapolis, MD	1	1	1	
57	Mohead	Malcolm	NOAA	Silver Spring, MD	1	0	1	
58	Morse	Richard	New York State Education Dept	Troy, NY	1	1	1	
59	Nash	James	AKRF, Inc	White Plains, NY	1	1	1	
60	Parsons	Alexandra	NPS Southeastern Archeological Ctr	Tallahassee, Florida	1	1	1	
61	Peterson	Doug	U of GA	Athens, GA	1	1	1	
62	Pikitch	Ellen	Stony Brook University	Stony Brook, NY	1	1	1	
63	Popper	Arthur	U of MD	College Park, MD	1	1	1	
64	Ragusa	James	Fire Island NS resident	Ocean Beach, NY	1	0	0	Response only
65	Renshaw	Mark	Notre Dame University	Notre Dame, IN	0	1	1	
66	Richardson	Brian	Maryland DNR	Stevensville, Maryland	1	1	1	
67	Richmond	Alan	UMASS Amherst	Amherst, MA	0	1	1	Ichthyology (U. collection)
68	Ricci	Michael	Normandeau Associates	Indian Point, NY	1	1	0	
69	Saul	Bruce	GA Regents University	Augusta, GA	0	1	1	
70	Savoy	Thomas	CT DEP	Old Lyme, CT	1	1	1	
71	Secor	Dave	U of MD	Solomons, MD	1	1	1	Age structures
72	Schanke	Scott	Normandeau Associates	Indian Point, NY	1	1	0	
73	Seewagen	Chad	Pace University	Pleasantville, NY	1	1	1	
74	Sheehan	Timothy	NOAA	Woods Hole, MA	1	1	1	
75	Shirey	Craig	DE DFW	Smyrna, DE	1	1	1	Taxidermy
76	Shotts	Kelly	NOAA	St. Petersburg, FL	1	1	1	
77	Slater	Caleb	Mass Wildlife	Westborough, MA	1	1	1	
78	Sokolowski	Mark	Stony Brook University	Stony Brook, NY	1	1	1	
79	Somes	Robert	NJ DFW	Robbinsville, NJ	1	1	1	
80	Spiess	Arthur	Maine Historic Preservation Com.	Augusta, ME	1	1	1	
81	Starnes	Wayne	NC State Museum of Nat History	Raleigh, NC	0	1	1	(museum)
82	Sulak	Ken	USGS	Gainesville, FL	1	1	1	
83	Sulikowski	James	University of New England	Biddeford, ME	1	1	1	
84	Sweeney	Charles	Normandeau Associates	Indian Point, NY	1	1	0	
85	Swingle	Mark	VA AQ	VA Beach, VA	1	1	1	
86	Taft	Natalia	University of Chicago	Chicago, IL	0	1	0	
87	Tomichek	Christine	Kleinschmidt Associates	Essex, CT	1	1	1	
88	Van Atten	Amy	NOAA	Woods Hole, MA	0	1	0	
89	Weatherwax	Bryan	New York State Museum	Albany, NY	1	1	1	
90	Wieczorek	Daniel	NOAA	Highlands, NJ	1	1	1	
91	Wilcox	Jeffrey	FL Fish & Wildlife	Tallahassee, Florida	1	1	1	
92	Williams	Jeff	Smithsonian Institution	Washington, DC	0	1	1	(museum)
93	Wippelhauser	Gail	ME DMR	Augusta, ME	1	1	1	
94	Wirgin	Ike	NYU	Tuxedo, NY	0	1	0	Genetic analyses
95	Zydlowski	Gayle	U ME	Orono, ME	1	1	1	

Appendix 2 Continued: Cooperating Facilities Holding Captive-Bred Shortnose Sturgeon and Anticipated Cooperating Diagnostic Laboratories

#	Cooperating Facilities Holding Captive-Bred Shortnose Sturgeon	Primary Contact	Location
1	USFWS Bears Bluff NFH	Kent Ware	Wadmalaw Island, SC
2	USFWS Warm Springs Fish Technology Center	Chester Figel	Warm Springs, GA
3	Alden Research Labs	Steve Amaral	Holden, MA
4	USGS Conte Anadromous Fish Laboratory	Micah Kieffer	Turners Falls, MA

#	Cooperating Diagnostic Laboratories	Primary Contact	Location
1	USFWS Northeast Fisheries Center	Jerre Mohler	Lamar, PA
2	USFWS Analytical Control Facility	Judy Bischoff	Shepherdstown, WV
3	NOAA Fisheries NEFSC, James J. Howard Marine Sciences Laboratory	Andy Draxler	Sandy Hook, NJ
4	Maryland Department of Natural Resources, Cooperative Oxford Laboratory	Mark Matsche	Oxford, MD
5	ANTECH	No one contact	Lake Success, NY
6	New York University School of Medicine, Division: Environmental Medicine	Ike Wirgin	Tuxedo, NY
7	USGS - Biological Resources Division, Leetown Science Center	Tim King	Kearneysville, WV
8	UC Davis, Department of Medicine and Epidemiology	Ron Hedrick	Davis, CA
9	University of Georgia, College of Veterinary Medicine	Susan Knowles	Athens, GA
10	Dept. of Pathobiology and Vet. Services, UCONN	Sylvain Deguise	Storrs, CT
11	Cornell University, College of Veterinary Medicine	Paul Bowser	Ithaca, NY
12	Micro Technologies	Bill Kelliher	Richmond, ME
13	USGS Columbia Environmental Research Center	David Alvarez	Columbia, MO
14	USGS Western Fisheries Research Center	Jim Winton	Seattle, WA
15	New England Aquarium	Charlie Innis	Boston, MA
16	Burris Logistics	Tine Hawkins	Harrington, DE

Appendix 3a:

Certification, Identification and Chain of Custody Form for Submitting Sturgeon Genetic Tissue Samples.^{1, 2}

(A) CERTIFICATION OF SPECIES (Collector)

I, _____, hereby certify that I have positively identified the
 Full Name
 fish or fishes sampled in this shipment as: shortnose sturgeon; Atlantic sturgeon; other unknown
 based on my knowledge and experience as a _____,
 Position Job Title
 Signature: _____ Date Identified: _____
 Address: _____
 Phone Number: _____

(B) SAMPLE IDENTIFICATION

Species Identification: shortnose sturgeon; Atlantic sturgeon; unknown
 Unique ID No: _____; Tissue Type: _____; Preservative: _____;
 Location: (River: _____; River-km: _____; Lat/Long: _____);
 River Location Description: _____;
 Total Length (TL) of Specimen (mm): _____ Weight of Specimen (g): _____; Sex (if known) _____

Specific comments on take: _____

Check here if multiple samples are submitted and use *Field Collection Report* (Appendix 3b) with the data fields listed in this section.

(C) EVIDENCE OF CHAIN OF CUSTODY

1.	_____	_____	_____	_____
	Release Signature	NMFS Permit No.	Method of Transfer	Date
	_____	_____	_____	_____
	Receipt Signature	NMFS Permit No.		Date
2.	_____	_____	_____	_____
	Release Signature	NMFS Permit No.	Method of Transfer	Date
	_____	_____	_____	_____
	Receipt Signature	NMFS Permit No.		Date
3.	_____	_____	_____	_____
	Release Signature	NMFS Permit No.	Method of Transfer	Date
	_____	_____	_____	_____
	Receipt Signature	NMFS Permit No.		Date

¹ Instructions on next page.

² If multiple samples are shipped, attach summary sheet in Appendix 3b.

Instructions: Collecting, Certifying, Identifying & Shipping Tissue Samples Collected from Sturgeon.

1. **Species Certification:**

For each shipment a “*Certification of Species Identification*” (Section A) must be provided. This form documents the collector has identified the fish or fishes sampled in the shipment as either a shortnose or Atlantic sturgeon. If there is any doubt about the identity of a sample, then mark unknown and include comments on the take.

2. **Sample Identification:**

Assign a unique number identifying each individual fish captured and subsequently sampled. This number must be recorded in Section B and on the collection vial for each sample taken. Record tissue type; preservative used; date of capture; location of capture (river & description, lat/long, river km, and nearest city); length of specimen; weight; and sex, if known. Check the box provided if you are submitting multiple samples, and provide a hard-copy and/or email a copy of the sample spreadsheet with information for each of the data fields listed above.

3. **Tissue Sampling Instructions:**

a. Cleanliness of Samples: Cross contamination should be avoided. For each fish, use a clean cutting tool, syringe, etc. for collecting and handling samples.

b. Preserving & Packaging Samples:

- i. Label vial with fish’s unique ID number.
- ii. Place a 1-2 cm² section of pelvic fin clip in vial with preservative (95% absolute ETOH (un-denatured), recommended).
- iii. Seal individual vials or containers with leak proof positive measure (e.g., tape).
- iv. Package vials and absorbent within a double sealed container (e.g., zip lock baggie).
- v. Label air package properly identifying ETOH warning label (**See Appendix 3c**).

c. Shipping Instructions:

When shipping samples, place separately Appendix 3a, 3b and 3c (Sample ID and Chain of Custody Forms and Shipping Training Form) in container and seal the shipping box to maintain the chain of custody. (**Note:** A copy of the ESA permit authorizing the collection of the sample(s) must also accompany the sample(s)).

Important Notice: You must be certified before shipping tissue samples preserved with 95% ETOH in “excepted quantities” (A Class 3 Hazardous Material Due to Flammable Nature). See **Appendix 3c: “NMFS Guidelines for Air-Shipments of Excepted Quantities of Ethanol Solutions”** to comply with the DOT/IATA federal regulations.

4. **Chain of Custody Instructions:**

The “*Chain of Custody*” (Section C) should be maintained for each shipment of tissue samples and must accompany the sample(s) at all times. To maintain the chain of custody, when sample(s) are transferred, the sample(s) and the documentation should be packaged and sealed together to ensure that no tampering has occurred. All subsequent handlers breaking the seal must also sign and document the chain of custody section.

5. **Contact Information:**

A. NMFS, Office of Protected Resources:

i. Primary Contact: (Greater Atlantic Regional Fisheries Office) Shortnose Sturgeon Recovery Coordinator (Jessica Pruden, jessica.pruden@noaa.gov, 978/282-8482); Atlantic Sturgeon Recovery Coordinator (Lynn Lankshear, lynn.lankshear@noaa.gov, 978/282-8473)

ii. Primary Contact: (Southeast) Shortnose Sturgeon and Atlantic Sturgeon Recovery Coordinator (Kelly Shotts, kelly.shotts@noaa.gov, 727/551-5603)

i. Secondary Contact: Malcolm Mohead (malcolm.mohead@noaa.gov) Phone: 301/713-2289

ii. Secondary Contact: Jennifer Skidmore (jennifer.skidmore@noaa.gov) Phone: 301/713-2289

B. NOS Archive:

i. Primary Contact: Julie Carter (julie.carter@noaa.gov) Phone: 843/762-8547

Appendix 3b Summary Sheet for Genetic Tissue Samples Collected^{1,2}

Date	Species	Unique ID No.	Genetic Tissue Type	Preservative	Location: (River)	Location (River-km)	Location (Lat/Long)	Total Length (mm)	Weight (g)	Sex	Comments

1. Please coordinate with NMFS to receive a file copy of this appendix in spreadsheet format and include file on disk with shipment.
2. If multiple samples are shipped, attach this form to supplement Appendix 3a.

Appendix 3c

NMFS Guidelines for Air-Shipment of "Excepted Quantities" of Ethanol Solutions

These guidelines have been adapted with permission from the University of New Hampshire-Office of Environmental Health & Safety; our appreciation is to Andy Glode for providing reference materials upon which this guide was created.

The U.S. Department of Transportation (DOT: 49 CFR 173.4) and the International Air Transport Association (IATA: 2007 Dangerous Goods Regulations, Sec. 2.7) regulate shipments of ethanol (ETOH) in *excepted quantities*. As a result, specific procedures must be followed as well as certifying proper training of individuals prior to packaging and shipping specimens preserved in ETOH. These guidelines will inform proper shipping and also satisfy certifying requirements. Failure to meet such requirements could result in regulatory fines and/or imprisonment.

Therefore, prior to submitting ETOH preserved samples and appropriate documentation (*e.g.*, a FedEx Airbill) to a carrier, please read, initial and sign this document, affirming you have understood the requirements as outlined. Please include this document in the shipping package and retain a copy for your records.

- 1) Packages and documents submitted to a carrier must not contain any materials other than those described in this document (*i.e.* containers holding ethanol-preserved specimens and related absorbent and packaging materials). Also, laboratory or sampling equipment, *unrelated documents*, or other goods must be packaged and shipped in separate boxes. (Note: ETOH solutions are not permitted to be transported in checked baggage, carry-on baggage, or airmail.) **I understand (____)**
- 2) Please read the manufacturer's Material Safety Data Sheet (MSDS) for ETOH recognizing ETOH (55 - 100%) is classed as hazardous flammable material (NFPA Rating = 3). Note also, its vapor is capable of traveling a considerable distance to an ignition source causing "flashback." Properly packaging and labeling shipments of ethanol solutions will minimize the chance of leakage, and would also communicate the potential hazard to transport workers in the event of a leak. **I understand (____)**
 - a) **Quantity Limits:** Small quantities (inner container less than 30 ml, with a maximum net quantity of 500 ml for the entire package) of ETOH can be shipped with "Excepted Quantities" labels without completion of a Dangerous Goods Declaration. (*e.g.*, If shipping vials having a maximum volume of 10 ml each, you may put up to 50 vials in one box.) **I understand (____)**
 - b) **Package Components:**
 - i. **Inner (primary) packaging (*e.g.*, vial, tube, jar, etc.):** Do not completely fill inner packaging; allow 10% head-space for liquid expansion. Liquids must not completely fill inner packaging at a temperature of 55°C (130°F). Closures of inner packaging (*e.g.*, vials with tops) must be held securely in place with tape or other positive means. **I understand (____)**
 - ii. **Intermediate (secondary) packaging (*e.g.* Ziplock or other plastic bag):** Place inner container(s) (*e.g.*, vials with ETOH) into a high-quality plastic bag. Then add an absorbent material capable of absorbing any spillage without reacting with the ethanol. Seal the first bag tightly and then tape the locking seals. Next, seal the inner bag within a second bag for added safety. **I understand (____)**
 - iii. **Outer packaging (*e.g.*, cardboard box):** Ethanol solutions may not be shipped in envelopes, Tyvek® sleeves, or other non-rigid mailers. The dimensions of the outer box must be at least 100 mm (~4 inches) on two sides. Any space between the inner packing containers placed in the outer packaging should be eliminated with additional filler. **I understand (____)**
 - c) **Package Labels:**
 - i. **Dangerous Goods in Excepted Quantities Label (Figure 1):** The label must display a "3" as the ethanol hazard class number using a black marker. You may obtain self-adhesive labels from NMFS, or else, order online. **I understand (____)**
 - ii. **Name and Address:** The outer container must display the name and address of the shipper and consignee. When using shipping boxes, completely remove or black out all unnecessary labels or marks. **I understand (____)**

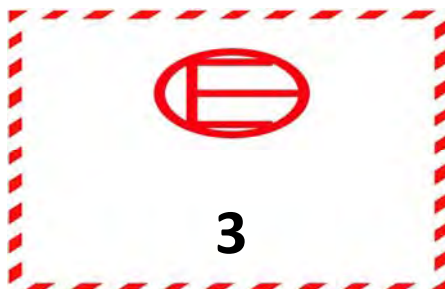


Figure 1. Dangerous Goods in Excepted Quantities label

Appendix 3c (continued)

d) **Package Tests:**

A representative example of packaging used for excepted quantities of ethanol solutions must pass a drop test and compressive load test without any breakage or leakage of any inner packaging and without any significant reduction in package effectiveness. Perform the following tests on a representative example of your packaging and keep a record of the results.

i. **Drop Test:** Drop a representative package from a height of 1.8 m (5.9 feet) directly onto a solid unyielding surface:

Test Results

- a. One drop flat on the base; (_____)
- b. One drop flat on top; (_____)
- c. One drop flat on the longest side; (_____)
- d. One drop flat on the shortest side; and (_____)
- e. One drop on a corner. (_____)

ii. **Compressive Load Test:** Apply a force to the top surface of a representative package for a duration of 24 hours, equivalent to the total weight of identical packages if stacked to a height of 3 meters. (_____)

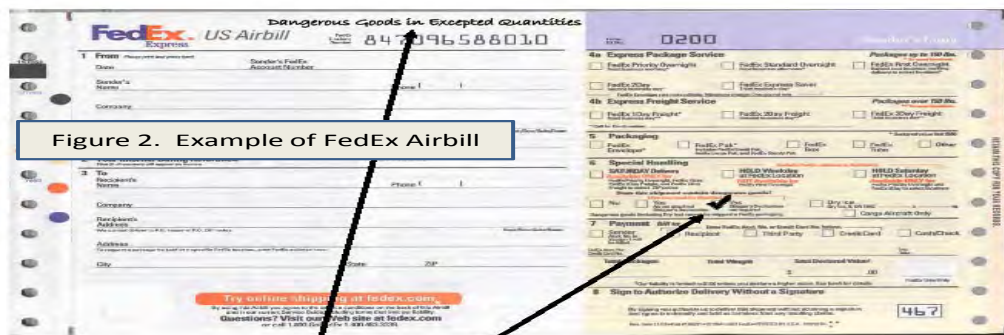
e) **Package Documentation:**

Proper documentation is required for all shipments of hazardous materials. Incorrect documentation is the most common cause for package refusal. If using documentation for couriers other than FedEx, UPS and DHL, please contact NMFS for assistance.

i. **FedEx:** For domestic shipments with FedEx Express, fill out the standard US Airbill. Fill out the form completely including the following information:

- a. In Section 6, Special Handling, check the box “Yes, Shipper’s Declaration not required.”
- b. On the top of the form above the FedEx tracking number, include the statement, “**Dangerous Goods in Excepted Quantities**” See example in **Figure 2**. I understand (_____)

ii. **DHL:** The “*Nature and Quantity of Goods*” box of the air waybill must include “**Dangerous Goods in Excepted Quantities.**” I understand (_____)



Include this statement and check this box.

By signing this document, I affirm I understand the hazards associated with ethanol and the shipping requirements for ethanol solutions, as outlined in this guide. I also understand I am required to include a copy of this document in the package and that it should be appended to an ESA permit (if listed samples are shipped).

Print Name:		Signature:	
Employer:		Employer Address:	
Date:			Phone:

STURGEON SALVAGE FORM

For use in documenting dead sturgeon in the wild under ESA permit no. 17273 (version 1-30-2014)

INVESTIGATORS'S CONTACT INFORMATION Name: First _____ Last _____ Agency Affiliation _____ Email _____ Address _____ _____ Area code/Phone number _____	UNIQUE IDENTIFIER (Assigned by NMFS) DATE REPORTED: Month <input type="checkbox"/> <input type="checkbox"/> Day <input type="checkbox"/> <input type="checkbox"/> Year 20 <input type="checkbox"/> <input type="checkbox"/> DATE EXAMINED: Month <input type="checkbox"/> <input type="checkbox"/> Day <input type="checkbox"/> <input type="checkbox"/> Year 20 <input type="checkbox"/> <input type="checkbox"/>
--	---

SPECIES: (check one) <input type="checkbox"/> shortnose sturgeon <input type="checkbox"/> Atlantic sturgeon <input type="checkbox"/> Unidentified <i>Acipenser</i> species Check "Unidentified" if uncertain. See reverse side of this form for aid in identification.	LOCATION FOUND: <input type="checkbox"/> Offshore (Atlantic or Gulf beach) <input type="checkbox"/> Inshore (bay, river, sound, inlet, etc) River/Body of Water _____ City _____ State ____ Descriptive location (be specific) _____ _____ Latitude _____ N (Dec. Degrees) Longitude _____ W (Dec. Degrees)
--	--

CARCASS CONDITION at time examined: (check one) <input type="checkbox"/> 1 = Fresh dead <input type="checkbox"/> 2 = Moderately decomposed <input type="checkbox"/> 3 = Severely decomposed <input type="checkbox"/> 4 = Dried carcass <input type="checkbox"/> 5 = Skeletal, scutes & cartilage	SEX: <input type="checkbox"/> Undetermined <input type="checkbox"/> Female <input type="checkbox"/> Male How was sex determined? <input type="checkbox"/> Necropsy <input type="checkbox"/> Eggs/milt present when pressed <input type="checkbox"/> Borescope	MEASUREMENTS: Circle unit Fork length _____ cm / in Total length _____ cm / in Length <input type="checkbox"/> actual <input type="checkbox"/> estimate Mouth width (inside lips, see reverse side) _____ cm / in Interorbital width (see reverse side) _____ cm / in Weight <input type="checkbox"/> actual <input type="checkbox"/> estimate _____ kg / lb
--	--	--

TAGS PRESENT? Examined for external tags including fin clips? <input type="checkbox"/> Yes <input type="checkbox"/> No Scanned for PIT tags? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Tag # _____ _____	Tag Type _____ _____	Location of tag on carcass _____ _____

CARCASS DISPOSITION: (check one or more) <input type="checkbox"/> 1 = Left where found <input type="checkbox"/> 2 = Buried <input type="checkbox"/> 3 = Collected for necropsy/salvage <input type="checkbox"/> 4 = Frozen for later examination <input type="checkbox"/> 5 = Other (describe) _____	Carcass Necropsied? <input type="checkbox"/> Yes <input type="checkbox"/> No Date Necropsied: _____ Necropsy Lead: _____ _____	PHOTODOCUMENTATION: Photos/video taken? <input type="checkbox"/> Yes <input type="checkbox"/> No Disposition of Photos/Video: _____ _____ _____
--	---	--

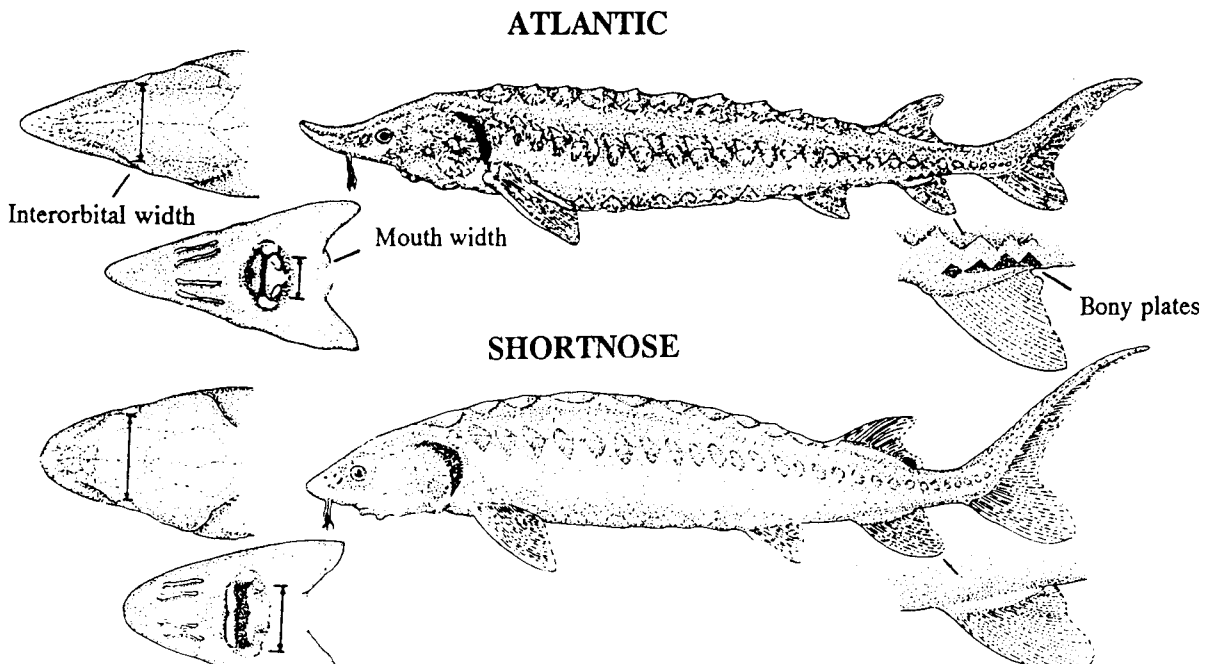
SAMPLES COLLECTED? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Sample _____ _____ _____ _____ _____ _____ _____ _____	How preserved _____ _____ _____ _____ _____ _____ _____	Disposition (person, affiliation, use) _____ _____ _____ _____ _____ _____ _____

Comments:

Distinguishing Characteristics of Atlantic and Shortnose Sturgeon (version 01-30-2014)

Characteristic	Atlantic Sturgeon, <i>Acipenser oxyrinchus</i>	Shortnose Sturgeon, <i>Acipenser brevirostrum</i>
Maximum length	> 9 feet/ 274 cm	4 feet/ 122 cm
Mouth	Football shaped and small. Width inside lips < 55% of bony interorbital width	Wide and oval in shape. Width inside lips > 62% of bony interorbital width
*Pre-anal plates	Paired plates posterior to the rectum & anterior to the anal fin.	1-3 pre-anal plates almost always occurring as median structures (occurring singly)
Plates along the anal fin	Rhombic, bony plates found along the lateral base of the anal fin (see diagram below)	No plates along the base of anal fin
Habitat/Range	Anadromous; spawn in freshwater but primarily lead a marine existence	Freshwater amphidromous; found primarily in fresh water but does make some coastal migrations

* From Vecsei and Peterson, 2004



Describe any wounds / abnormalities (note tar or oil, gear or debris entanglement, propeller damage, etc.). Please note if no wounds / abnormalities are found.

Data Access Policy: Upon written request, information submitted to National Marine Fisheries Service (NOAA Fisheries) on this form will be released to the requestor provided that the requestor credit the collector of the information and NOAA Fisheries. NOAA Fisheries will notify the collector that these data have been requested and the intent of their use.

Submit completed forms (within 30 days of date of investigation) to: Greater Atlantic Regional Fisheries Office
Contacts – Shortnose Sturgeon Recovery Coordinator (Jessica Pruden, Jessica.Pruden@noaa.gov, 978-282-8482) or Atlantic Sturgeon Recovery Coordinator (Lynn Lankshear, Lynn.Lankshear@noaa.gov, 978-282-8473); **Southeast Region Contact**- Shortnose and Atlantic Sturgeon Recovery Coordinator (Kelly Shotts, Kelly.Shotts@noaa.gov, 727-551-5603).

NOAA Marine Biotoxins Program – Analytical Response Team

Sampling Protocol for Algal Identification and Toxin Analysis

Supplies

- * Bucket
- * Plastic bottles (100 ml and 1 liter)
- * Plankton net (10 µm nylon mesh) if available
- * Lugol's iodine fixative
or
- * glutaraldehyde fixative

Lugol's iodine: - dissolve 10 g potassium iodide (KI) in 100 ml distilled water
 - add 5 g crystalline iodine (I₂)
 - add 10 ml glacial acetic acid

Protocol

1. Look for discolored water patches (record observations). *There may not be discolored water in association with some toxic algal events.* Record temperature, salinity, and dissolved oxygen if possible.
2. For qualitative analysis, collect sample with a plankton net, if available, using vertical tow (bottom to surface). Transfer ~100 ml of concentrated sample to a 100 ml plastic bottle. Add preservative: Lugol's to make a tea color (1-2 ml) or glutaraldehyde to make 2% final concentration (2 ml).
3. For quantitative analysis, collect surface water samples using bucket.
 - a. Transfer water into two 1 L bottles (rinsed soda bottles are acceptable) for toxin analysis. Wrap bottles with wet paper towels. Store in a cool, dark place (do not freeze). Ship overnight if possible in styrofoam cooler containing wet paper towels and refrigerated blue ice packs (keep these from actually touching the bottle).
 - b. Transfer ~100ml sub-sample to 100 ml plastic bottles. Add preservative: Lugol's to make a tea color (1-2 ml) or glutaraldehyde to make 2% final concentration (2 ml). Store in cool, dark place until shipping.

Sampling Protocol for Toxin Analysis in Animals

Supplies

- * Normal sized samples: 50-mL plastic centrifuge tubes or other plastic tubes
- * Large samples: sealable/ziplock plastic bags or bottles

** Prior to collection, obtain required permits or licenses in order to comply with state and/or federal regulations for shellfish or protected species (marine mammals, sea turtles).

Invertebrates, (clams, oysters, mussels, scallops, crustaceans)

Generally collect entire animal. Freeze whole or shucked – 100 g meat/tissue. Samples can be stored in ziplock bags on ice until they can be frozen. Freeze (-20°C) and ship on dry ice.

Collection of shellfish is most easily accomplished by the use of available harvesting methods (rakes, dredges, etc.)

Prey Fish

If possible, the species should be identified before freezing. Small fish should be collected and frozen, then shipped whole. For large species, stomach contents (whole stomach), liver and flesh should be sampled and stored separately. Minimum of 50 g flesh should be obtained. All tissues can be stored frozen (-20°C) in ziplock bags until shipment on dry ice.

Mammals

(also see Geraci, J.R. and Lounsbury, V.J. 2005. Marine Mammals Ashore: A Field Guide for Strandings. National Aquarium, Baltimore, MD, 372 pp. for detailed necropsy sampling procedures). Limit sampling to code 1 or 2 animals (see above reference for definition), as changes in toxin structure and tissue matrix may occur in degraded tissue samples.

The most useful tissues/fluids for confirming biotoxin exposure are generally feces, urine and stomach contents. However, samples from additional tissues (gastric fluid, liver, kidney, lung, brain, serum) are important for metabolism and body burden studies. All samples should be immediately placed in a cooler on ice and frozen (-20°C) as soon as possible after collection. Samples should be shipped on dry ice to the laboratory for analysis. Prior to shipping samples, please contact receiving laboratory to ensure proper receipt of the samples.

All samples must be labeled with animal ID, date, species in indelible ink. Additionally, a small tag containing sample information inserted inside the sample container may be useful in some cases. Additional details, including location (latitude/longitude or closest landmark), animal length, weight, condition code, sex, and additional relevant information must be recorded on a sample log and a hard copy must accompany samples. In addition, also send a digital version to your contact at the laboratory. See the attached sample information sheet as an example.

Urine - Collect a minimum of 0.5 ml urine, more if available (5-10 ml). Store frozen (-20°C) in capped plastic centrifuge tubes.

Feces – Collect a minimum of 5 g (preferably 50 g). Store frozen (-20°C) in capped plastic centrifuge tubes or other container suitable for freezer storage.

Intestinal contents - Collect a minimum of 5 g (preferably 50 g). Store frozen (-20°C) in capped plastic centrifuge tubes or other container suitable for freezer storage. Indicate which portion of the intestine was sampled (e.g. upper, mid-, lower intestine)

Stomach contents – Collect a minimum of 5 g (preferably 50 g) of solid or semi-solid contents if available. Store frozen (-20°C) in capped plastic centrifuge tubes or other container suitable for freezer storage. If stomach fluid only is available, collect at least 5ml in a plastic tube or vial.

Gastric fluid, liver, kidney, lung, spleen, brain – collect 100 g (or mL) if possible. Store frozen (-20°C) in separate ziploc bags.

Serum – obtain serum by centrifugation (1500-3000 x g; 5 minutes) of whole, heparinized blood. The top layer is the serum. Collect >0.5 ml of serum and store frozen (-20°C) in a plastic tube.

Whole blood -Heparinized whole blood can be spotted directly onto blood collection cards and stored at room temperature in the presence of dessicant pouches. Blood cards with detailed instructions can be obtained from your contact at the Marine Biotoxins Program laboratory.

Birds

Collect as above for mammals, substituting cloacal contents for feces and urine, and with the addition of gizzard contents.

Marine Mammal Stranding Response Agreement

Between

Northeast Region
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
Department of Commerce

AND

Virginia Aquarium & Marine Science Center
Stranding Response Program

Articles III, IV, V, and VI are reserved and issued at the discretion of the NMFS Regional Administrator.



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Article I: General Provisions

A. Authority

1. This Marine Mammal Stranding Response Agreement (hereinafter Agreement) is entered into between the Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) Northeast Region, and the Stranding Network Participant Virginia Aquarium & Marine Science Center Stranding Response Program (Participant), under the authority of section 112(c) and section 403 of the Marine Mammal Protection Act of 1972 (MMPA), as amended. **This Agreement supersedes all pre-existing Stranding Agreements between these parties. An organizational representative with signatory authority (e.g. Executive Director, President, CEO) must sign this Agreement on behalf of the Stranding Network Organization.**
2. NMFS has been delegated authority by the Department of Commerce to administer the MMPA. To assist in the implementation and administration of the MMPA, the Stranding Network has been established to respond to stranded marine mammals within NMFS' Northeast Region of the United States. The Northeast Region consists of the following coastal states and territories: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, New Jersey, Delaware, Maryland and Virginia.

B. Scope

1. Under the MMPA, NMFS is responsible for mammals of the **Order Cetacea** and the **Order Pinnipedia** other than walruses (hereinafter marine mammals).
2. The geographic response area assigned to Participant consists of the following: coastal and tidal waters of Virginia, including the Virginia portion of Chesapeake Bay and its tributaries. The Participant may assist in stranding response within the Region outside of their assigned response area, if requested by NMFS or by another Participant. Outside the Northeast Region, the Participant may assist with stranding response upon request from the appropriate NMFS Regional Stranding Coordinator(s).

C. Limitations

1. This Agreement creates an authorization for the Participant to take marine mammals, which would be otherwise prohibited by the MMPA. This taking authorization only applies to the Participant and its authorized personnel (see Article VI) for activities that are consistent with this Agreement.
2. In particular, this Agreement does not authorize:

- a. The taking of any marine mammal species listed as endangered or threatened under the Endangered Species Act of 1973 (ESA), as amended. Authorization to take ESA listed species is provided under an MMPA/ESA Permit No. 932-1489-09, as amended, issued to the NMFS National Marine Mammal Health and Stranding Response Program Coordinator and **requires authorization and direction from the NMFS Regional Stranding Coordinator in the event of a stranding involving a threatened or endangered marine mammal.**
- b. The sale or offer of sale of any marine mammal or marine mammal parts including cells, gametes, or cell cultures.

D. Definitions

All terms used in the Agreement shall be interpreted to have the meaning specified in the MMPA section 3 and section 409 and NMFS implementing regulations 50 CFR 216.3 unless the context or specific language requires otherwise. For ease of reference, those definitions, as well as additional terms and definitions for this Agreement, are provided in Attachment A.

Article II: Purpose and General Responsibilities

A. Purpose of Agreement. NMFS and the Participant enter into this Agreement for the following purposes:

1. To provide for rapid response and investigation of stranded marine mammals (Order Cetacea and Order Pinnipedia) within the Northeast Region in accordance with the purposes and policies of the MMPA.
2. To implement Title IV (Marine Mammal Health and Stranding Response Program) of the MMPA:
 - a. to facilitate the collection and dissemination of reference data on the health of marine mammals and health trends of marine mammal populations in the wild;
 - b. to correlate the health of marine mammals and marine mammal populations in the wild with available data on physical, chemical, and biological environmental parameters; and
 - c. to detect and coordinate effective responses to Marine Mammal Unusual Mortality Events (UMEs).
3. To specify the activities during which the Participant may take stranded marine mammals (Order Cetacea and Order Pinnipedia) or marine mammal parts for the primary purpose of ensuring the appropriate response, rehabilitation, disposition, and utilization of stranded marine mammals or marine mammal parts under MMPA sections 109(h), 112(c), and 403 and the Agreement.
4. To define the nature and extent of services that the Participant will provide NMFS under this Agreement and NMFS' responsibilities to the Participant.
5. To specify the requirements for the preparation and maintenance and reporting of records containing scientific data obtained from dead and live stranded marine mammals or parts from dead stranded marine mammals.
6. To provide for the timely exchange of information for use by both parties and other network members in furthering the objectives of the MMPA under this Agreement.

B. Joint Responsibilities

NMFS and the Participant will work cooperatively to:

1. Implement Title IV of the MMPA;

2. Effectively respond to and investigate the causes and impacts of UMEs;
3. Collect the appropriate data for determination of serious injuries and mortalities due to human interactions;
4. Collect reference data on marine mammal health and diseases;
5. Collect data on the frequency and causes of strandings; and
6. Interpret findings and identify health trends and diseases of concern to include emerging, reportable, and zoonotic diseases.

C. NMFS Responsibilities

NMFS Shall:

1. Provide the Participant with notice of any changes to laws, regulations, policies and/or guidelines applicable to or promulgated by NMFS that may apply to the Participant's activities. This includes criteria for issuance, renewal and termination of stranding agreements. Notwithstanding this provision, it is the responsibility of the Participant to comply with all laws, regulations, policies and/or guidelines that apply to the Participant's activities.
2. Conduct periodic compliance reviews of Stranding Agreements as stated in Article IX.
3. Provide guidance and assistance regarding investigation of marine mammal unusual mortality events including financial and physical resources (example: NOAA laboratory assistance) and financial resources when available and authorized (in accordance with section 405 of the MMPA – UME National Contingency Fund) and in coordination with the Working Group on Marine Mammal Unusual Mortality Events.
4. Alert the Participant when NMFS has been notified that there are diseases of concern that are emerging, reportable, and/or zoonotic within the Northeast Region.
5. Pursuant to criteria established under the MMPA section 407, provide access to the National Marine Mammal Health and Stranding Response Program Database, as developed, and access to marine mammal tissues in the National Marine Mammal Tissue Bank following NMFS data and tissue access procedures and policies.
6. As needed and as resources are available, provide specialized marine mammal stranding response equipment and investigation training on a local, regional or national basis.

7. Pursuant to MMPA section 402, collect and update periodically and make available to stranding network participants and other qualified scientists, existing information on:
 - a. procedures and practices for rescuing and rehabilitating stranded marine mammals;
 - b. species by species criteria used by the stranding network participants, for determining at what point a marine mammal undergoing rescue and rehabilitation is returnable to the wild based on its ability to survive in the wild and risk to the wild population of marine mammals;
 - c. procedures and practices for collecting, preserving, labeling, and transporting marine mammal tissues for physical, chemical, and biological analyses;
 - d. relevant scientific literature on marine mammal health, disease, and rehabilitation;
 - e. compilation and analyses of strandings by region to monitor species, numbers, conditions, and causes of illness and death in stranded marine mammals; and
 - f. other life history and reference level data, including marine mammal tissue analyses that would allow comparison of the causes of illness and death in stranded marine mammals with physical, chemical, and biological environmental parameters.
8. Identify a Northeast Region Marine Mammal Stranding Response Program Coordinator who will serve as the Participant's primary point of contact for notification, coordination, reporting, response and rehabilitation activities as specified throughout this Agreement. The NMFS Regional Administrator will serve as the Participant's primary point of contact for administration of the Agreement, as well as dispositions and other management activities as specified throughout the Agreement. **The NMFS Regional Administrator's designated point of contact for this Agreement is the NMFS Northeast Region Marine Mammal Stranding Coordinator, Northeast Regional Office, Protected Resources Division.** (see Attachment B for contact information).
9. In certain circumstances such as large scale events (e.g. mass stranding, unusual mortality events, live right whale stranding), NMFS may establish a formal Incident Command System (ICS) for response, including the identification of an Incident Commander. Events such as oil spills, NMFS will follow direction from United States Coast Guard (USCG). Opportunities for ICS training can be accessed through the Federal Emergency Management Agency (see <http://www.training.fema.gov/EMIWeb/IS/is100.asp>), USCG, or NMFS. If necessary, guidance will be provided by NMFS on a case-by-case basis.

10. Relay reports of stranded marine mammals (live or dead) within the Participant's geographic range to the Participant and inquire whether the Participant has the capability to respond. If the Participant cannot respond, the Stranding Coordinator may make requests to other regional Stranding Participants to respond.
11. Coordinate regional activities to maximize geographic coverage while facilitating appropriate division of responsibilities among regional Participants according to institutional abilities and authorities.
12. Respond to the Participant's completed requests for authorizations such as requests for parts authorizations, parts transfers, and release determinations.
13. Provide information regarding availability of Prescott Grants and any other relevant NMFS funding opportunities.
14. For emergency stranding events (live or dead), provide and maintain a 24-hour stranding hotline number: 1-866-755-NOAA (6622).

D. Participant Responsibilities

The Participant shall:

1. Comply with laws, regulations, policies and/or guidelines applicable to or promulgated by NMFS that apply to activities under this Agreement; or any Federal, state or municipal laws that pertain to stranding network operations (e.g., municipal water management laws).
2. Cooperate with other members of the Northeast Region Stranding Network and the National Marine Mammal Stranding Program as well as Federal, state, and local officials and employees in matters supporting the purposes of this Agreement.
3. Be subject to the direction of a designated employee (e.g., NMFS Marine Mammal Stranding Coordinator or NMFS Special Agent) representing the NMFS Northeast Regional Administrator or Office of Law Enforcement with respect to the taking of a stranded marine mammal.
4. Manage any and all expenses that the Participant incurs associated with the activities authorized by this Agreement. NMFS does not have funds to reimburse volunteers for expenses incurred in responding to stranding events. However under the marine mammal UME process, funding may be available for costs associated with specific analyses and additional requests in accordance with section 405 of the MMPA UME National Contingency Fund and in coordination with the Working Group on Marine Mammal Unusual Mortality Events. Additionally, competitive funding opportunities for Stranding Network Participants may be available through the Prescott Stranding Assistance Grant Program (see

<http://www.nmfs.noaa.gov/pr/health/prescott/>). Non-competitive funds to supplement equipment and training needs may become available on a year by year basis. NMFS will provide notification of the availability of these funds.

5. Promote human and public safety by taking precautions against injury or disease to any network personnel, volunteers, and the general public when working with live or dead marine mammals.
6. Notify immediately the NMFS Stranding Coordinator upon learning of any diseases of concern (e.g., emerging, reportable, and/or zoonotic diseases) that are detected and/or confirmed that could be a potential hazard for public health or animal health (NMFS will provide guidance on reportable diseases as it becomes available);
7. Transfer of marine mammal parts (50 CFR 216.22 and 216.37):
 - a. Non-diagnostic parts, tissues, cells, gametes, or cell cultures to be used for scientific research, species enhancement, or education shall be transferred only to persons or labs that have received prior written authorization from the NMFS MMPA/ESA scientific research permit or a Regional Parts Authorization Letter. A unique field number assigned by NMFS (e.g., NMFS Registration Number) or the Participant must be marked on or affixed to the marine mammal part or container.
 - b. Diagnostic parts, tissue samples, fluid specimens, parts, or cells may be transferred to labs within the United States for diagnostic use without any additional authorizations.
8. Work cooperatively with the NMFS and the USCG in a hazardous waste spill (i.e., oil spills) ICS if implemented.
9. Notify the NMFS Regional Administrator in writing within 30 days of any changes in its Designee organizations, key personnel (see Attachment A), capabilities, and/or geographic area of response.
10. If requested, the Participant shall coordinate with NMFS to develop and implement a media plan relating to stranding events.
11. Photo documenting (still or video) for other than diagnostic or identification purposes (such as dorsal fin identification, documentation of lesions, scars, etc.) must not interfere or influence the conduct of the stranding responders and response in any way or cause additional harassment to marine mammals.
12. If requested by the NMFS Regional Stranding Coordinator, the Participant will provide copies of any photographs, films, and/or videotapes documenting any stranding, particularly for those strandings when human interactions are

reported or suspected. Reimbursement for this request is subject to negotiation between NMFS and the Participant. Any photography, film and/or videotape of the stranding response use for educational or commercial purposes of stranding response by the Participant should include a credit, acknowledgment, or caption indicating that the stranding response was conducted under a Stranding Agreement between NMFS and the Participant under the authority of the MMPA. NMFS will not reproduce, modify, distribute, or publicly display the photograph, film and/or videotape without consent of the owner, unless required to release a copy under Federal law or order (such as the Freedom of Information Act).

13. By its nature, the handling of stranded marine mammals (dead or alive) is potentially a dangerous activity. The Participant shall indemnify and hold harmless the United States Government from any and all losses, damages, or liability -or claims therefore -on account of personal injury, death, or property damage of any nature whatsoever, arising out of the activities of the Participant, his/her/its employees, his/her/its qualified representatives, designees, subcontractors, volunteers, or agents. Liability for person(s) acting under this agreement is addressed in sections 406(a) and (b) of the MMPA [16 U.S.C. 1421(e)].
14. Provide accurate and honest information in all reports to NMFS.
15. Except where a longer period is specified (e.g., 15 years for rehabilitation cases, see Attachment D *NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release – Standard for Rehabilitation Facilities*), maintain records upon which required reports are based for at least 3 years on-site.
16. Upon request by the NMFS Regional Administrator, allow the Regional Stranding Coordinator, other appropriate NMFS employees, or any other appropriate person duly designated by the Regional Administrator, to inspect the facilities and inspect and/or request records that pertain to stranding network activities.
17. Verbally report any right whale sightings that occur or are reported as part of their normal activities. See Attachment B for contact information.

Article III: Dead Animal Response

A. The Participant may take species of marine mammals under the MMPA for the purpose of dead animal investigation and response.

Subject to the conditions contained in this Agreement, the MMPA, and the implementing regulations, the Participant may take dead stranded marine mammals or parts there from for the collection of data on the health and health trends of wild populations, for the detection of marine mammal UMEs, for the detection of signs of human interaction, for research or education on marine mammal biology and life history, for the determination of cause of death, for the detection of human caused and natural mortality, or for other research as deemed appropriate by the NMFS. These activities specifically include: obtaining measurements and biological samples from dead stranded marine mammals; disposing, or assisting in the disposal, of dead stranded marine mammals at an appropriate landfill or other suitable location; and taking and transporting dead stranded or floating dead marine mammals, or parts there from, to facilities or individuals approved pursuant to 50 CFR. 216.22 for scientific research, maintenance in a properly curated, professionally accredited scientific collection, or for educational purposes.

B. Terms and Conditions for Dead Animal Response

1. Response

- a. The Participant shall respond as practicable to reports of dead stranded marine mammals within the geographic range or response specified under Article I, Number B.2. If the Participant is the closest and/or first responder, the Participant is considered to be the on-site coordinating organization and is in charge of all on-site activities. In certain circumstances such as a UME, mass stranding, or endangered marine mammal stranding, NMFS may implement the ICS structure and designate an on-site coordinator to be in charge of the event (see Article II C9). In all situations, the Participant will cooperate with Federal, state and local government officials and employees and other stranding network participants when responding to these strandings. If the Participant receives a verified report of a dead stranded marine mammal and does not have the capability to respond appropriately to the report, the Participant shall notify the NMFS Regional Stranding Coordinator and/or adjacent stranding network participants within 24 hours if feasible.
- b. If the Participant leaves a dead animal at the stranding site or in the case of a UME or mass stranding response, the Participant shall, if feasible, mark each animal with a tag or mark, such as roto-tags or grease stick, to assist with data collection and to prevent multiple reports on the same animal(s).

- c. If requested by NMFS Regional Stranding Coordinator and if feasible and practicable, the Participant will assist with stranding response in neighboring areas outside the Participant geographic range (specified in Article I B2).

2. Data Collection and Reporting. The Participant shall collect and provide the following information for each stranded marine mammal they respond to:

- a. Complete the NOAA Form 89-864, OMB #0648-0178 (the Marine Mammal Stranding Report - "Level A" Form) for each stranded marine mammal. Completed forms shall be sent to the NMFS Regional Stranding Coordinator via the NMFS National Marine Mammal Stranding Database or in writing (see Attachment B), no later than 30 days after responding to the stranding event. If requested by the NMFS Regional Stranding Coordinator and if feasible, the Participant shall provide preliminary data (verbal or written) from the Level A - Marine Mammal Stranding Report within 24 hours.
- b. As resources are available, collect additional Level B and Level C data.
- c. Notify the Regional Stranding Coordinator of the following cases within 24 hours or according to the specific reporting guidance provided by the Stranding Coordinator:
 - 1. possible or confirmed human interactions (including military activity),
 - 2. suspected UMEs,
 - 3. extralimital or out-of-habitat situations,
 - 4. mass stranding events and/or mass mortalities,
 - 5. large whale strandings, and
 - 6. any stranding involving endangered or threatened species or identified species of concern.
- d. In certain circumstances (e.g., listed or rare species stranding, UME, possible human interaction case, extralimital or out-of-habitat situation), the NMFS Regional Stranding Coordinator may request necropsies be conducted by a Necropsy Team Leader, or that additional and expedited reporting (verbal or written) of Level B and C data such as analytical results and necropsy reports if available. NMFS will not reproduce, modify, distribute, or publish the data without consent of the Participant unless required to release the data under Federal law or order (such as the Freedom of Information Act);
- e. Collect and make available any gear, debris, or other objects (e.g., bullets, arrows, net webbing, etc.) recovered from a stranded marine mammal that may be evidence of human interaction. The Participant must comply with chain of custody procedures

or any other instructions as specified and supported by NMFS Northeast Region and/or NMFS Office of Law Enforcement personnel.

3. **Parts Disposition.** Diagnostic parts, tissue samples, fluid specimens, parts or cells may be transferred to labs within the United States for diagnostic use without any additional authorizations. For non-diagnostic parts or samples:
 - a. **Retention:** Marine mammal parts may be retained by the Participant for education and/or research purposes, provided they are properly indicated in the "Specimen Disposition" field of NOAA Form 89-864, OMB #0648-0178 (the Marine Mammal Stranding Report - "Level A" Form). Parts and/or containers must be marked with the field identification number assigned by the Participant or by NMFS (i.e., NMFS registration number). Authorization to take parts from ESA listed species in the Northeast Region is currently provided under MMPA/ESA Permit No. 932-1489-09, as amended, issued to the NMFS Marine Mammal Health and Stranding Response Program Coordinator, and requires authorization and direction from the NMFS Regional Stranding Coordinator in the event of a stranding involving a threatened or endangered marine mammal, prior to any action by the Participant.
 - b. **Transfer:** Report to the NMFS Regional Administrator (See Attachment B) within 30 days of the stranding event, the transfer of any parts salvaged from the stranded marine mammal collected under this Agreement as required by 50 CFR 216.22 or 50 CFR 216.37. The Participant must provide the institution name where specimen materials have been deposited and ensure that the retained or transferred parts are marked with the field identification number or assigned NMFS Registration number in the "Specimen Disposition" field on the NOAA Form 89864, OMB #0648-0178 (the Marine Mammal Stranding Report - Level "A" Form) and ensure that retained or transferred parts are marked with the field identification number or the NMFS Registration Number. If parts are being transferred, the Participant must ensure the receiving institution is authorized by the NMFS Regional Administrator to receive marine mammal parts.
4. **Site cleanup.** The Participant shall make every reasonable effort to assist in the clean up of beach areas where their activities (e.g., necropsy or specimen collection) under this Agreement that may contribute to soiling of the site.

Article IV: Live Animal Response – First Response

A. The Participant may take species of marine mammals covered under the MMPA for the purpose of live stranding first response (initial assessment and care at the site of stranding and assist in the appropriate disposition of the animal), beach triage, beach release, temporary holding for assessment and triage, translocation and/or transportation to a NMFS authorized rehabilitation center within the Northeast Region.

1. The Participant must take live stranded marine mammals in a humane manner (as defined in 50 CFR 216.3, see Attachment A) for the protection or welfare of the marine mammal. If the animal dies during the course of response and/or investigation, then the terms and responsibilities contained in Article III of this Agreement become operative. In addition to the activities authorized in Articles I, II, and III, the Participant is authorized to implement the following activities under this article:
 - a. Take measurements and collecting blood or other diagnostic samples from live stranded marine mammals for health assessment.
 - b. Return live stranded marine mammals, as directed by the NMFS Regional Stranding Coordinator, to their natural habitat and tagging such animals.
 - c. Transport live stranded marine mammals for rescue and rehabilitation to a NMFS approved rehabilitation facility or temporary holding facility.
 - d. Perform humane euthanasia. Euthanasia shall only be performed by the attending veterinarian or by a person acting under the direction of the attending veterinarian and following approved guidelines such as those referenced in Attachment C (2007 Report of the American Veterinary Medical Association Panel on Euthanasia, 2nd Edition of the CRC Handbook of Marine Mammal Medicine, 2006 Journal of the American Association for Zoo Veterinarians). When using controlled drugs, such person(s) shall comply with all applicable state and Federal laws and regulations (i.e., registered with the Drug Enforcement Administration). Authorization for euthanasia of ESA-listed species provided under MMPA/ESA Permit No. 932-1489-09, as amended, and requires prior approval and direction from the NMFS Regional Stranding Coordinator.
2. This Agreement does not authorize any projects involving “intrusive research” (as defined in 50 CFR 216.3). Measurements or sampling for scientific research purposes (i.e., outside the scope of accepted diagnostic and treatment practices for the care of an animal) must be authorized under a NMFS MMPA/ESA scientific research permit.

B. Terms and Conditions for Live Stranding - First Response

1. Response

- a. The Participant shall respond to reports of live stranded marine mammals (Order Cetacea and Order Pinnipedia). If the Participant is the closest and/or first responder, the VAQS is considered to be the on-site coordinator and is in charge of all on-site activities. In certain circumstances such as a UME, mass stranding, or endangered marine mammal stranding, NMFS may implement the ICS structure and designate an on-site coordinator to be in charge of the event (see Article II C9). In all situations, the Participant will cooperate with Federal, state and local government officials and employees and other stranding network participants when responding to these strandings. If the Participant receives a verified report of a live stranded marine mammal and does not have the capability to respond appropriately to the report, the Participant shall notify the NMFS Regional Stranding Coordinator without delay. Also, if the NMFS Regional Stranding Coordinator receives a report of a live stranded marine mammal, the Regional Stranding Coordinator may contact the Participant to determine whether the Participant has the capability to respond to the stranding. If the Participant cannot respond in a timely manner, the NMFS Regional Stranding Coordinator may request another Stranding Network participant to respond.
- b. The Participant shall take all steps reasonably practicable under the circumstances to prevent further injury to any live stranded marine mammal, injury to any network personnel, volunteers, government personnel and the general public.
- c. The Participant shall tag or mark any animals that are immediately released to their natural habitat using a NMFS approved tag, such as one-bolt roto tag, cattle ear tags, or freeze branding. Application of other tagging methods must first be approved by the NMFS Regional Stranding Coordinator. Tagging and post-tagging activities are restricted to monitoring the success of marine mammals released to the wild. Any projects outside the scope of monitoring the success of a release must be authorized under a NMFS MMPA/ESA scientific research permit.
- d. If the Participant determines that it is necessary to temporarily hold or triage a stranded marine mammal at a separate site from the NMFS approved rehabilitation facility, the animal(s) cannot be moved until the Participant obtains verbal approval from the NMFS Regional Stranding Coordinator.

- e. Written documentation of the need for an interim location and written concurrence from the NMFS Regional Stranding Coordinator with any associated conditions must be provided at the earliest time practicable within 24 hours.
 - f. If the Participant considers responding to an “out-of-habitat” or free-swimming marine mammal in distress (e.g., entanglement), the Participant must first contact the NMFS Regional Stranding Coordinator for approval and discuss plans for live capture and/or needs for assistance. The NMFS Regional Stranding Coordinator may require a NMFS employee to be present at the time of capture.
 - g. The Participant shall follow the guidance provided by the Northeast Region in Attachment E, Disposition of Live Stranded Marine Mammals, and shall consult with the NMFS Stranding Coordinator and the attending veterinarian to make a determination regarding immediate release, rehabilitation, or euthanasia of live stranded marine mammals or cetaceans.
2. **Data Collection and Reporting.** The Participant shall collect and provide the following information for each stranded marine mammal they respond to:
- a. Complete the NOAA Form 89-864, OMB #0648-0178 (the Marine Mammal Stranding Report - “Level A” Form) for each stranded marine mammal. Completed forms shall be sent to the NMFS Regional Stranding Coordinator via the NMFS National Marine Mammal Stranding Database or in writing (see Attachment B), no later than 30 days after responding to the stranding event. If requested by the NMFS Regional Stranding Coordinator and if feasible, the Participant shall provide preliminary data (verbal or written) from the Level A - Marine Mammal Stranding Report within 24 hours.
 - b. If temporarily holding a stranded animal prior to transferring to a NMFS approved rehabilitation facility acting in accordance with this Article, the Participant shall complete the NOAA Form 89878, OMB # 0648-0178 (the Marine Mammal Rehabilitation Disposition Report). This report shall be sent to the NMFS Regional Stranding Coordinator via the NMFS National Marine Mammal Stranding Database or in writing (see Attachment B), no later than 30 days after responding to the stranding event. If requested by the NMFS Regional Stranding Coordinator and if feasible, the Participant shall provide preliminary data (verbal or written) from the Marine Mammal Rehabilitation Disposition Form within 24 hours.
 - c. As resources are available, collect additional Level B and Level C data.

- d. Notify the NMFS Regional Stranding Coordinator of the following cases within 24 hours or according to the specific reporting guidance provided by the Stranding Coordinator:
 - 1). possible or confirmed human interactions (including military activity),
 - 2). suspected UMEs,
 - 3). extralimital or out-of-habitat situations (see B.1.e. of this Article),
 - 4). mass stranding events and/or mass mortalities,
 - 5). large whale strandings, and
 - 6). any stranding involving endangered or threatened species or identified species of concern.
 - e. In certain circumstances (e.g., UME, possible human interaction case, extralimital or out-of-habitat situation), the NMFS Regional Stranding Coordinator may request additional and expedited reporting (verbal or written) of Level B and C data such as analytical results and necropsy reports if available. NMFS will not reproduce, modify, distribute, or publish the data without consent of the Participant unless required to release the data under Federal law or order (such as the Freedom of Information Act);
 - f. Collect and make available any gear, debris, or other objects (e.g., bullets, arrows, net webbing, etc.) recovered from a stranded marine mammal that may be evidence of human interaction. The Participant must comply with chain of custody procedures or any other instructions as specified and supported by NMFS Northeast Region and/or NMFS Office of Law Enforcement personnel.
4. **Site Cleanup.** The Participant shall make every reasonable effort to assist in the clean up of beach areas where their activities (e.g., euthanasia, necropsy, or specimen collection) under this Agreement.

Article V: Live Animal Response – Rehabilitation and Final Disposition

A. The Participant may take live stranded marine mammals in a humane manner with the goal of rehabilitation and release. If the animal dies during the course of rehabilitation, then the terms and responsibilities contained in Article III of this Agreement become operative. In addition to the activities authorized in Articles I, II, III, and IV of this Agreement and subject to the conditions contained in this Agreement, the MMPA, and the implementing regulations, the Participant is authorized to implement the following activities under this article:

1. In accordance with applicable regulations and NMFS guidelines and best practices, transfer marine mammals to another NMFS approved rehabilitation facility within the Northeast Region for:
 - a. release back to the wild;
 - b. temporary placement in a scientific research facility holding a current NMFS scientific research permit and a United States Department of Agriculture Animal and Plant Health Inspection Service (APHIS) Research License; or
 - c. permanent disposition at an authorized facility (i.e. holds an APHIS exhibitors license {7 U.S.C. 2131 *et seq.*}) after consultation with, and authorization by, the NMFS Office of Protected Resources Permits, Conservation and Education Division.
2. Conduct scientific research on stranded animals in a rehabilitation facility, only if the responsible individual has a NMFS scientific research permit and the facility holds an APHIS research license in accordance with the Animal Welfare Act (see 50 CFR 216.27 (c)(6)).
3. Return rehabilitated stranded marine mammals to their natural habitat. A decision regarding whether or not a marine mammal has the potential to be released must be made as early as possible during the rehabilitation period. Any marine mammal eligible for release must be released as early as possible and no later than six months after being taken for rehabilitation unless the attending veterinarian determines that: the marine mammal might adversely affect marine mammals in the wild; release is unlikely to be successful due to the physical condition and behavior of the marine mammal; or more time is needed to make a determination. Release plans must be submitted to the NMFS Regional Administrator at least 15 days prior to the release, unless advanced notice is waived by the NMFS Regional Administrator. The NMFS Regional Administrator may require the participant to provide additional information, modify the release plan, or dispose of the marine mammal in another manner (see 50 CFR 216.27(a) and the *NMFS/FWS Best*

Practices for Marine Mammal Stranding Response, Rehabilitation, and Release – Standards for Release.)

4. Tag rehabilitated stranded marine mammals, strictly for purposes of monitoring success of release to the wild using a NMFS approved tag, such as one-bolt roto-tag, cattle ear tags, or freeze branding. Application of other tagging methods must first be approved by the NMFS Regional Stranding Coordinator. Tagging and post-tagging activities are restricted to monitoring the success of marine mammals released to the wild. Any projects outside the scope of monitoring the success of a release must be authorized under a NMFS MMPA/ESA scientific research permit.
5. Perform humane euthanasia. Euthanasia shall only be performed by the attending veterinarian or by a person acting under the direction of the attending veterinarian and following approved guidelines such as those referenced in Attachment C (*2007 Report of the American Veterinary Medical Association Panel on Euthanasia, 2nd Edition of the CRC Handbook of Marine Mammal Medicine, 2006 Journal of the American Association for Zoo Veterinarians*). When using controlled drugs, such person(s) shall comply with all applicable state and Federal laws and regulations (i.e., registered with the Drug Enforcement Administration). Authorization for the euthanasia of ESA-listed species provided under MMPA/ESA Permit No. 932-1489-09, as amended, and requires prior approval and direction from the NMFS Regional Stranding Coordinator.

B. Terms and Conditions for Live Animal Response: Rehabilitation, Release, or Final Disposition Determination

1. Rehabilitation

- a. The Participant shall comply with laws, regulations, policies, and/or guidelines applicable to or promulgated by NMFS that apply to activities under this Agreement. The Participant must also have all applicable Federal, state, and local permits for rehabilitation facilities, and must comply with all Federal, state, and municipal laws related to operations of the facility.
- b. The Participant shall be responsible for the custody of any living marine mammal taken pursuant to this Article using standards for humane care and for practicing accepted medical evaluation and treatment as described in the *NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release – Standard for Rehabilitation Facilities* (Attachment D).
- c. The Participant shall not exceed their maximum holding capacity for cetaceans and pinnipeds based on the minimum standard space requirements, the number of animals housed in each holding area, and the availability of qualified personnel as described in the *NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release – Standard*

for Rehabilitation Facilities (Attachment D) unless a written waiver is first received from the NMFS Regional Administrator. The NMFS Regional Stranding Coordinator may offer assistance for relocating animals to another rehabilitation facility and in supporting decisions to euthanize when necessary. Other considerations for determining maximum holding capacity include:

- (1) On-site veterinary care, volunteer support, and experienced staff;
 - (2) Adequate food and medical supplies and medical test capabilities;
 - (3) Isolation for marine mammals;
 - (4) Adequate water quality;
 - (5) Limited public access; and
 - (6) Ability to maintain current, accurate and thorough records.
- d. The Participant shall follow contingency plans approved by NMFS for the care of marine mammals in rehabilitation during planned events (e.g., construction) or unexpected events such as mass strandings, UMEs, natural disasters (e.g., hurricanes, harmful algal blooms, El Niño), and/or hazardous waste spills.
 - e. The Participant shall isolate rehabilitating marine mammals from other wild or domestic animals and from any animal in permanent captivity.
 - f. The Participant shall prohibit the public display and training for performance of stranded rehabilitating marine mammals as required by 50 CFR 216.27(c)(5). This includes any aspect of a program involving interaction with the public.
 - g. The Participant shall follow any additional requirements for rehabilitation (e.g. isolation) and release prescribed by NMFS in consultation with the Working Group for Marine Mammal Unusual Mortality Events during a marine mammal UME, as recommended in the *National Contingency Plan for Response to Unusual Marine Mammal Mortality Events*; D.W. Wilkinson, NOAA Technical Memorandum NMFS-OPR-9, September 1996.
 - h. The Participant must temporarily refuse admittance of new cases of stranded marine mammals due to the severity of a disease outbreak when instructed by the NMFS Regional Stranding Coordinator, in consultation with the UME Working Group or other experts, if diseases of concern have been reported (e.g. diseases associated with a UME, or any emerging or zoonotic diseases).
 - i. The Participant shall not transfer a marine mammal being rehabilitated

under this Agreement to another facility without prior approval from the NMFS Regional Stranding Coordinator.

- j. If a marine mammal dies while in rehabilitation, Article III applies.

2. Release

- a. Release Recommendation. The Participant shall make a final written recommendation for each animal in rehabilitation as early as possible, and no more than six months after its date of rescue, for release or non-release determination to the NMFS Regional Administrator according to any applicable NMFS release guidelines and regulations including 50 CFR 216.27 (release, non-releasable, and disposition under special exception permits for rehabilitated marine mammals). This final recommendation shall include a release recommendation signed by the Participant's attending veterinarian, attesting that the marine mammal is medically and behaviorally suitable for release in accordance with the NMFS Standards for Release, and a concurrence signature from the Participant's Authorized Representative or Signatory of the Stranding Agreement (see Attachment D, *NMFS /FWS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release – Standards for Release*).
- b. Release Plan. If the Participant recommends release, a release plan must also be included with the final recommendation letter. This information must be submitted to and approved by the NMFS Regional Administrator at least 15 days prior to the release, unless advanced notice is waived by the NMFS Regional Administrator, as required by 50 CFR 216.27(a).

3. Data Collection and Reporting

- a. Diseases of Concern Reporting. The Participant shall notify immediately the NMFS Regional Stranding Coordinator upon learning of any diseases of concern (e.g., emerging, reportable, and/or zoonotic diseases) that are detected and/or confirmed that could be a potential hazard for public health or animal health (NMFS will provide guidance on Reportable Diseases);
- b. Disposition Reports. Upon release or other disposition of any marine mammal under this Article, the Participant shall complete the NOAA Form 89878, OMB # 0648-0178 (the Marine Mammal Rehabilitation Disposition Report Form). Completed forms shall be sent to the NMFS Regional Stranding Coordinator via the NMFS National Marine Mammal Stranding Database or in writing (see Attachment B), no later than 30 days after final disposition of the marine mammal. If requested by the NMFS Regional Stranding Coordinator and if feasible, the Participant shall provide preliminary data (verbal or written) from the Marine Mammal Rehabilitation Disposition Report within 24 hours.

- c. Annual Summary Reports. The Participant shall submit an annual report (due January 31 each year) summarizing the Participant's rehabilitation activities for the past calendar year. NMFS will not reproduce, modify, distribute, or publish the data without consent of the Participant unless required to release the data under Federal law or order (such as the Freedom of Information Act). The reports shall include the following for each animal in rehabilitation:
- i. Species and field number
 - ii. If the animal was released:
 - a. Date, location of release (latitude and longitude).
 - b. Type and specifics of post-release monitoring (roto-tag, satellite, etc.) and any roto-tag or freeze brand numbers used.
 - c. Photos if possible.
 - d. Duration of post-release monitoring.
 - e. Status of post-release monitoring.
 - f. Indications from monitoring relative to the success of the rehabilitation effort.
 - g. Disposition of tracking data if applicable.
 - iii. If the animal was transferred to permanent care:
 - a. Date of physical transport (if applicable).
 - b. Location of permanent care.
 - iv. If the animal was euthanized, provide the date of euthanasia.
 - v. If the animal died, provide the date of death.

Article VI: Good Standing Agreement

Northeast Region Marine Mammal Stranding Network Good Standing Agreement

To be considered in “good standing” the Northeast Marine Mammal Stranding Network Member (Network Member) must meet all of the following criteria:

General Criteria

- (1) If the Network Member is a designated Principal Investigator of an MMPA or Endangered Species Act (ESA) scientific research or enhancement permit holder, the applicant must have fulfilled all permit requirements, including but not limited to submission of all reports, and must have no pending or outstanding enforcement actions under the MMPA or ESA.
- (2) The Network Member must comply with the terms and responsibilities of its Stranding Agreement (SA), MMPA Section 109(h) authorization, or researcher authorization letter. This includes, but is not limited to, the following response and reporting requirements:
 - a. Timely (within 24 hours) response to all stranding reports in Network Member’s area of responsibility in accordance with SA;
 - b. Respond to stranding in an effective manner that protects both the health and safety of the responders and the stranded animals;
 - c. Timely (immediate) notification to NMFS regarding any unusual stranding circumstances (UME, out of habitat, large cetacean stranding, etc) according to the timelines as specified in the SA;
 - d. Adhere to the *Policies and Best Practices for Marine Mammal Stranding Response, Rehabilitation and Release*;
 - e. Reporting of stranding events to NMFS as specified in SA;
 - f. Submission of complete reports on basic or Level A data to the Regional Coordinator (includes investigator’s name, species, stranding location, number of animals, date and time of stranding and recovery, length and condition, and sex; marine mammal parts retention or transfer; annual reports) as specified in SA;
 - g. Collecting information or samples as necessary and as requested; and
 - h. Prompt notification to NMFS for any article of SA (or points above) with which the Network member cannot comply.
- (3) The Network Member must cooperate with NMFS in collecting and submitting Level B (supplementary information regarding sample collection related to life history and to the stranding event) and Level C (necropsy results) data and samples, when requested and within the requested timeframe.
- (4) The Network Member must have no current enforcement investigation for the ‘take’ of marine mammals in violation of the Marine Mammal Protection Act and Endangered Species Act.

- (5) The Network Member must have no record of a pending NMFS notice of violation(s) regarding the policies governing the goals and operations of the Stranding Network and Stranding Agreement, if applicable (e.g., probation, suspension, or termination).

Coordination and Cooperation Criteria

The following coordination/cooperation requirements must be satisfied:

- (1) Cooperation with state, local, and Federal officials;
- (2) Cooperation with state and local officials in the disposition of stranded marine mammals; and
- (3) Cooperation with other stranding network participants.

If the Network Member feels they are in danger of not being in “good standing”, please refer to *Communication Agreement*.

If NMFS determines a Network Member is in danger of not being in “good standing”:

1. The Network Member will receive a written warning from the Regional Administrator
2. The Network Member must reply to this warning within 30 days
3. The reply must include remediation efforts with a proposed timeline
4. Efforts and timeline must be agreed to by the Regional Administrator

If the Network Member fails to meet the timeline, and no further remediation letter is received from the Network Member, the Network Member will no longer be considered in “good standing”.

AGREEMENT

I have read and understand the conditions above for participating as a member of the Northeast Region Stranding Network. I agree to abide by all applicable provisions of the Good Standing Criteria established by National Marine Fisheries Service Northeast Region. By signing this agreement I understand and acknowledge the consequences of not complying with The Good Standing Criteria will lead to ineligibility for Prescott Grant funding and suspension or termination of the Stranding Network Member’s SA.

Article VII: Communications Agreement

Northeast Region Marine Mammal Stranding Program Communication Agreement

If the Northeast Marine Mammal Stranding Network Member (Network Member) foresees a problem or potential for non-compliance with their Stranding Agreement (SA), the Network Member will notify NOAA's National Marine Fisheries Service (NMFS) regional stranding staff immediately, no matter how small the problem. Should a Network Member foresee a problem or potential for non-compliance with their SA, the Network Member must:

1. Contact Marine Mammal Stranding Coordinator, or if not available;
 2. Contact Assistant Stranding Coordinator, or if not available;
 3. Contact Marine Mammal Stranding Data Assistant Coordinator.
- * If an emergency situation; call the Stranding HOTLINE: 866-755-6622**

If NMFS foresees a problem or potential for non-compliance with a Network Members SA, NMFS will provide a written warning to the Network Member (see Good Standing Criteria) and will work with the Network Member to identify the deficiency as:

1. Minor
2. Intermediate
3. Major

Minor Deficiency : a deficiency that will likely require little or no time to correct. Minor deficiencies have little impact on the operational capability of the Network Member and do not directly affect the rescue or care of live animals or the collection of data from live and dead animals.

Intermediate Deficiency : a deficiency that may require a short period of time to correct (less than 6 months) and require a small amount of resources (expense) to address. Intermediate deficiencies may cause the Network Member to become non-compliant with the NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release and may impact the operational capability of the Network Member. These deficiencies may also affect the rescue and care of live animals and data collection capabilities from live and dead stranded animals.

Major Deficiency : a deficiency that will require a prolonged period of time to correct (greater than 6 months) and require significant resources (expense) to address. Major deficiencies will cause the Network Member to become non-compliant with Federal, state and local laws and regulations as well as the NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release and will impact the operational capability of the Network Member. These deficiencies will likely be controversial and affect the

rescue and care of live animals and data collection capabilities from live and dead stranded animals.

The roles and responsibilities for each level of deficiency is as follows:

Minor Deficiency

Network Member responsibilities

1. Notify NMFS Regional Stranding Staff immediately
2. Submit remediation efforts within timeframe specified by NMFS
3. Work with NMFS on correcting the problem
4. Keep NMFS informed of progress on meeting deadline (if applicable)
5. Notify NMFS immediately if problem progresses or new issues develop
6. Submit report verifying steps taken to correct deficiency and future steps to prevent deficiency from reoccurring

NMFS responsibilities

1. NMFS staff will provide consultation to help correct problem if applicable
2. NMFS staff will develop timeline for corrective measures and consider an extension if requested

Intermediate Deficiency

Network Member responsibilities

1. Notify NMFS Regional Stranding Staff immediately
2. Develop an Action Plan to correct the problem, in consultation with NMFS
3. Keep NMFS informed of progress on meeting deadlines (if applicable)
4. Notify NMFS immediately if problem progresses or new issues develop
5. Seek guidance from NMFS staff or external experts
6. Submit report verifying steps taken to correct deficiency and future steps to prevent deficiency from reoccurring

NMFS responsibilities

1. NMFS staff will provide consultation to help correct problem if applicable
2. NMFS will develop a timeline for corrective measures and consider an extension if requested
3. NMFS staff will work with Network Member to identify cause of problem and identify solutions
4. Seek guidance from additional NMFS staff or external experts

Major Deficiency

Network Member responsibilities

1. Notify NMFS Regional Stranding Staff immediately
2. Develop an Action Plan to correct the problem, in consultation with NMFS
3. Keep NMFS informed of progress on meeting deadlines (if applicable)
4. Notify NMFS immediately if problem progresses or new issues develop
5. Seek guidance from NMFS staff or external experts
6. Convene other staff members to meet with NMFS to address problems: such as board members, attending veterinarians and veterinary technicians, upon request.
7. Provide requested data and files to NMFS as requested.
8. Submit report verifying steps taken to correct deficiency and future steps to prevent deficiency from reoccurring

NMFS responsibilities

1. NMFS staff will provide consultation to help correct problem if applicable
2. NMFS will develop a timeline for corrective measures and consider an extension if requested
3. NMFS staff will work with Network Member to identify cause of problem and identify solutions
4. Outside consultation from experts in the field may be sought to help address solutions to deficiencies
5. If applicable, NMFS staff will seek consultation of NOAA Office of Law Enforcement and General Council

If deadlines are disregarded without correction of deficiency, the Network member will be subject to disciplinary action: probation, suspension and/or termination (as outlined in the SA). NMFS will make every effort to notify the Network Member in writing of failure to comply with agreed upon remedies for deficiency. In cases of willfulness, or those in which public health, interest, or safety requires immediate attention, NMFS, Northeast Regional Administrator reserves the right to immediately suspend or terminate the Network Member's stranding agreement (as outlined in the SA).

AGREEMENT

I have read and understand the conditions above for participating as a member of the Northeast Region Stranding Network. I agree to abide by all applicable provisions of the Communication Agreement established by National Marine Fisheries Service Northeast Region.

Article VIII: Participant's Authorized Personnel

A. Personnel and Volunteers

Takings of marine mammals authorized in this Agreement may only be directed by the Participant's personnel and trained volunteers identified by the Participant in writing to the NMFS Regional Administrator. The Participant may use other (i.e., not previously identified to NMFS) volunteers to carry out activities in this Agreement only if they are under the close direction of previously identified trained personnel or volunteers. The Participant may not delegate authority to take marine mammals to another person except as provided in this article.

In the event of changes in key personnel, the prospective Participant shall notify the NMFS Regional Administrator in writing (see Attachment B) within 30 days and provide a description of the experience of new key personnel for review and approval by NMFS. New key personnel must meet the qualification terms identified in the *NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release - Evaluation Criteria for a Marine Mammal Stranding Agreement* (Attachment D).

B. Untrained Citizens

If the Participant requests the assistance of untrained citizens (e.g., during a mass stranding), the Participant is responsible for the actions of those citizens during the response; must take precautions against injury or disease to those volunteer citizens; and must ensure that the citizens' actions do not cause unnecessary harassment of marine mammals.

Article IX: Rights of States and Local Governments

Rights of States and Local Governments

Nothing in this Agreement shall be construed to affect the rights or responsibilities of other Federal, state, or local government officials or employees acting in the course of their official duties with respect to taking of marine mammals in a humane manner (including euthanasia) for protection or welfare of the marine mammal, protection of public health and welfare or non-lethal removal of nuisance animals (MMPA section 109(h)).

Article X: Effective Dates, Renewal and Application Procedures

A. Effective Date

The terms of this Agreement shall become effective upon the signature by both VAQS and the NMFS Northeast Regional Administrator.

B. Period of Agreement

1. **Duration:** Unless terminated as provided in this Agreement, this Agreement shall expire at the end of the following applicable period:
 - 1 year for new Stranding Network Participants
 - 1 year for a Stranding Network Participant on probation
 - 3 years for a live animal responder and rehabilitator (Articles IV and V)
 - 6 years for a dead animal only responder (Article III only)
2. **Stranding Agreement Renewals:** No later than 90 days prior to the expiration date of this Agreement, NMFS will provide the Participant with a written notice of expiration, and prescribe information needed from the Participant for renewal (see *NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release - Evaluation Criteria for a Marine Mammal Stranding Agreement*, Attachment D). No later than 60 days prior to the expiration date, the Participant shall indicate in writing to NMFS (see Contacts, Attachment B.) that a renewal of this Agreement is requested and shall provide the prescribed information. Following NMFS review of the submitted information to determine if Participant meets applicable requirements, the Agreement may be renewed if agreed to in writing by both parties.

If no written renewal request is received from the Participant, this Agreement becomes null and void upon the above expiration date.

3. **Denial of Stranding Agreement Renewal:** The decision to renew or deny a Stranding Agreement is solely at the discretion of the NMFS Regional Administrator and is not compelled by the Participant's adherence to the Stranding Agreement criteria. If the NMFS Regional Administrator denies a renewal request, the denial will be issued in writing by certified mail from the NMFS Regional Administrator to the Participant within 30 days of the Participant's submission of a completed application, and will be based upon the Regional Administrator's judgment of:
 - a. Past performance of the Participant;
 - b. Existing capabilities of the Participant; and
 - c. Geographic and programmatic needs of NMFS' stranding program.

A Stranding Agreement for which renewal is denied by the NMFS Regional Administrator becomes null and void upon the expiration date listed above.

Article XI: Review, Modification and Termination

A. Review

The NMFS Northeast Region ARA for Protected Resources shall review this Agreement from time to time for performance adequacy and effectiveness.

B. Modification

The Participant or the Northeast Regional Administrator may request a modification to the Stranding Agreement, including, but not limited to, procedural or administrative changes, such as a change in contact information, and a request for expansion or reduction of activities authorized by this Agreement. A request for authority for additional activities may require submission of information identified in Attachment D, *NMFS Best Practices for Marine Mammal Stranding Response, Rehabilitation, and Release - Evaluation Criteria for a Marine Mammal Stranding Agreement*. Modifications and reductions in authority, as well as notice of issuance or denial of a request for increased authorizations, will be given in writing within 30 days of receipt of a completed request. The Participant and the NMFS Regional Administrator may determine that a new Stranding Agreement is warranted.

C. Suspension or Termination request by Participant

The Participant may request suspension of all or part of this Stranding Agreement for a stated period of time, or may terminate this Agreement, upon 30 days written notice to the NMFS Regional Administrator. Suspension of the authorization of activities at the request of the Participant may be given without prejudice to the reinstatement of authorization or renewal of a Stranding Agreement.

D. Non-Compliance with Stranding Agreement or Violations of Law by Participant

Except in cases of willfulness, or those in which public health, interest, or safety requires immediate suspension, or termination of this Agreement, NMFS shall provide the Participant with notice and an opportunity to correct any deficiencies within a time period specified by NMFS, in writing, if the Participant fails to satisfy the terms and condition of this Agreement or violates any laws, regulations, or guidelines applicable to this Agreement, or Federal, state or municipal laws related to stranding network operations. The NMFS Region may take the following actions based on the circumstances:

1. **Probation.** The Participant may be put on probation for up to three years if deficiencies are not corrected. The NMFS Regional Stranding Coordinator and the Participant will develop a timetable with reasonable and measurable milestones that must be achieved to correct deficiencies during the probation period. Probation requires annual reviews of the Participant's activities for up to three years.

A participant on probation may not be in “good standing” with the Stranding Network.

2. **Suspension.** The NMFS Regional Administrator may suspend the Participant’s authority, or any portion of their authority, as appropriate (e.g., suspend rehabilitation authority, but not live or dead animal response), with 30 days written notice, for up to 1 year or until NMFS is satisfied that all deficiencies and violations have been adequately addressed. A notice of suspension listing deficiencies and a timetable with reasonable and measurable milestones required to correct those deficiencies will be issued in writing, delivered in person or by certified mail, from the NMFS Regional Administrator if, in the judgment of the Regional Administrator, the Participant has:
 - a. Submitted false information or statements in applications or reports;
 - b. Not satisfied the terms and conditions of the Stranding Agreement;
 - c. Failed to correct deficiencies in a timely manner; or
 - d. Violated applicable Federal, state, or municipal laws, regulations, guidelines, or other requirements.

A participant on suspension is not in “good standing” with the Stranding Network.

3. **Immediate suspension.** The NMFS Regional Administrator may require immediate suspension of authorization under a Stranding Agreement, or any part of the Agreement, without prior notice if, in the judgment of the Regional Administrator, suspension is needed to protect marine resources, in cases of willfulness, or as otherwise required to protect public health, welfare, interest, or safety, (which includes interest in the welfare of marine mammals). During the suspension period, the NMFS Regional Stranding Coordinator may ask other Stranding Network participants to respond in the Participant’s area of geographic coverage. If the Participant’s Stranding Agreement is suspended while animals are in rehabilitation, NMFS reserves the right to either confiscate the animals or to arrange for another participant to take over rehabilitation or take custody of the animals. A written notice of immediate suspension will be issued in person or by certified mail.

A participant on immediate suspension is not in “good standing” with the Stranding Network.

4. **Termination.** The NMFS Regional Administrator may terminate this Agreement, or any part thereof, upon at least 30 days written notice to the Participant, delivered in person or by certified mail. The Agreement may be terminated for any reason, including the Participant’s:
 - a. Submission of false information or statements in applications or reports;

- b. Failure to satisfy the terms and conditions of the Stranding Agreement;
- c. Failure to correct deficiencies in a timely manner; or
- d. Violation of applicable Federal, state, or municipal laws, regulations, guidelines, or other requirements.

The NMFS Regional Stranding Coordinator may ask another Stranding Network participant to respond in the Participant's area of geographic coverage. If the Participant's Stranding Agreement is terminated while animals are in rehabilitation, NMFS reserves the right to either confiscate the animals or to arrange for another participant to take over rehabilitation of or to take custody of the animals.

Termination of the Agreement for any reason shall automatically terminate any designations by the Participant to any designee organizations under this Agreement.

Acceptance of Agreement

Pursuant to the terms and conditions described above in this Stranding Agreement between the Northeast Region and Virginia Aquarium & Marine Science Center the Participant is authorized:

- Under Article III to response to strandings of dead marine mammals (Order Cetacea and Order Pinnipedia);
- Under Article IV to provide first response to live stranded marine mammals;
- Under Article V to rehabilitate and release live stranded marine mammals (Order Pinnipedia).

THIS STRANDING AGREEMENT IS ENTERED INTO AND MADE EFFECTIVE THIS

Date 12/20/12

Date 01-14-13

APPROVED:

NMFS Northeast Region
55 Great Republic Drive
Gloucester, MA 01930

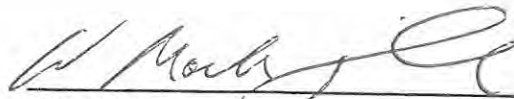
Virginia Aquarium & Marine
Science Center
Stranding Response Program
717 General Booth Blvd
Virginia Beach, VA 23451

Signature of Regional Administrator

Signature of Authorized Representative



John K. Bullard
NMFS Regional Administrator



W. Mark Swingle
Director of Research and Conservation

THIS STRANDING AGREEMENT REMAINS IN EFFECT UNTIL:

Expiration Date: January 1, 2016

Attachment List

Attachment A. List of Terms and Definitions under 50 CFR 216.3, Glossary of Terms, etc.

Attachment B. Regional contact information, 24 hour numbers, etc.

Attachment C: Euthanasia guidance

Attachment D: NOAA National Marine Fisheries Service *Best Practices* for Marine Mammal Stranding Response, Rehabilitation, and Release Documents:

- Evaluation Criteria for a Marine Mammal Stranding Agreement (New Applicants and Renewals of Existing Participants)
- Standards for Release
- Standards for Rehabilitation Facilities
- Level A Forms (Marine Mammal Stranding Report and Marine Mammal Rehabilitation Disposition Report)

Attachment E: NMFS Northeast Region Disposition of Live Stranded Cetaceans Guidance.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 Westgate Center Drive
Hadley, MA 01035-9589



In Reply Refer To:
FWS/Region 5/ES-TE

DEC 06 2013

Mr. John K. Bullard
Regional Administrator
National Marine Fisheries Service
1 Blackburn Drive
Gloucester, Massachusetts 01930

Dear Mr. Bullard:

This is in response to your application dated May 31, 2013, requesting renewal of your existing valid U.S. Fish and Wildlife Service (Service) endangered species recovery subpermit, which was issued on May 22, 2008 (enclosed). The subpermit was issued to the Northeast Region Sea Turtle Stranding and Salvage Network (STSSN) under the Service's Regional Endangered Species Recovery Permit #TE-697823 (Permit #TE-697823). The subpermit authorizes the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), in its role as administrative coordinator for the Northeast Region STSSN, to continue scientific research activities and recovery activities to enhance the propagation and survival of endangered and threatened sea turtles as provided for in section 10(a)(1)(a) of the Endangered Species Act of 1973, as amended.

Your request is hereby approved, and your subpermit is renewed.

I. Covered Species

Green sea turtle (*Chelonia mydas*)
Kemp's ridley sea turtle (*Lepidochelys kempi*)
Hawksbill sea turtle (*Eretmochelys imbricate*)
Leatherback sea turtle (*Dermochelys coriacea*)
Loggerhead sea turtle (*Caretta caretta*)

II. Conditions

All of the terms and conditions remain the same except the following:

1. Additional Stranding Response Organization

Pursuant to Permit #TE-697823 and in response to NMFS' request, one additional organization is being added to the list of authorized Response Organizations contained in the May 22, 2008, letter of authorization. We understand that the Marine Mammals of Maine (MMoME) is a

DEC 10 2013

nonprofit marine animal stranding response organization located in Portland, Maine, and is well-situated geographically to provide sea turtle stranding response coverage along the Maine coast from Rockland south to the Maine-New Hampshire border, an area which is currently lacking a dedicated response organization. As a subpermittee to the Northeast Region STSSN, the MMoME is authorized to aid and/or possess any live stranded or injured sea turtles, to salvage any dead specimens or parts, and to conduct the other authorized activities contained in the May 22, 2008, letter of authorization, provided all necessary State permits are obtained.

2. Service Contacts

For the purpose of general compliance with the terms and conditions of this subpermit, the current Service contacts, mailing addresses, and telephone numbers are:

Chief, Division of Endangered Species
Attention: Permits Coordinator
Ecological Services
U.S. Fish and Wildlife Services
300 Westgate Center Drive
Hadley, Massachusetts 01035

Field Supervisor
New England Field Office
U. S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301

The Chief, Division of Endangered Species, is Martin Miller. His contact information is: telephone 413-253-8615, electronic mail martin_miller@fws.gov

The New England Field Office Supervisor is Tom Chapman. His contact information is: telephone 603-223-2541, electronic mail tom_chapman@fws.gov

The Endangered Species Recovery Permit Coordinator is Deb Carter. Her contact information is: telephone 703-358-2402, electronic mail deb_carter@fws.gov

3. Reporting Requirements

In the event that it becomes necessary to euthanize a sea turtle, the subpermittee must contact Ms. Carter, the Service's Recovery Permits Coordinator prior to the procedure. If Ms. Carter cannot be reached, the subpermittee should provide Federal notification by leaving a message, including contact information, at the phone number or electronic mail address for Ms. Carter, provided above.

4. Reservation of Authority

The Service reserves its authority to amend the conditions of the subpermit, including the expiration date.

5. Expiration

In accordance with 50 Code of Federal Regulations 13.22(a), the expiration date of this subpermit is indefinite pending renewal of the Service's Regional Endangered Species Recovery Permit #TE-697823. After Permit #TE-697823 is renewed, we will provide a copy of it and an expiration date for this subpermit.

If you have any questions, please contact Tom Chapman, Supervisor, New England Field Office, at 603-223-2541, or Deb Carter, Regional Endangered Species Recovery Permits Coordinator, at 703-358-2402.

Sincerely,



Martin Miller
Chief, Division of Endangered Species
Ecological Services

Enclosures

cc: Kate Sampson, NOAA-National Marine Fisheries Service
Tom Chapman, Supervisor, New England Field Office
Genevieve Larouche, Supervisor, Chesapeake Bay Field Office
Eric Schradling, Supervisor, New Jersey Field Office
Cindy Schulz, Supervisor, Virginia Field Office
David Stilwell, Supervisor, New York Field Office
Laury Zicari, Supervisor, Chesapeake Bay Field Office



DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

3-201
(1/97)

FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

FISH & WILDLIFE SERVICE, REGION 5
300 WESTGATE CENTER DRIVE
HADLEY, MA 01035-9589
U.S.A.

2. AUTHORITY-STATUTES

16 USC 1539(a)
16 USC 1533(d)

REGULATIONS (Attached)

50 CFR 17.22
50 CFR 17.32
50 CFR 17.62 & 17.72
50 CFR 13

3. NUMBER

TE697823-4 AMENDMENT

4. RENEWABLE

YES
 NO

5. MAY COPY

YES
 NO

6. EFFECTIVE

06/13/2008

7. EXPIRES

06/13/2013

8. NAME AND TITLE OF PRINCIPAL OFFICER (if #1 is a business)

REGIONAL DIRECTOR, ES
ASSISTANT

9. TYPE OF PERMIT

THREATENED AND ENDANGERED SPECIES

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

Region 5 - Including the States of: Maine, New Hampshire, Vermont, New York, Massachusetts, Connecticut, Rhode Island, New Jersey, Delaware, Pennsylvania, Maryland, Virginia, West Virginia, and the District of Columbia.

11. CONDITIONS AND AUTHORIZATIONS:

- A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.
- B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.
- C. VALID FOR USE BY PERMITTEE NAMED ABOVE.
- D. Further conditions of authorization are contained in the attached Special Terms and Conditions.

ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS

ANNUAL REPORT DUE: 01/31

ISSUED BY

TITLE
Acting
REGIONAL DIRECTOR

DATE
06/13/2008

- E. Acceptance of this permit serves as evidence that the permittee understands and agrees to abide by the 'Special Conditions for Native Endangered and Threatened Species' (copy attached).
- F. Authorized to take listed species identified on the attached sheets for scientific purposes or the enhancement of propagation or survival for approved recovery activities and as conditioned below.
- G. Prior to conducting any activities not excluded under the Service's NEPA categorical exclusions (516 DM 6, Appendix I the permittee must ensure that all NEPA requirements have been satisfied).
- H. Permittee must monitor each action taken under this permit to assure that the limits specified in each subpermit are not exceeded, that research efforts and handling of individual species is not duplicated by overlapping research.
- I. This permit is conditioned upon all applicable policy and guidance.
- J. Subpermittee's may be designated in writing.
- K. Subpermittee's must be required to hold and transport living specimens captured in the wild according to the provisions and procedures outlined in professionally established protocols for the handling and transport of the affected species.
- L. Procedures must be instituted to ensure that disease transmission does not occur during tissue sampling or other invasive procedures and that such activities are only performed by persons skilled in the techniques of handling the affected species.
- M. The permittee must ensure that all appropriate section 7 consultation requirements have been completed prior to initiating any otherwise permitted activities and that no action taken under this permit will violate subsection 7(a)(2) of the Endangered Species Act.



Virginia Department of Game and Inland Fisheries

4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-1000 (V/TDD)

Under Authority of § 29.1-412, § 29.1-417, & § 29.1-568 of the Code of Virginia & DGIF Policy E-1-90



Threatened/Endangered Species Permit

Permit Type: **Renewal**

Fee Paid: **\$20.00**

VADGIF Permit No. **052977**

Permittee: **Ms. Rachel Metz**
Address: **717 General Booth Blvd.**
Virginia Beach, VA 23451

Office: **(757) 385-7777**
City/County: **Virginia Beach**

Business: **Virginia Aquarium & Marine Science Center**

Sea Turtle Rescue, Collection, Possession, Exhibit, and Research

Authorized Collection Methods: Species are collected as a result of the stranding network activities or received from other public aquaria and research institutions. Canebrake Rattlesnake/Barking Tree Frogs/Wood Turtles must be obtained from other public aquaria/museums/research institutions. By Hand/Dip Nets/Gill Nets/Trawl Nets/Tangle Net/Pound Net/Dredge Mitigation Trawl/Hand Nets (Butterfly/Reptile)

Authorized Waterbodies: All within authorized cities/counties

Authorized Marking Techniques: marking of stranding turtles as needed for identification

Additional authorizations under this permit:

Authorized Project/Research: Satellite tracking of young Loggerhead Sea Turtles released into ocean waters off of Virginia-North Carolina to characterize the behavior, movement patterns and survivorship of captive-reared yearling sea turtles.

ngle Net/Pound Net/Dredge Mitigation Trawl

Permittee MUST notify VDGIF a minimum of 4 days prior to any sampling activity (per the standard conditions which accompany this permit). Notification must be made via email to: collectionpermits@dgif.virginia.gov

Report Due: 31 January 2016

ALL PERMIT REPORTS MUST CONTAIN COORDINATES; PERMITTEE CAN USE THE VIRGINIA FISH AND WILDLIFE INFORMATION SERVICE (VAFWIS) TO OBTAIN COORDINATES BY VISITING: [HTTP://VAFWIS.ORG/FWIS](http://VAFWIS.ORG/FWIS)

STANDARD CONDITIONS ATTACHED APPLY TO THIS PERMIT.

Authorized Counties / Cities:

- Accomack**
- Arlington**
- Caroline**
- Charles City**
- Chesterfield**
- Essex**
- Fairfax**
- Gloucester**
- Hanover**
- Henrico**
- Isle of Wight**
- James City**
- King and Queen**
- King George**
- King William**
- Lancaster**
- Mathews**
- Middlesex**
- New Kent**
- Northampton**
- Northumberland**
- Prince George**
- Prince William**
- Richmond**
- Spotsylvania**
- Stafford**
- Surry**
- Westmoreland**
- York**
- Alexandria**
- Chesapeake**
- Colonial Heights**
- Fredericksburg**
- Hampton**
- Hopewell**
- Newport News**
- Norfolk**
- Petersburg**
- Poquoson**



Virginia Department of Game and Inland Fisheries

4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104

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Under Authority of § 29.1-412, § 29.1-417, & § 29.1-568 of the Code of Virginia & DGIF Policy E-I-90



Threatened/Endangered Species Permit

Permit Type: **Renewal**

Fee Paid: **\$20.00**

VADGIF Permit No. **052977**

**Portsmouth
Richmond City
Suffolk
Virginia Beach**

Authorized Species:

See Attached Sheet for List of Species

Authorized Sub-Permittees:

See Attached Sheet

Approved by:

Applicants may appeal permit decisions within 60 days of issuance. The appeal must be in writing to the Director, Department of Game and Inland Fisheries.

Title: **James E. Husband - Permits Manager**

Date: **12/12/2014**

20

Permit Effective

1/1/2015

through

12/31/2015

15



Virginia Department of Game and Inland Fisheries
4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-1000 (V/TDD)



Under Authority of § 29.1-412, § 29.1-417, & § 29.1-568 of the Code of Virginia & DGIF Policy E-1-90

Threatened/Endangered Species Permit

Permit Type: **Renewal**

FeePaid: **\$20.00**

VADGIF Permit No.

052977

Authorized Sub-Permittees:

**W. Mark Swingle, Virginia Aquarium & Marine Science Center
717 General Booth Boulevard, Virginia Beach, VA 23451**

William G. Harshaw, Virginia Aquarium & Marine Science Center

Elizabeth A Firchau, Virginia Aquarium & Marine Science Center

Cecilia L Hatton, Virginia Aquarium & Marine Science Center

Jeffrey W Thompson, Virginia Aquarium & Marine Science Center/Stranding Center

Susan G Barco, Virginia Aquarium & Marine Science Center/Stranding Center

Crystal D Matthews, Virginia Aquarium & Marine Science Center/CCB

Dr. Soraya Bartol, Virginia Wesleyan College

Sarah Mallette, Virginia Aquarium & Marine Science Center/Stranding Center

Maureen A Fender, Virginia Aquarium & Marine Science Center/Stranding Center

Gwendolyn Lockhart, Virginia Aquarium & Marine Science Center/Stranding Center

Dr. Ian Bartol, Old Dominion University

Crystal I Equels, Virginia Aquarium & Marine Science Center

Mary A McCarthy, Virginia Aquarium & Marine Science Center

Lori Semple, Virginia Aquarium & Marine Science Center

Margaret L Lynott, Virginia Aquarium & Marine Science Center/Stranding Center

Dr. Katherine L Mansfield, University of Central Florida

Justin G Fuller, Virginia Aquarium & Marine Science Center

Julie Levans, Virginia Aquarium & Marine Science Center

Katie Glanton, Virginia Aquarium & Marine Science Center/Stranding Center

Erin B Bates, Virginia Aquarium & Marine Science Center

Jennifer Richardson, Virginia Aquarium & Marine Science Center

Colin Walker, Virginia Aquarium & Marine Science Center

Stephen Knoop, Virginia Aquarium & Marine Science Center

Sarah Dawson, Virginia Aquarium & Marine Science Center

April Adams, Virginia Aquarium & Marine Science Center

Jon Nichols, Virginia Aquarium & Marine Science Center

Lori Lawson, Virginia Aquarium & Marine Science Center

Rhoderick Alejo, Virginia Aquarium & Marine Science Center

Kristen Phillips, Virginia Aquarium & Marine Science Center/Stranding Center

Sarah Rose, Virginia Aquarium & Marine Science Center/Stranding Center

Michelle Coley, Virginia Aquarium & Marine Science Center

Jordon Salyers, Virginia Aquarium & Marine Science Center/Stranding Center

Michael "Evan" Culbertson, Virginia Aquarium & Marine Science Center/Stranding Center

Krystle Rodrique, Virginia Aquarium & Marine Science Center/Stranding Center

Raegan Reints, Virginia Aquarium & Marine Science Center/Stranding Center

Katherine A Stines, Virginia Aquarium & Marine Science Center

Rebecca Gangler, Virginia Aquarium & Marine Science Center

Sam Poulin, Virginia Aquarium & Marine Science Center



Virginia Department of Game and Inland Fisheries

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Threatened/Endangered Species Permit

Permit Type: **Renewal**

FeePaid:

\$20.00

VADGIF Permit No.

052977

Alex Isbell, Virginia Aquarium & Marine Science Center
Holly Blackwood, Virginia Aquarium & Marine Science Center
Betty Alexander, Virginia Aquarium & Marine Science Center
Nick Allen, Virginia Aquarium & Marine Science Center
Kristine Williams, Virginia Aquarium & Marine Science Center/Stranding Center
Alex Balke, Virginia Aquarium & Marine Science Center/Stranding Center
Anthony Bosnengo, Virginia Aquarium & Marine Science Center/Stranding Center
Nick Sundin, Virginia Aquarium & Marine Science Center
Rebecca Maxey, Virginia Aquarium & Marine Science Center
Jackie Rushley, Virginia Aquarium & Marine Science Center
Sarah Gray, Virginia Aquarium & Marine Science Center



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4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-1000 (V/TDD)



Under Authority of § 29.1-412, § 29.1-417, & § 29.1-568 of the Code of Virginia & DGIF Policy E-1-90

Threatened/Endangered Species Permit

Permit Type: **Renewal**

Fee Paid: **\$20.00**

VADGIF Permit No.

052977

Description

Scientific Name

Atlantic Sturgeon	1 <i>Acipenser oxyrhynchus</i>
Barking Treefrog	1 <i>Hyla gratiosa</i>
Blackbanded Sunfish	12 <i>Enneacanthus chaetodon</i>
Blackside Dace	6 <i>Phoxinus cumberlandensis</i>
Canebrake Rattlesnake	2 <i>Crotalus horridus</i>
Carolina Darter	6 <i>Etheostoma collis</i>
Duskytail Darter	6 <i>Etheostoma percnurum</i>
Eastern Tiger Salamander	1 <i>Ambystoma tigrinum tigrinum</i>
Fin Whale	6 <i>Balaenoptera physalus</i>
Green Sea Turtle*	1 <i>Chelonia mydas</i>
Greenfin Darter	<i>Etheostoma chlorbranchium</i>
Hawksbill Sea Turtle*	<i>Eretmochelys imbricata</i>
Humpback Whale	<i>Megaptera novaeangliae</i>
Kemp's Ridley Sea Turtle *	1 <i>Lepidochelys kempii</i>
Leatherback Sea Turtle*	<i>Dermochelys coriacea</i>
Loggerhead Sea Turtle *	6 <i>Caretta caretta caretta</i>
Northern Right Whale	<i>Eubalaena glacialis</i>
Sei Whale	<i>Balaenoptera borealis</i>
West Indian Manatee	<i>Trichechus manatus</i>
Western Sand Darter	12 <i>Ammocrypta clara</i>
Wood Turtle	1 <i>Glyptemys insculpta</i>
Yellowfin Madtom	6 <i>Noturus flavipinnis</i>



Virginia Department of Game and Inland Fisheries
4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-6913 FAX (804) 367-2427



Under Authority of § 29.1-412, § 29.1-417, & § 29.1-568 of the Code of Virginia and Policy E-1-90

Threatened/Endangered Species Permit -- Standard Conditions

- **This permit, or a copy, must be carried by the above named individuals during collection activities.**
- **The permittee is required to submit to this Department a report of all specimens collected under this permit by the report due date. Report form may be found at <http://www.dgif.virginia.gov/permits/guide.asp>. FAILURE TO RETURN THIS REPORT WILL RESULT IN NON-ISSUANCE OF FUTURE PERMITS. If no activity occurs under this permit, an email should be sent to collectionpermits@dgif.virginia.gov containing the following statement: No activity occurred under Permit #insert permitID during insert year (i.e. 2006). Permit reports are due by January 31.**
- Permittee **MUST** notify VDGI within the seven (7) day period prior to EACH sampling event. Notification must be made via email to: collectionpermits@dgif.virginia.gov.
- This permit does not support any activities outside of those associated with the application and proposal submitted to and approved by DGIF.
- If incidental death or injury of threatened or endangered species occurs, the permittee is required to notify this Department at collectionpermits@dgif.virginia.gov within twenty-four (24) hours of occurrence.
- If incidental *collection and live release* of threatened or endangered species occurs *for species other than those authorized under this permit*, the permittee is required to notify this Department at collectionpermits@dgif.virginia.gov within four (4) working days. The following information must be reported: collector, date, species, location (county, quad, waterbody, and specific location, either in latitude and longitude to nearest second, or by way of a photocopied 7.5' topographic map), general habitat associations, and number collected.
- No species may be retained unless specifically authorized by this permit.
- All traps must be marked with the name and address of the trapper or an identification number issued by the Department (Code of Virginia §29.1-521.7). Steel foothold traps, Conibear-style body gripping traps, and snares must be marked with a nonferrous metal tag bearing this information (Virginia Administrative Code 4 VAC 15-40-170).
- All traps must be checked at least once a day and all captured animals removed, except completely submerged body-gripping traps which must be checked at least once every 72 hours (Code of Virginia §29.1-521.9).
- The permittee is required to report any incidences of wildlife deaths or diseases observed during the course of collection activities. Reports should be made to: collectionpermits@dgif.virginia.gov within seven (7) days.
- This permit satisfies only the Department's requirement for collection permits and is issued with the understanding that no collections will be made on federal, state, or private property without the prior approval and necessary permits from the landowners involved. The permittee is responsible for obtaining any additional permits required for collection.
- Sampling gear, boats, or trailers which have been used in states harboring zebra mussels must be cleaned and prepared following the guidelines specified in the attached summary prior to use in waters in the Commonwealth.
- For safety reasons, it is recommended that all permittees display at least 100 square inches of solid blaze orange material at shoulder level within body reach and visible from 360 degrees, especially during hunting season.

Appendix H

Nest & Crawl Datasheet

Nest# _____
Crawl# _____

DATA SHEET FOR CRAWLS & NEST RELOCATIONS

I. General Information (weather, time, tide level, wind speed, location, etc.)

Date: _____ Tide height: _____ Estimated air temperature: _____
General weather conditions (ie. % cloud cover, rainfall): _____

Wind speed & direction _____
Location of crawl (~, include markers): _____

Latitude of Crawl: _____ Longitude of Crawl: _____

Notes: _____

II. Parties Involved

Refuge: _____

Navy: _____

III. Data to be collected for Each Set of Tracks

Crawl # (ie. 1,2, 3,...): _____ Time crawl detected: _____ Date: _____

Track measurements: (from where first visible near surf to nest site or end of crawl)

Length of incoming tracks (m): _____ Width of incoming tracks (cm): _____

Length of outgoing tracks (m): _____ Width of outgoing tracks (cm): _____

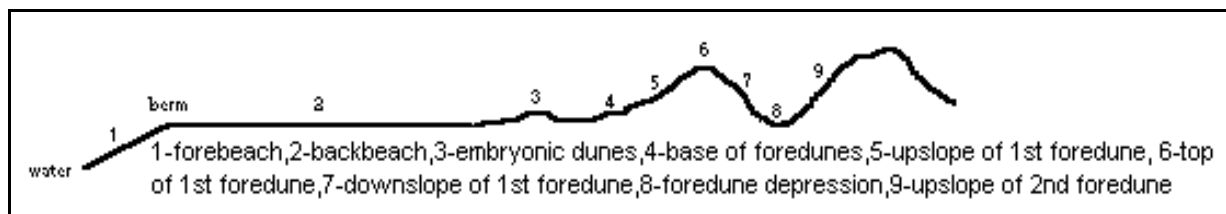
Flipper impressions alternate or opposite: _____ Were tracks prominent?: _____

Distance from center of disturbed nesting area to toe of dunes: _____

Topographical feature at end of tracks (CIRCLE area on diagram): _____

Was a nest found?: _____ False nest?: _____ False crawl only?: _____

Notes: _____

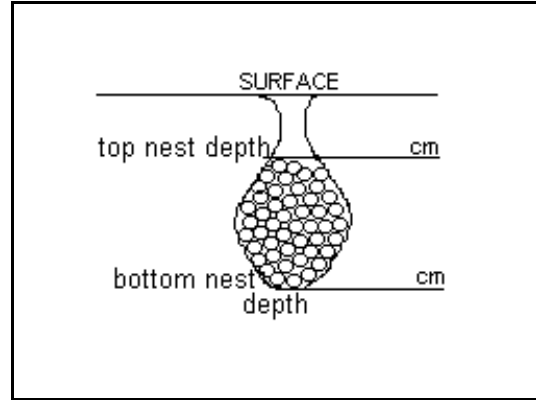


IV. Data to be collected for Each Nest (measurements of nest, egg #, etc.)

Original Nest Data:

NEST CAVITY

Nest # (ie. 1, 2, 3 ...): _____ Crawl# : _____
Time nest excavated: _____ until _____
Width of disturbed nesting area: _____ cm
Length of disturbed nesting area: _____ cm
Nest cavity width at widest pt.: _____
Nest cavity length at longest pt.: _____
Total # eggs: _____
 #damaged eggs: _____
 # broken or predated eggs: _____
Temperature of soil in nest cavity: _____

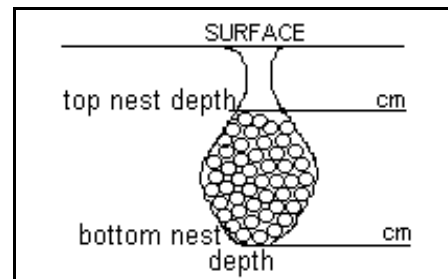


Notes: _____

Relocated Nest Data: _____

NEST CAVITY

Time nest reburied: _____ until _____
Temperature of soil in nest cavity: _____
Air temperature (C): _____
Estimated hatch date: _____



Notes: _____

V. Data to be Collected on Hatchlings/Hatch:

Turtle nest #(ie. 1,2, 3...): _____ Time hatch detected: _____

Hatch Period: _____ Estimated hatch date: _____

Incubation period (days): _____

Total # hatchlings counted: _____ (See table below if hatch is extended.)

Location of Nursery (estimate, include markers): _____

Latitude of Nursery: _____ Longitude of Nursery: _____

Date of relocated nest's excavation: _____

#unhatched eggs: _____ # dead hatchlings: _____

unhatched eggs hatched later at Visitor's Center: _____

Storage location of dead hatchlings (if not disposed of): _____

Notes: _____

Date	Time Hatchlings discovered	# of Hatchlings	AirTemp/ Soil Temp	Weather Conditions	Time of Hatchling Release	# of Hatchlings Released	Status of Hatchlings	Weather Conditions and Type of Tide (incoming or outgoing)
Total # of Hatchlings		<input type="text"/>		Total # of Hatchlings Released		<input type="text"/>		

VI. Additional Comments and Observations (diagram of tracks and nest, opinions, etc.)

Attach photos or slides and brief narrative for each nest/ hatch.

Appendix I

Nest Monitoring SOP

**STANDARD OPERATING PROCEDURES
FOR SEA TURTLES**

(Subsection for Nest Monitoring)

Naval Air Station Oceana, Dam Neck Annex

VIRGINIA BEACH, VIRGINIA

Revised May 2013

Prepared by: Michael F. Wright
Natural Resources Specialist

Date: July 2012

Revised by: Michael F. Wright
Natural Resources Specialist

Date: May 2013

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Acknowledgements

Thanks to the many people who make the sea turtle nesting program at NASO DNA a success no matter how many nests we have. Thanks to the morning patrollers, to the interns, student hires, and bio-techs who respond to strandings, keep up the ATVs, and do a million other things, and to the dedicated corps of nest-sitters who brave insects, sand and sleeplessness to safely escort vulnerable sea turtle hatchlings into the ocean and start them on their adventurous lives.

Introduction

Naval Air Station Oceana (NASO) and United States Fish & Wildlife Service Back Bay National Wildlife Refuge (BBNWR) work cooperatively to manage the sea turtle program at NASO Dam Neck Annex (NASO DNA). The guiding documents associated with this cooperative working partnership are the NASO DNA Integrated Natural Resources Management Plan (INRMP) mandated by the Sikes Act, the BBNWR Biological Opinion as amended on 25 May 2012, and the 2008 NASO & BBNWR nest relocation agreement.

NASO Natural Resources staff and authorized associates perform daily sea turtle patrols to locate nests, crawls, and strandings at NASO DNA and Virginia Army National Guard-Camp Pendleton (VAARNG-CP). For nests located on NASO DNA, NASO and BBNWR biologists collaboratively determine if a nest should be left in place (in situ) or relocated. Then the nest is either surrounded by an in situ predator enclosure or relocated within a buried cylindrical predator enclosure at the BBNWR designated nursery area. Hatchlings can self-release from in situ predator enclosures, and must be aided in releasing from relocation predator enclosures. In either case, nests are monitored when the estimated hatching date approaches.

Nests located on VAARNG-CP property will be collaboratively managed between BBNWR and VAARNG-CP biologists. NASO staff will notify both BBNWR and VAANG-CP biologists if a crawl is located on their property.

All turtle strandings on NASO DNA and VAARNG-CP will be reported to the VA Aquarium Stranding Team (VAST).

Nest Monitoring

After an appropriate length of incubation (40 days for Kemps Ridley and 50 days for Loggerhead and Green sea turtle nests), nests will be monitored via 2 daytime nest checks and overnight “nest sitting.” Day time checks will be made once in the morning and once in the afternoon. Nest sitting will occur from 8PM to 5AM. Day and night checks are looking to initially identify a cone shaped depression in the center of the nest and for evidence of prior/undocumented emergence. The time a depression is first seen is recorded on the Nest Sitting Log, as well as on the original Nest Data Sheet.

The majority of nests hatch out at night. Nest sitters prepare the path to the surf, count the hatchlings and protect the hatchlings from predators such as gulls, raccoons and foxes.

Nest-Sitting Guidelines

- **Tents:** A tent is provided as part of the nest-sitting kit. The tent should only be used in inclement weather and/or when mosquitoes are overly abundant. Please take down the tent and pack it with the other nest sitting supplies when you leave each morning.
- **Flashlights:** No white lights on beach after dark. Use flashlights with red filters/lens/light-bulbs or cover white light flashlights with red acetate, provided.
- **Radios/ MP3 players:** No open/public music. Please use headphones.
- **No cameras during or following hatching that utilize Flashes.** The flash is a big no-no, and if the turtles hatch, you will be really busy. Once any signs of emergence begin, please put cameras away. We can e-mail pictures of emerging turtles to you for a memento, if you like. **No pictures should be taken of any buildings or military training at any time.**
- **UNDER NO CIRCUMSTANCES IS ALCOHOL ALLOWED.**
- **NO** Unauthorized Guests. All nest-sitters **MUST** be signed up to provide this service with the Navy.
- Campfires are **NOT** permitted.
- If you smoke, make sure you pick up all cigarette butts.
- **Do not handle the hatchlings**, unless directed to do so by Michael Wright, Geralyn Mireles, or John Gallegos.
- If there is lightning, please get off the beach **IMMEDIATELY**. Sitting in a vehicle is much safer than sitting on the beach.
- Remember- **SAFETY ALWAYS COMES FIRST!** Be smart and safe out there. If you ever feel uncomfortable while nest-sitting because of weather, presence of unauthorized people, or for whatever reason, do what you need to do to feel safe (i.e., leave the nest site). If you cannot check the nest(s) every half hour at a minimum, please contact Michael Wright. If there is an **EMERGENCY**, especially if you feel like you are in danger, you may contact the Base Emergency Line 757-433-9111.
- These nests are in remote locations and access to restroom facilities is not immediately available. One person should remain at the nest site at all times. Nest sitters may access the dunes **ONLY** to relieve themselves. Be aware while working on NASO DNA even in the dunes, you may be being watched. If you enter the dune you must: bury your deposit; and cover/smooth out your tracks on the way out to discourage unauthorized dune access. There are restroom facilities available at the MWR Sea Mist Camp Ground. Depending on the nest location you may be able to walk to the camp ground via walking or you may need to walk to your/the vehicle and drive to the restroom. An access code to these restrooms will be provided.

Nest-Sitting Procedures

- 1) Drive your personal vehicle or government work vehicle, as appropriate to the NASO DNA Building 127 Natural Resources storage facility (prefabricated “stone” building), located in the North East corner adjacent to the dunes of the Building 127 parking lot, north of the Building 127 beach access, and pick up appropriate supplies. Storage facility key is located in a lockbox attached to the storage facility door. An access code will be provided to authorized individuals.
- 2) Ensure that you have all the required items before you leave to attend to the nest (cell phone, rake, data log, personal items, etc.)
- 3) Read the update in the front of the binder. Reread nest-sitting procedures, if necessary.
- 4) Drive to the closest beach access point (see attached map) to the nesting site and park your vehicle. **Ensure you place the Vehicle Parking Permit on the dashboard of your vehicle before you park and leave you vehicle to go nest sit.**
- 5) Carry all items to the nest-sitting area.
- 6) Nest is marked with reflectors, signs identifying the site as a sea turtle nest, and flagging tape placed in the immediate vicinity of the nest to help prevent nests from being run over by vehicles or inadvertently disturbed. A predator guard, constructed of galvanized fence wire with a rectangular mesh size of approximately 2 inches by 4 inches covers the nest.
- 7) **If you see a depression, or if hatchlings start to emerge**
 - a. Initiate calling the individuals on the phone list. 1st call Michael Wright, then GERALYN MIRELES, then John Gallegos, and then Ruth Boettcher. Since this will be after normal business hours utilize cell phone numbers. Ensure that you speak with Michael Wright directly. If you cannot reach her: leave a voice message with date, time, brief message, and phone numbers to call you back on; continue contacting the other individuals; attempt to contact Ms. Wright again; upon second attempt to contact Ms. Wright if you still cannot reach her contact the Conservation Law-enforcement Officer “Mac” McGrogan.
 - b. Note time of first emergence, and time of main emergence (“boil”, if there is one), number, etc. (binder, data sheets, pencils, watch) Err on the side of too many notes, rather than too few
 - c. Rake out tire ruts (rake, board) to make pathway to the ocean from the high tide line. (Recommend, conducting this action each night as the 1st duty of the night once on site.)
 - d. Ascertain that the hatchlings make it into water. If a hatchling turns upside down you may turn it back over. If it gets stuck in a rut for more than a few minutes, you can help it out. If one starts crawling parallel to the ocean for more than a few meters, you can redirect it, if a turtle gets snatched by a ghost crab you may attempt to retrieve it. Outside of these conditions, the hatchlings may not be handled without further approval from Navy or USFWS biologist.

- e. Patrol beach for $\frac{1}{4}$ mile to either side of release area after all have made it into water to make sure none were washed back in
- 8) Be sure to fill out the Sea-Turtle Nest Sitting Log
 - 9) **When you are ready to go home:**
 - a. Drive back to the NASO DNA Natural Resources Storage Facility.
 - b. Place all equipment back in the shed in their designated locations. Ensure you have returned the vehicle parking permit to the nest sitting toolbox for the next user.
 - c. If you have used up anything, make a note of it in the Nest Sitting binder so that a staff member can replace it for the next night.
 - d. Place the key back in the lock box, and ensure that the box is locked.
 - e. Drive safely, and get some well-deserved sleep!!!

Supplies

- **Navy provides:**
 1. Latex gloves of several sizes
 2. Flashlights covered with red acetate (or flashlight with other red lighting filter) and extra batteries
 3. Rake (leave in truck, sharp side down)
 4. Cell phone with numbers programmed into it
 5. List of phone numbers
 6. Binder with data sheets and log book
 7. Pencils, pens
 8. First aid kit
 9. Red acetate and tape
 10. Tent
 11. Vehicle Parking Permit
 12. Handheld Radios
- **Nest-sitter provides:**
 1. Watch
 2. Flashlight/headlamp for personal use
 3. Water & Snacks/Food
 4. Personal Protective Equipment (PPE): insect repellent, raincoat, hacket/warm clothing, etc.
 5. Chair, reading material, etc.
 6. Personal cell phone (optional and highly recommended in the event the Navy provided cell phone malfunctions)

Cell Phone Instructions

1. Push and Hold the End/Power button, located on the right side of the phone. The lettering on the button is red.
2. Select the contacts button, located on the top right side of the phone.
3. Utilize the up and down arrows to scroll through and highlight/shade the list of names in the contact list. Nesting sitting Points of Contacts will be preceded by

“#NS” and then the person’s last name (example: in the contacts list Michael Wright will show up as “#NS Wright”).

4. Select the appropriate highlighted/shaded name utilizing the OK button.
5. If the phone number is not highlighted, utilize the up and down arrows to scroll to and highlight/shade the phone number.
6. Select the send button located on the left side of the phone. The lettering on the button is green.
7. For Reference the phone number for this cell phone is 757-613-0320.

Important Phone Numbers

ON BASE EMERGENCIES/REPORTING ILLEGAL ACTIVITIES

- Call = 757-433-9111.

Navy Natural Resources:

- Natural Resources Specialist (NRS), Michael Wright = 757-433-3461(o); 757-373-8531(c)...contact regarding any hatching activity, if there are any emergencies, and if there are any signs of illegal nest tampering by humans, or if it appears the nest has been predated by wildlife.
- Conservation Law-Enforcement Officer (CLEO), Lawrence McGrogan = 757-433-2151(o); 757-635-5436(c)... contact regarding access issues and if there are any signs of illegal nest tampering by human and if you cannot get a hold of the NRS.
- Biological Science Technician (BST), Mark L. Edwards = 757-433-2151(o); 757-406-3764 (pc)...contact if you cannot get a hold of the NRS or the CLEO.
- Installation Environmental Program Director (IEPD), Terry Chamberlain, = 757-433-3437(o); 757-288-6005(c)...contact in case of an emergency, and if you were unable to get a hold of anyone listed above.

USFWS Back Bay National Wildlife Refuge:

- Main Office = 757-301-7329
- Refuge Biologist, Geralyn Mireles = 757-778-5828(c); 757-301-7329 xt 153 (o) ...contact regarding any hatching activity.
- Refuge Biologist, John Gallegos = 757-493-1870 (c); 757-301-7329 xt154 (o) ...contact regarding any hatching activity.
- Refuge Biologist, Chris Hernandez = 757-301-7329 xt158(o); 757-268-4640(c) ...contact if you cannot get a hold of Ms. Mireles or Mr. Gallegos regarding any hatching activity.

VA Dept. of Game and Inland Fisheries:

- VA State Sea Turtle Coordinator, Ruth Boettcher = 757-787-5911(o); 757-709-0766 (c) ...contact regarding any hatching activity.

Radio Instructions

Radios are for communication between you and the other nest sitter monitoring the nest and hatchlings that have emerged and are making their way to the water. Radios may be needed if someone is patrolling the ¼ mile distance looking for hatchlings, if someone is working near the surf while the other person is at the nest, if someone has taken a break and is not immediately available when hatching activity is observed, etc.

1. Turn the radio on by turning the volume knob.

2. Ensure the radios are on the same frequency. To adjust and check the frequency, push the menu button and scroll down to frequency.
3. To talk to one another, hold in the button on the left side of the radio and TALK into the radio. Do not put your mouth right on the radio or you will be difficult to hear.
4. When you finish talking, you must let go of the button in order to hear the other person.

Datasheets

(Current examples provided from 2012 season, datasheets will be updated with current season's data, when and if needed.)

USFWS Data Sheet for Crawls & Nest Relocations:

Nest#3

Nest# 3
Crawl# 3

DATA SHEET FOR CRAWLS & NEST RELOCATIONS

I. General Information (weather, time, tide level, wind speed, location, etc.)

Date 6/15/2012 Tide height 2" MLLW Estimated air temperature 71 F

General weather conditions (ie. % cloud cover, rainfall) No rain

Wind speed & direction 13 mph NE (3:00 pm)

Location of crawl (~, include markers) Dam Neck Naval Air Station, end of Bldg # 127, 30 yards south of South Beach Access.

Latitude of Crawl N 36 degrees 46'28.861" Longitude of Crawl W 75 degrees 57'16.259"

II. Parties Involved

Refuge: John Gallegos, Chris Hernandez, Geralyn Mireles, Camille Sims, Lee Ann Barger, Samantha Smith.

Dam Neck: Michael Wright and Terry Chamberlain

III. Data to be collected for Each Set of Tracks

Crawl # (ie. 1,2, 3,...) 3 Time crawl detected Visitors saw turtle digging nest between 2:30 – 3:00 pm Date 6/15/2012

Track measurements: (from where first visible near surf to nest site or end of crawl)

Length of incoming tracks (m) 23.12 m Width of incoming tracks (cm) 87 cm, 87 cm

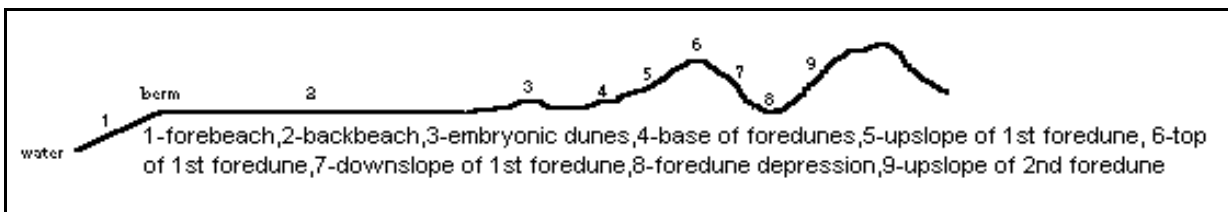
Length of outgoing tracks (m) 21.59 m Width of outgoing tracks (cm) 78.5 cm, 87 cm

Flipper impressions alternate or opposite ALT Were tracks prominent? some, footprints throughout tracks

Distance from center of disturbed nesting area to toe of dunes 0 (on toe of dunes)

Topographical feature at end of tracks (CIRCLE area on diagram) Located at # 4 on graph

Was a nest found? Yes false nest? _____ false crawl only? _____

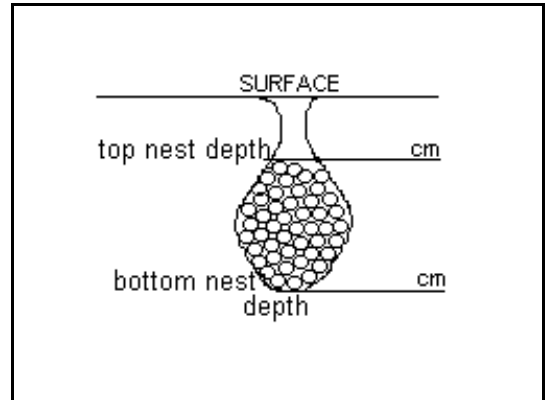


IV. Data to be collected for Each Nest (measurements of nest, egg #, etc.)

Original Nest Data:

NEST CAVITY

Nest # (ie. 1, 2, 3, ...) 3 Crawl# 3
Time nest excavated _____ until _____
Width of disturbed nesting area 122 cm
Length of disturbed nesting area 130.5 cm
Nest cavity width at widest pt. _____
Nest cavity length at longest pt. _____
Total # eggs _____
 #damaged eggs _____
 # broken or predated eggs _____
Temperature of soil in nest cavity _____



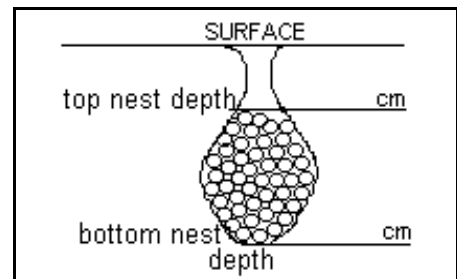
Notes: The distance from the ground surface to top nest depth was 38 cm. Nest was left “in -situ”.

An outer protective cage was placed over nest. One egg was removed from nest for a genetic analysis of parentage of sea turtle nesting. The couple, who saw the turtle digging, took pictures and sent them to the Virginia Aquarium Standing Team, who identified the turtle as a Kemp’s ridley. Refuge staff met Dam Neck personnel at 7:00 pm and finish data collection and placing protective cage at 8:15 pm.

Relocated Nest Data: Nest left “in-situ”

NEST CAVITY

Time nest reburied _____ until _____
Temperature of soil in nest cavity _____
Air temperature (C) _____
Estimated hatch date August 4 -14 (24Jul-23Aug)



V. Data to be Collected on Hatchlings/Hatch:

Turtle nest #(ie. 1,2, 3,...) _____ Time hatch detected _____

Hatch Period _____ Estimated hatch date _____

Incubation period (days) _____

Total # hatchlings counted _____ (See table below if hatch is extended.)

Location of Nursery (estimate, include markers) _____

Latitude of Nursery _____ Longitude of Nursery _____

Date of relocated nest's excavation _____

unhatched eggs _____ # dead hatchlings _____

unhatched eggs hatched later at Visitor's Center _____

storage location of dead hatchlings (if not disposed of) _____

Date	Time Hatchlings discovered	# of Hatchlings	AirTemp/ Soil Temp	Weather Conditions	Time of Hatchling Release	# of Hatchlings Released	Status of Hatchlings	Weather Conditions and Type of Tide (incoming or outgoing)
Total # of Hatchlings				Total # of Hatchlings Released				

VI. Additional Comments and Observations (diagram of tracks and nest, opinions, etc.)

Attach photos or slides and brief narrative for each nest/ hatch.

Two SeaMist Camp Ground campers, Doug and Yvonne Gilbert, saw and reported the nesting sea turtle. They took photos which confirmed that the turtle was a Kemps Ridley (VAST, USFWS, VDGIF, and Navy all concurred). Turtle had a healed damaged carapace. Campers reported that turtle was on beach digging between 1430-1500 and was gone, back in the water, by 1530.

Those Notified:

Base Watch Captain, Lt. Glass.

VA Aquarium Stranding Team

USFWS-BBNWR Biologists

VDGIF-SeaTurtle Coordinator

Base Conservation Law-enforcement Officer

Base Natural Resources Specialist/NRS (rec'd ~1615)

Installation Environmental Program Director/IEPD

NRS on site ~1700. IEPD on site ~ 1800. USFWS on site ~1900.

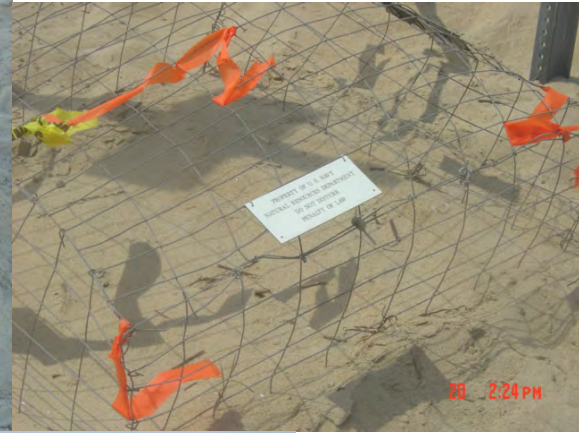
NRS confirmed crawl was not a hoax and notified USFWS so that they would respond and bring all appropriate equipment.



NASO Dam Neck Annex Sea Turtle Nest Monitoring SOP



NASO Dam Neck Annex Sea Turtle Nest Monitoring SOP



VDGIF Data Sheet for Individual Sea Turtle Crawl Record:

INDIVIDUAL SEA TURTLE CRAWL RECORD

CRAWL DATE: _____ (for all crawls discovered *after* midnight, enter the date the crawl was found. For all crawls found/reported *before* midnight, enter the next day's date).

CRAWL TYPE (check one): FALSE CRAWL _____ NEST _____

CRAWL NUMBER: _____

TREATMENT: (circle one): 0 = No treatment 1 = Relocated 2 = Wired in place 3 = Relocated & wired

CRAWL FOUND BY: _____

CRAWL LOCATION: _____

LATITUDE _____ LONGITUDE _____ WAYPOINT # _____

REASON FOR MOVING NEST: _____

OF EGGS IN THE CLUTCH: _____ # OF EGGS RELOCATED: _____ # OF BROKEN EGGS _____

NEST DEPTH _____ in./cm. (circle one) TIME NEST WAS MOVED _____

RELOCATED NEST LOCATION: _____

LATITUDE _____ LONGITUDE _____ WAYPOINT # _____

HATCHLINGS EMERGENCES OBSERVED

	1 st Night	2 nd Night	3 rd Night	4 th Night	5 th Night	6 th Night
Date						
# of Hatchlings Emerged						

TOTAL NUMBER OF OBSERVED HATCHLINGS THAT EMERGED FROM THE NEST: _____

HATCHING/NEST INVENTORY DATA

Date of first hatchling emergence (if first emergence was seen *after* midnight, record that day's date; if first emergence was seen *before* midnight, record the next day's date) _____

Date of last hatchling emergence (if last emergence was seen *after* midnight, record that day's date; if last emergence was seen *before* midnight, record the next day's date) _____

Nest inventory date: _____ Excavated by: _____

Perform the following steps to assist with the determination of the nest's hatch success rate:

- To obtain number of hatched eggs, separate whole eggshells (>50%) from pieces (<50%); only count whole eggshells (each whole eggshell represents one hatched egg):
- Add together the number of unhatched eggs and pipped eggs with dead hatchlings to obtain the total number of unhatched eggs:
- Count the # of dead hatchlings that emerged from eggs but did not leave the nest:
- Count the # of live hatchlings that emerged from eggs but did not leave the nest, irrespective of their condition.

ES = _____

UH = _____

DH = _____

LH = _____

SEE BACK PAGE FOR SPACE TO RECORD ADDITIONAL COMMENTS

Map

(Current example provided from 2012 season, map will be updated with current season's data, when and if needed.)



Appendix J

Lighting Assessment



WHAT ARE LIGHTING INSPECTIONS?

During a lighting inspection, a complete census is made of the number, types, locations, and custodians of artificial light sources that emit light visible from the beach. The goal of lighting inspections is to locate lighting problems and to identify the property owner, manager, caretaker, or tenant who can modify the lighting or turn it off.

WHICH LIGHTS CAUSE PROBLEMS?

Although the attributes that can make a light source harmful to sea turtles are complex, a simple rule has proven to be useful in identifying problem lighting under a variety of conditions:

An artificial light source is likely to cause problems for sea turtles if light from the source can be seen by an observer standing anywhere on the nesting beach.

If light can be seen by an observer on the beach, then the light is reaching the beach and can affect sea turtles. If any glowing portion of a luminaire (including the lamp, globe, or reflector) is directly visible from the beach, then this source is likely to be a problem for sea turtles. But light may also reach the beach indirectly by reflecting off buildings or trees that are visible from the beach. Bright or numerous sources, especially those directed upward, will illuminate sea mist and low clouds, creating a distinct glow visible from the beach. This “urban skyglow” is common over brightly lighted areas. Although some indirect lighting may be perceived as nonpoint-source light pollution, contributing light sources can be readily identified and include sources that are poorly directed or are directed upward. Indirect lighting can originate far from the beach.

Although most of the light that sea turtles can detect can also be seen by humans, observers should realize that some sources, particularly those emitting near-ultraviolet and violet light (e.g., bug-zapper lights, white electric-discharge lighting) will appear brighter to sea turtles than to humans. A human is also considerably taller than a hatchling; however, an observer on the dry beach who crouches to the level of a hatchling may miss some lighting that will affect turtles. Because of the way that some lights are partially hidden by the dune, a standing observer is more likely to see light that is visible to hatchlings and nesting turtles in the swash zone.

HOW SHOULD LIGHTING INSPECTIONS BE CONDUCTED?

Lighting inspections to identify problem light sources may be conducted either under the purview of a lighting ordinance or independently. In either case, goals and methods should be similar.

GATHER BACKGROUND INFORMATION

Before walking the beach in search of lighting, it is important to identify the boundaries of the area to be inspected. For inspections that are part of lighting ordinance enforcement efforts, the jurisdictional boundaries of the sponsoring local government should be determined. It will help to have a list that includes the name, owner, and address of each property within inspection area

so that custodians of problem lighting can be identified. Plat maps or aerial photographs will help surveyors orient themselves on heavily developed beaches.

PRELIMINARY DAYTIME INSPECTIONS

An advantage to conducting lighting inspections during the day is that surveyors will be better able to judge their exact location than they would be able to at night. Preliminary daytime inspections are especially important on beaches that have restricted access at night. Property owners are also more likely to be available during the day than at night to discuss strategies for dealing with problem lighting at their sites.

A disadvantage to daytime inspections is that fixtures that are not directly visible from the beach will be difficult to identify as problems. Moreover, some light sources that can be seen from the beach in daylight may be kept off at night and thus present no problems. For these reasons, daytime inspections are not a substitute for nighttime inspections. Descriptions of light sources identified during daytime inspections should be detailed enough so that anyone can locate the lighting. In addition to a general description of each luminaire (e.g., HPS floodlight directed seaward at top northeast corner of the building at 123 Ocean Street), photographs or sketches of the lighting may be necessary. Descriptions should also include an assessment of how the specific lighting problem can be resolved (e.g., needs turning off; should be redirected 90° to the east). These detailed descriptions will show property owners exactly which luminaires need what remedy.

NIGHTTIME INSPECTIONS

Surveyors orienting themselves on the beach at night will benefit from notes made during daytime surveys. During nighttime lighting inspections, a surveyor walks the length of the nesting beach looking for light from artificial sources. There are two general categories of artificial lighting that observers are likely to detect:

1. **Direct lighting.** A luminaire is considered to be direct lighting if some glowing element of the luminaire (e.g., the globe, lamp [bulb], reflector) is visible to an observer on the beach. A source not visible from one location may be visible from another farther down the beach. When direct lighting is observed, notes should be made of the number, lamp type (discernable by color), style of fixture, mounting (pole, porch, *etc.*), and location (street address, apartment number, or pole identification number) of the luminaire(s). If exact locations of problem sources were not determined during preliminary daytime surveys, this should be done during daylight soon after the nighttime survey. Photographing light sources (using long exposure times) is often helpful.

2. **Indirect lighting.** A luminaire is considered to be indirect lighting if it is not visible from the beach but illuminates an object (e.g., building, wall, tree) that is visible from the beach. Any object on the dune that appears to glow is probably being lighted by an indirect source. When possible, notes should be made of the number, lamp type, fixture style, and mounting of an indirect-lighting source. Minimally, notes should be taken that would allow a surveyor to find the lighting during a follow-up daytime inspection (for instance, which building wall is illuminated

and from what angle?).

WHEN SHOULD LIGHTING INSPECTIONS BE CONDUCTED?

Because problem lighting will be most visible on the darkest nights, lighting inspections are ideally conducted when there is no moon visible. Except for a few nights near the time of the full moon, each night of the month has periods when there is no moon visible. Early-evening lighting inspections (probably the time of night most convenient for inspectors) are best conducted during the period of two to 14 days following the full moon. Although most lighting problems will be visible on moonlit nights, some problems, especially those involving indirect lighting, will be difficult to detect on bright nights.

A set of daytime and nighttime lighting inspections before the nesting season and a minimum of three additional nighttime inspections during the nesting-hatching season are recommended. The first set of day and night inspections should take place just before nesting begins. The hope is that managers, tenants, and owners made aware of lighting problems will alter or replace lights before they can affect sea turtles. A follow-up nighttime lighting inspection should be made approximately two weeks after the first inspection so that remaining problems can be identified. During the nesting-hatching season, lighting problems that seemed to have been remedied may reappear because owners have been forgetful or because ownership has changed. For this reason, two midseason lighting inspections are recommended. The first of these should take place approximately two months after the beginning of the nesting season, which is about when hatchlings begin to emerge from nests. To verify that lighting problems have been resolved, another follow-up inspection should be conducted approximately one week after the first midseason inspection.

WHO SHOULD CONDUCT LIGHTING INSPECTIONS?

Although no specific authority is required to conduct lighting inspections, property managers, tenants, and owners are more likely to be receptive if the individual making recommendations represent a recognized conservation group, research consultant, or government agency. When local ordinances regulate beach lighting, local government code-enforcement agents should conduct lighting inspections and contact the public about resolving problems.

WHAT SHOULD BE DONE WITH INFORMATION FROM LIGHTING INSPECTIONS?

Although lighting surveys serve as a way for conservationists to assess the extent of lighting problems on a particular nesting beach, the principal goal of those conducting lighting inspections should be to ensure that lighting problems are resolved. To resolve lighting problems, property managers, tenants, and owners should be given the information they need to make proper alterations to light sources. This information should include details on the location and description of problem lights, as well as on how the lighting problem can be solved. One should also be prepared to discuss the details of how lighting affects sea turtles. Understanding the nature of the problem will motivate people more than simply being told what to do.

Lighting Survey Form

The lighting survey must be conducted to include a landward view from the seaward most extent of the beach profile. The survey must occur after 9 p.m. The survey must follow standard techniques for such a survey and include the number and type of visible lights, location of lights and photo documentation.

Date: _____

Location (name of beach): _____

Contact information of person conducting the lighting survey: _____

Lighting ordinance or Light Management Plan: _____

Compliance Officer name and contact information: _____

Survey start time: _____

Survey end time: _____

Survey start location (include address or GPS location): _____

Survey end location (include address or GPS location): _____

Date summarizing report sent to mike_drummond@fws.gov: _____

Contact information for follow up meeting with the FWS:

Accident Prevention Plan

Lighting Survey for Sea Turtle Management

Naval Air Station Oceana – Dam Neck Annex and Virginia Army National Guard Camp Pendleton

Contract # N62470-13-D-8017, TO WE04

Submitted to:
Naval Facilities Engineering Command
MIDLANT



Prepared by:

Versar, Inc.



VERSAR

Hampton, Virginia

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1 **2. BACKGROUND INFORMATION**

2 **a. Contractor**

3 GMI-AECOM Joint Venture
4 6850 Versar Center #201
5 Springfield, Virginia 22151

6 **b. Contract Number**

7 N62470-13-D-8017, TO WE04

8 **c. Project Name**

9 Lighting Survey and Biological Assessment for Sea Turtle Nest Management at Joint Expeditionary Base
10 Little Creek Fort Story, Virginia Beach, VA

11 **d. Brief Project Description of Work**

12 The GMI-AECOM JV is subcontracting this task order to Versar, Inc.

13 The purpose of this survey is to conduct artificial lighting surveys along the beaches of Naval Air Station
14 Oceana-Dam Neck Annex (NASO-DNA) and Virginia Army National Guard Camp Pendleton (VAANG-
15 CP) in Virginia Beach, VA. These lighting surveys will document all observable lighting sources from
16 installation beaches.

17 Versar would utilize a group of experienced scientists in performing the tasks specified in the SOW for
18 performing a survey of artificial lighting sources that may impact sea turtle nesting on installation
19 beaches. The project team’s experience includes extensive biological and ecological work throughout the
20 southeast. Versar’s technical approach will be to adhere closely to the SOW as described in the contract.
21 Specifically, we will adhere to all guidance and complete each task as directed in order to successfully
22 complete surveys for each installation. The project areas for NASO-DNA and VAANG-CP are shown in
23 Figures 1 and 2, respectively. A total of five surveys will be conducted at each location. The following
24 steps will be undertaken to perform lighting surveys at each installation:

- 25 1. The plans and maps developed for each installation survey plan will be used by the surveyors to
26 assist in determining potential light sources and identifying survey boundaries.
- 27 2. Each installation survey will begin with a daytime survey. Day time surveys allow surveyors a
28 first look to help with orientation at night and allows for the identification of potential light
29 sources to be sought at night.
- 30 a. Daytime surveys will occur both along the beach face and behind the rear dunes in order
31 to identify potential light source locations that will be sought out during night surveys.
- 32 b. Identification of potential light sources will be sufficiently detailed (location and type) so
33 that they can be easily located during night surveys.
- 34 3. Nighttime surveys will consist of at least two surveyors walking the beach at night along the
35 water line in the swash zone.
- 36 a. Surveys will be conducted 2 to 14 days following a full moon. See Table 1 for the full
37 moon calendar and survey opportunities. The PM will coordinate all visits with the NTR

- 1 and IR at least three weeks in advance to ensure beach access and entry to restricted
2 areas, if necessary, to obtain coordinates.
- 3 b. The first nighttime survey will be conducted prior to the nesting season which begins
4 early summer.
- 5 c. Three subsequent surveys will occur during the nesting (May – September) and hatching
6 season (approximately 55 – 80 days after eggs are laid).
- 7 d. Both direct and indirect light sources will be identified. Identification will consist of the
8 classification of the type of light source with GPS coordinates of the actual light source.
9 Survey forms will also document building number, parking area, or other identifier of the
10 location on the installation. The number of lights, type, color and potential disruption (as
11 reviewed in Witherington and Martin [2003]) will be included in the survey forms.
- 12 4. The windows for surveys is provided in Table 1. Specific dates will be coordinated with the
13 Installation Representatives (IR) and the Naval Technical Representative (NTR).
- 14 Hazards associated with the activities conducted under this scope of work include hazards encountered
15 with exposure from being outdoors; encounters with wildlife; trips and falls; and working in close
16 proximity to the water. Section 10, Risk Management Processes, of this APP discusses the associated
17 hazards involved with each activity and an activity hazard analysis (AHA).

18 **Table 1. Lighting Survey Windows**

Survey	Survey Window
Initial (Pre-nesting) Daytime Survey	30 Mar - 3 Apr
Initial (Pre-nesting) Night Survey (Night Survey 1)	13-17 April
Midseason Nesting/Hatching Survey (Night Survey 2)	4-8 Jun
Midseason Nesting/Hatching Survey (Night Survey 3)	12-16 Jun
Final Nesting/Hatching Survey (Night Survey 4)	31 Aug – 4 Sep

19

20

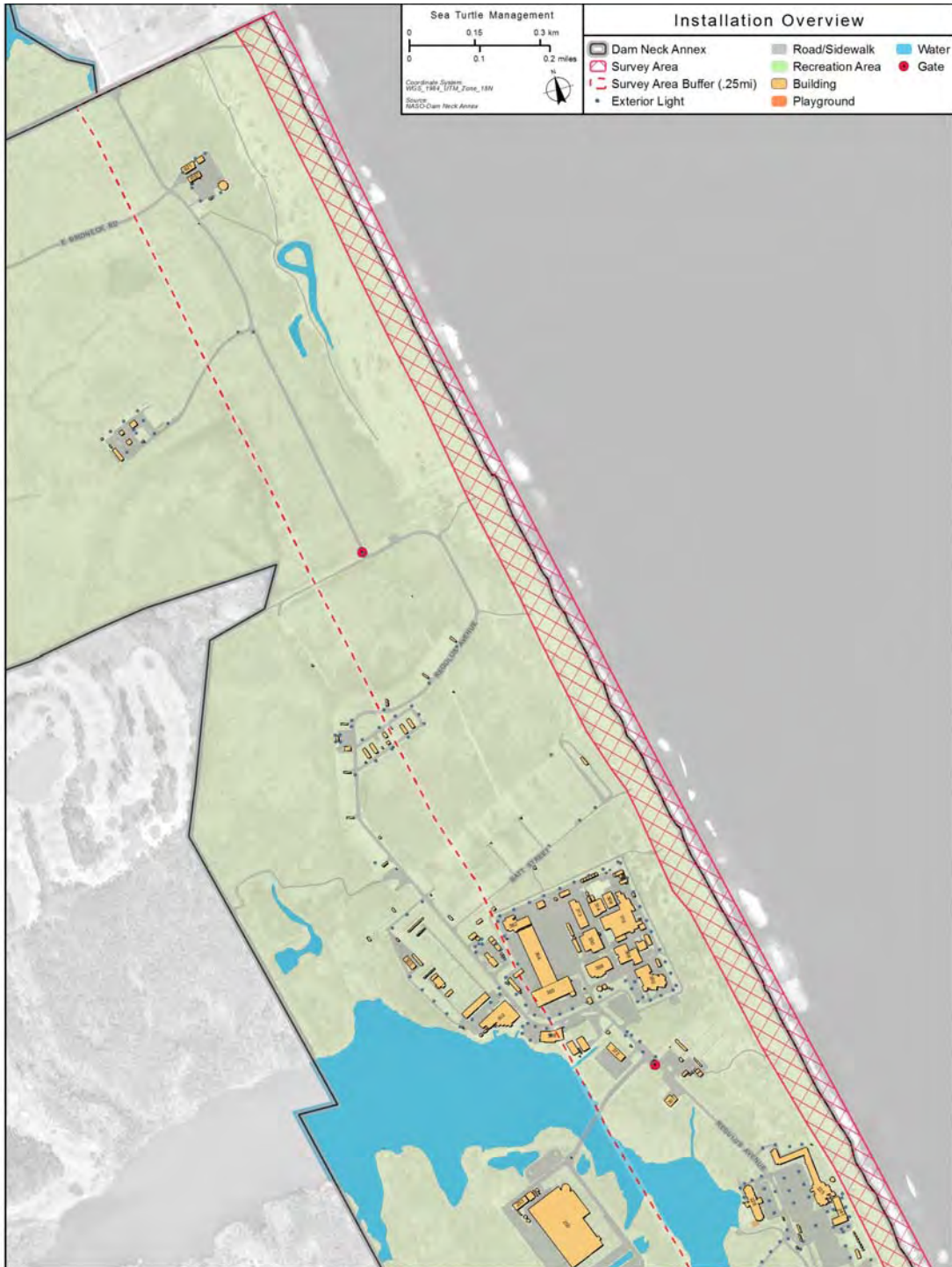


Figure 1. Naval Air Station Oceana – Dam Neck Annex Survey Area (North)



Figure 2. Naval Air Station Oceana – Dam Neck Annex Survey Area (North)

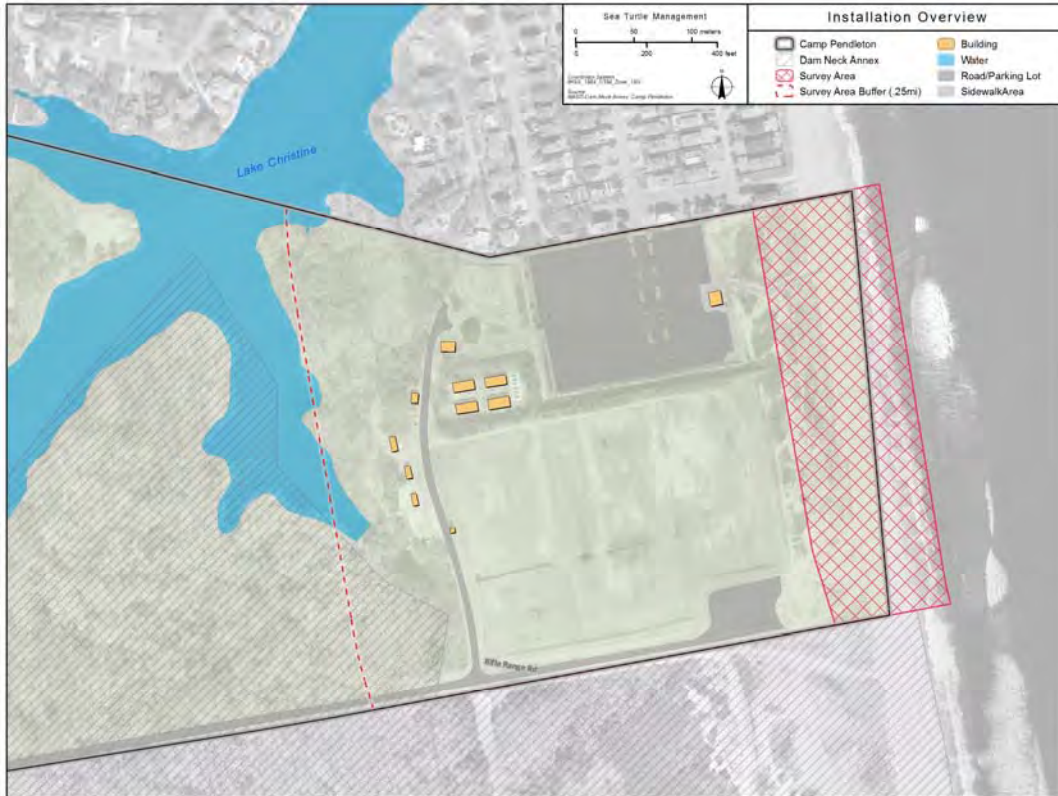


Figure 3. VAANG Camp Pendleton Survey Area

3. STATEMENT OF SAFETY AND HEALTH POLICY

The personal safety and health of each employee of the Versar Team is of primary importance. The prevention of work-induced injuries and illness is of such importance that it will be given precedence over operating productivity whenever necessary. To the greatest degree possible, management will provide all training, mechanical, and physical facilities required for personal safety and health in keeping with the highest standards of the industry.

The Versar Team will maintain a safety and health program conforming to the best practices of organizations within the environmental and construction services. To be successful, such a program must embody the proper attitudes toward injury and illness prevention on the part of both supervisors and employees. It also requires cooperation in all safety and health matters, not only between supervisor and employee, but also between each employee and his or her fellow workers. Only through such a cooperative effort can a safety record in the best interest of all be established and preserved.

The objective is a safety and health program that will reduce the number of disabling injuries and illnesses to an absolute minimum, not merely in keeping with, but surpassing, the best experience of other similar operations.

The Versar Team safety and health program includes:

- Providing mechanical and physical safeguards to the maximum extent possible;

- Conducting a program of safety and health inspections to find and eliminate unsafe working conditions or practices; to control health hazards; and to comply fully with the safety and health standards for every job;
- Training all employees in good safety and health practices;
- Providing necessary personal protective equipment (PPE) and instructions for its use and care;
- Developing and enforcing safety and health rules; and requiring that employees cooperate with these rules as a condition of employment;
- Investigating, promptly and thoroughly, every accident to find out what caused it and to correct the problem so that it will not happen again; and
- Recognizing and awarding outstanding safety service or performance.

The Versar Team recognizes that the responsibilities for safety and health are shared:

- The company is responsible for leadership of the safety and health program, for its effectiveness and improvement, and for providing the safeguards required to ensure safe conditions;
- The person responsible for administration of the company safety program is the Company President. Some items in the safety program may be delegated to others, but the primary responsibility remains with this person.
- Supervisors are responsible for developing the proper attitudes toward safety and health in themselves and in those they supervise and for ensuring that all operations are performed with the utmost regard for the safety and health of all personnel involved, including themselves.

Employees are responsible for cooperation with all aspects of the safety and health program, including compliance with all rules and regulations, and for continuously practicing safety while performing their duties.

4. RESPONSIBILITIES AND LINE OF AUTHORITY

a. Statement of Employer’s Ultimate Responsibility for Implementation of Safety and Occupational Health Program

The provisions of this Accident Prevention Program (APP) along with the applicable regulations issued by governmental entities will be strictly adhered to by site personnel and visitors. Each subcontractor will be held accountable for the safe and healthful performance of work by each of their employees, subcontractors, or support personnel who may enter the site. It is Versar’s policy to ensure that every reasonable precaution is taken to prevent accidents. Always use the safety equipment provided for your protection. Unsafe conditions, unsafe practices, property damage or personal injuries, regardless of how slight, must be reported to your supervisor immediately.

b. Identification and Accountability of Personnel Responsible at Corporate and Project Level

(1) GMI-AECOM JV

John Ouellette, Program Manager

(2) Versar

Mark Housand, Safety Officer
Brian Bishop, Project Manager

c. Requirements that No Work Shall be performed unless a Designated Competent Person is Present of the Job Site

The services outlined in Section 2 require specific skills sets and no services will be rendered without a trained, competent person present. All services are provided with a minimum of two employees present.

d. Requirements of Pre-task Safety and Health Analysis

Every employee is required to go through an on-sight safety briefing outlining daily tasks, equipment needs, and specific hazards that may be encountered during the course of daily activities. Additionally, employees are not allowed to operate any specific equipment without being briefed by the owner and illustrating competency with said item. This includes establishing corporate requirements that each employee discloses any health concerns that would impact their ability to operate equipment and perform assigned tasks.

e. Lines of Authority

(1) Project Manager

In effectively executing their safety responsibilities, project managers will:

- Familiarize themselves with the safety program and ensure its effective implementation.
- Be aware of all safety considerations when introducing a new process, procedure, machine or material to the workplace.
- Give maximum support to all programs and committees whose function is to promote safety and health.
- Actively participate in safety activities as required.
- Review serious accidents to ensure that proper reports are completed, and appropriate action is taken to prevent recurrences.

(2) Foremen (Crew Lead)

In effectively executing their safety responsibilities, foremen will:

- Familiarize themselves with company safety policies, programs and procedures.
- Provide appropriate safety training to employees prior to the assignment of duties.
- Consistently and fairly enforce all company safety rules.
- Investigate injuries to determine cause, and then take action to prevent recurrence.
- See that all injuries, no matter how minor, are treated immediately and referred to the front office to ensure prompt reporting to the insurance carrier.
- Inspect work areas often to detect unsafe conditions and work practices. Use company self-inspection checklists as required.

(3) All Employees

Employee responsibilities for safety include the following:

- Adhere to all safety rules and regulations.
- Wear appropriate safety equipment as required.
- Maintain equipment in good condition, with all safety guards in place when in operation.
- Report all injuries and near misses, no matter how minor, immediately to their supervisor, safety personnel or management.
- Encourage coworkers to work safely.
- Report unsafe acts and conditions to their supervisor, safety personnel, or management.
- Halt site operations in the event of an emergency or to correct unsafe work practices.
- Notifying emergency response personnel in the event of an emergency; and
- Review this APP.

f. Policy Regarding Noncompliance

Employees who fail to comply with safety rules will be subject to disciplinary action up to and including termination. Supervisors will follow the normal disciplinary procedures as follows:

- 1. Verbal counseling - must be documented in the employee's personnel file.
- 2. Written warning - outlining nature of offense and necessary corrective action.
- 3. Suspension without pay - one (1) working day without pay - the third step or a separate disciplinary action resulting from a serious violation.
- 4. Termination - if an employee is to be terminated, specific and documented communication between the supervisor and the employee must occur.

g. Procedures for Holding Managers and Supervisors Accountable to Safety

Supervisors will be subject to disciplinary action for the following reasons:

- Repeated safety rule violation by their department employees.
- Failure to provide adequate training prior to job assignment.
- Failure to report accidents and provide medical attention to employees injured at work.
- Failure to control unsafe conditions or work practices.
- Failure to maintain good housekeeping standards and cleanliness in their departments.

Supervisors who fail to maintain high standards of safety within their departments will be demoted or terminated after three documented warnings have been levied during any calendar year.

5. SUBCONTRACTORS AND SUPPLIERS

a. Identification of Subcontractors

Versar
6850 Versar Center
Springfield, VA 22151
(703) 750-3000

Virginia Aquarium & Marine Science Center
717 General Booth Blvd
Virginia Beach, VA 23451
(757) 385-3474

b. Safety Responsibilities of Subcontractors

Subcontractors and suppliers shall comply with all applicable federal, state, and local laws, rules, regulations, and orders in effect on the date of this order, including, but not limited to the following, as amended: (a) the Fair Labor Standards Act of 1938; (b) the Federal Occupational Safety and Health Act of 1970 (OSHA); (c) the Toxic Substances Control Act of 1976; (d) the Walsh-Healy Public Contracts Act; and (e) any other federal law concerning labor relations, nondiscrimination in employment, minimum wages, overtime compensation, and hours of employment. Seller agrees to indemnify and hold Contractor harmless against any loss or liability due to Seller’s violation or noncompliance with such regulations. Upon Contractor’s request, Seller shall furnish evidence demonstrating such compliance.

6. TRAINING

a. Requirements for New Employees

Each subcontractor or department manager must employ a program for new employee acclimation and orientation, including current employees who are reassigned and directed towards familiarization with:

- Safety rules, procedures and standards with which compliance is expected
- Inherent hazards of the job and surroundings
- Safe work methods, motions and habits
- Emergency procedures, alarms and telephone numbers related to reporting injury, illness, fire and other catastrophes
- Physical layout of the properties, including exits, emergency signal devices, first-aid facilities, and fire extinguishers and other emergency equipment
- PPE required on the job including its maintenance and proper use
- Safety committees, safety meetings, and safety educational materials.

While on-site, the Project Manager will brief all newly arriving workers and visitors to aid in protecting their safety. The training will familiarize personnel with hazards associated with the site and associated controls, describe work zone boundaries and access and exit procedures, explain emergency procedures, and describe the use of PPE required during activities on the site. The briefing will include a review of the requirements of this APP including the safety checklists in Appendix A.

b. Mandatory Training and Certifications Applicable to this Project

There are no mandatory or certifications required for this project.

c. Procedures for Periodic Safety and Health Training

Annual refresher training is required, even if there has been no change in a worker's job tasks.

d. Emergency Response Training

When a medical facility or physician is not accessible within five minutes of an injury to a group of two or more employees for the treatment of injuries, a minimum of two representatives, on site at all times, will be certified in both first aid and cardiopulmonary resuscitation. Certifications are contained Appendix B.

7. SAFETY AND HEALTH INSPECTIONS

a. Internal Inspections

Inspections should be performed by personnel who have been trained in recognizing hazards that have a tendency to “slip out” of controls designed to reduce employee exposure to them. All inspections should be documented in writing, and where hazards are identified, corrective actions should be developed as soon as possible, based on the severity of the hazard involved.

(1) Mechanical Equipment

The two general classifications are “frequent” and “periodic.”

- Frequent inspection: Daily to monthly intervals.
- Periodic inspection: 1- to 12-month intervals, or as specifically recommended by the manufacturer.

The operator should check the following items daily:

- All control mechanisms for maladjustment interfering with proper operation
- Deterioration or leakage in air or hydraulic systems if applicable
- All safety devices for malfunction

The following items should be checked weekly or monthly, depending on how much the equipment is used:

- All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.
- Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.

Complete inspections of all mechanical equipment must be performed at periodic intervals depending upon its activity, severity of service, and environment or as specifically indicated below. These inspections have to include all “frequent” inspection items and in addition, items such as the following:

- Loose bolts or rivets
- Worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers and locking devices
- Excessive wear on brake and clutch system parts, linings, pawls, and ratchets
- Gasoline, diesel, electric, or other power plants for improper performance or noncompliance with safety requirements
- Excessive wear of chain-drive sprockets and excessive chain stretch
- Travel steering, braking, and locking devices, for malfunction

c. Immediate Notification of Major Events

Immediate (8 hour) reporting to OSHA is required under 29 CFR 1904 if a fatality or catastrophe (3 or more people sent to the hospital with injuries that require an overnight stay) occurs. This reporting is done only by the Versar Safety Officer or Project Manager. All other personal injuries requiring first aid or resulting in lost time will be recorded on an OSHA Form 300 by the manager/project manager.

The following require immediate accident notification:

- A fatal injury
- A permanent total disability
- A permanent partial disability
- The hospitalization of three or more people resulting from a single occurrence
- Property damage of \$200,000 or more.

The investigation and reporting of occupational injuries, illnesses and dangerous occurrences is essential for project management to be able to take the steps necessary to avoid additional injuries or illnesses. A complete investigation will provide information regarding the elements of the incident and the process by which they came together to cause the injury, illness, or dangerous occurrence. By identifying the elements and processes, further incidents can be avoided. Timely reporting also permits project contractors to remain in compliance with OSHA recordkeeping regulations.

9. PLANS REQUIRED BY THE SAFETY MANUAL

a. Emergency Response Plans

(1) Spill Plans

In the event of a chemical spill, the company who caused the spill is responsible for prompt and proper clean-up. It is also their responsibility to have spill control and PPE appropriate for the chemicals being handled readily available.

The following are general guidelines to be followed for a chemical spill.

- Immediately alert area occupants and supervisor, and evacuate the area, if necessary.
- If there is a fire or medical attention is needed, contact the installation SPOC.
- Attend to any people who may be contaminated. Contaminated clothing must be removed immediately and the skin flushed with water for no less than fifteen minutes.
- If a volatile, flammable material is spilled, immediately warn everyone, control sources of ignition and ventilate the area.
- Don PPE, as appropriate to the hazards. Refer to the Material Safety Data Sheet or other references for information.
- Consider the need for respiratory protection. The use of a respirator or self-contained breathing apparatus requires specialized training and medical surveillance. Never enter a contaminated atmosphere without protection or use a respirator without training. If respiratory protection is

used, be sure there is another person outside the spill area in communication, in case of an emergency.

Using the list below, determine the extent and type of spill. If the spill is large, if there has been a release to the environment the company will contact the POC at the installation immediately

<u>Category Size</u>	<u>Response / Treatment Materials</u>
Small up to 300cc	Chemical treatment or absorption neutralization or absorption spill kit
Medium 300 cc - 5 liters	Absorption spill kit
Large more than 5 liters	Call public safety outside help

Loose spill control materials should be distributed over the entire spill area, working from the outside, circling to the inside. This reduces the chance of splash or spread of the spilled chemical. Bulk absorbents and many spill pillows do not work with hydrofluoric acid. POWERSORB (by 3M) products and their equivalent will handle hydrofluoric acid. Specialized hydrofluoric acid kits also are available. Many neutralizers for acids or bases have a color change indicator to show when neutralization is complete.

When spilled materials have been absorbed, use brush and scoop to place materials in an appropriate container. Polyethylene bags may be used for small spills. Five gallon pails or 20 gallon drums with polyethylene liners may be appropriate for larger quantities. Complete a hazardous waste sticker, identifying the material as Spill Debris involving the given chemical, and affix onto the container. Spill control materials will probably need to be disposed of as hazardous waste. Decontaminate the surface where the spill occurred using a mild detergent and water, when appropriate. Report all spills to your supervisor or the manager/principal manager, installation POC, and ESA project manager. A certified hazardous waste disposal company must be contacted to pick up and dispose of the contained material. The installation Environmental Regulated Waste Manager's signature is required the accompanying waster manifest, which is required with every disposal shipment for the base.

(2) Firefighting Plan

MAINTENANCE

The Project Manager will ensure that equipment is maintained according to manufacturers' specifications. The project manager will also comply with requirements of the National Fire Protection Association (NFPA) codes for specific equipment. Only properly trained individuals shall perform maintenance work.

GOOD HOUSEKEEPING

To limit the risk of fires, employees shall take the following precautions:

- Minimize the storage of combustible materials
- Make sure that all exit routes are kept free of obstructions
- Dispose of combustible waste in covered, airtight, metal containers
- Use and store flammable materials in well-ventilated areas away from ignition sources
- Use only nonflammable cleaning products

- Keep incompatible (i.e., chemically reactive) substances away from each other
- Perform “hot work” (i.e., welding or working with an open flame or other ignition sources) in controlled and well-ventilated areas
- Keep equipment in good working order (i.e., inspect electrical wiring and appliances regularly and keep motors and machine tools free of dust and grease)
- Ensure that heating units are safeguarded
- Report all fuel leaks immediately
- Repair and clean up flammable liquid leaks immediately
- Keep work areas free of dust, lint, sawdust, scraps, and similar material.

EXTINGUISHERS

Know the location of the nearest fire extinguisher and how to operate it. Know the type of the fire on which it should be used by checking and reading the label. Be aware that certain toxic gases or vapors may be generated by a fire.

A carbon dioxide, dry chemical or equivalent fire extinguisher is kept in the cab or vicinity of all mechanical equipment.

Fire extinguishers of the proper type and size must be within 30 feet of each open flame operation that is performed. Return all extinguishers for servicing promptly after any use.

COMBUSTIBLE AND FLAMMABLE MATERIALS

The project manager shall regularly evaluate the presence of combustible materials at the job site. Certain types of substances can ignite at relatively low temperatures or pose a risk of catastrophic explosion if ignited. Such substances obviously require special care and handling.

1. Class A combustibles.

These include common combustible materials (wood, paper, cloth, rubber, and plastics) that can act as fuel and are found in non-specialized areas such as offices.

To handle Class A combustibles safely:

- a. Dispose of waste daily.
- b. Keep trash in metal-lined receptacles with tight-fitting covers (metal wastebaskets that are emptied every day do not need to be covered).
- c. Keep work areas clean and free of fuel paths that could allow a fire to spread.
- d. Keep combustibles away from accidental ignition sources, such as hot plates, soldering irons, or other heat- or spark-producing devices.
- e. Store paper stock in metal cabinets.
- f. Store rags in metal bins with self-closing lids.

- g. Do not order excessive amounts of combustibles.
- h. Make frequent inspections to anticipate fires before they start.

Water, multi-purpose dry chemical (ABC), and halon 1211 are approved fire extinguishing agents for Class A combustibles.

2. Class B combustibles.

These include flammable and combustible liquids (oils, greases, tars, oil-based paints, and lacquers), flammable gases, and flammable aerosols.

To handle Class B combustibles safely:

- a. Use only approved pumps, taking suction from the top, to dispense liquids from tanks, drums, barrels, or similar containers (or use approved self-closing valves or faucets).
- b. Do not dispense Class B flammable liquids into containers unless the nozzle and container are electrically interconnected by contact or by a bonding wire. Either the tank or container must be grounded.
- c. Store, handle, and use Class B combustibles only in approved locations where vapors are prevented from reaching ignition sources such as heating or electric equipment, open flames, or mechanical or electric sparks.
- d. Do not use a flammable liquid as a cleaning agent inside a building (the only exception is in a closed machine approved for cleaning with flammable liquids).
- e. Do not use, handle, or store Class B combustibles near exits, stairs, or any other areas normally used as exits.
- f. Do not weld, cut, grind, or use unsafe electrical appliances or equipment near Class B combustibles.
- g. Do not generate heat, allow an open flame, or smoke near Class B combustibles.
- h. Know the location of and how to use the nearest portable fire extinguisher rated for Class B fire.

Water should not be used to extinguish Class B fires caused by flammable liquids. Water can cause the burning liquid to spread, making the fire worse. To extinguish a fire caused by flammable liquids, exclude the air around the burning liquid. The following fire-extinguishing agents are approved for Class B combustibles: carbon dioxide, multi-purpose dry chemical (ABC), halon 1301, and halon 1211. (NOTE: Halon has been determined to be an ozone-depleting substance and is no longer being manufactured. Existing systems using halon can be kept in place.)

SMOKING

Smoking is prohibited in all company buildings, vehicles, and equipment. Certain outdoor areas may also be designated as no smoking areas. The areas in which smoking is prohibited outdoors will be identified by NO SMOKING signs.

STRIKE ANYWHERE matches are not permitted. On certain projects, permits are required for welding, burning, or other types of open flames.

(3) Employees working alone

Employees working alone shall be provided an effective means of emergency communication. This may be cellular phone, two-way radio or other acceptable means. The selected means of communication must be readily available and must be in working condition.

(4) Posting of Emergency Phone Numbers

Emergency telephone numbers and reporting instructions for ambulance, physician, hospital, fire, and police will be conspicuously and clearly posted at the work site.

(5) Medical Support

If the incident is serious/life threatening, the contractor is to **contact the JEBLCFS Emergency Dispatch Center at 757-443-9111 for the installation emergency dispatch**. In the event of an onsite incident that results in a need for first aid care, the closest hospital with acute care facilities to JEB Little Creek is Bon Secours DePaul Medical Center in Norfolk and the closest to JEB Fort Story is Sentara Princess Anna in Virginia Beach. To reach off-site hospitals, follow the driving directions in Appendix D.

Following an accident/injury or near miss, work will immediately stop and the POC will be contacted. Emergency contact information is located in Table 2. The POC will then contact the Safety Office to respond/document the incident. No work shall take place until the Installation Safety Office turns the site back over to the contractors.

Table 2. Emergency Contacts

Contact	Person or Agency	Telephone No.
Dam Neck Annex POC	Michael Wright	Office: (757) 433-3461 Cell: (757) 373-8531
Dam Neck Annex Emergency Dispatch		(757) 492-6911
Camp Pendleton POCs	Ken Oristaglio 1st Sgt Carter	Office: (434) 298-6416 Cell: (434) 264-4929 Cell: (434) 294-2100
Camp Pendleton Emergency Dispatch	Main Gate	911 757-491-5144
Off-base Hospital (Fort Story): Sentara Princess Anna	2025 Glenn Mitchell Dr, Virginia Beach, VA 23456	(757) 507-1000
Poison Control Center	Directs to appropriate state center	(800) 222-1222
NAVFAC MIDLANT NTR	Jessica Bassi	
GMI-AECOM JV Program Manager	John Ouellette	(757) 265-2901
Versar Project Manager	Brian Bishop	(757) 265-2903

Contact	Person or Agency	Telephone No.
Virginia Aquarium	Mark Swingle	(757) 384-3474

The above table shall be posted in a prominent location at the work area.

b. Plan for Prevention of Alcohol and Drug Abuse

While working the site, no personnel assigned to this project may use, possess, distribute, sell, or be under the influence of alcohol or engage in the unlawful manufacture, distribution, dispensation, possession, or use of illegal drugs. Violations of this policy may lead to disciplinary actions, up to and including immediate and permanent prohibition of the individual(s) from performing work on this project.

The policy to be implemented at this project site will involve drug testing for cause or suspicion. This means that any individual assigned to this project, who is observed behaving in such a manner that leads the project manager to suspect he or she is under the influence of alcohol or illegal drugs, will be immediately directed to stop work and report to the project manager. The individual under suspicion will be escorted off of the site and asked to submit to testing for illegal substances and alcohol. Individuals who agree to be tested will be provided transportation to an appropriate medical facility for evaluation. Individuals who decline to be tested will be provided transportation to their nearby residence or lodging and directed not to return to the project. Those who test positive for use of illegal substances may not return to the project until such time as they can demonstrate no further use of the substances.

Individuals with questions or concerns about substance dependency or abuse may wish to discuss these matters with their employer, supervisor, or appropriate resources in the community. The intent of this policy is to offer a helping hand to project personnel who suffer from the illness of addiction and to encourage those personnel to pursue recovery. The clear message is that continued drug use or alcohol abuse is incompatible with continuing work on this project. Any employee under a physician's treatment and taking prescribed narcotics or any medication that may prevent one being ready, willing and able to safely perform position duties shall provide a medical clearance statement to his supervisor.

c. Drinking Water Provisions, Toilet and Washing Facilities

All employees will either bring or Versar will provide an adequate supply of drinking water. The closest restroom and washing facilities on Dam Neck Annex are located behind the dunes in Bldg 153, which is located across the parking lot from the Shifting Sands Beach Club (Appendix E). On Camp Pendleton, portable latrines are located directly behind the dunes.

d. Health Hazard Control Program

Operations, materials, and equipment involving potential exposure to hazardous or toxic agents or environments shall be evaluated by the manager and project manager for each activity. Based on the scope of work outlined in Section 2, neither company anticipates operating equipment or using materials that may construed as health hazards to perform these tasks.

e. Heat/Cold Stress Monitoring plan

The following guidelines will be followed to prevent heat related injury:

1. Drinking water shall be made available to employees and employees encouraged to frequently drink small amounts, e.g., one cup every 15-20 minutes; the water shall be kept reasonably cool.
2. Tool box training in hot environments shall include training on the symptoms of heat related problems, contributing factors to heat related injuries, and prevention techniques.
3. When possible, work should be scheduled for cooler periods during the day.
4. Individuals shall be encouraged to take breaks in a cooler location, and use cooling devices as necessary, such as cooling vests, to prevent heat related injury.
5. A buddy system shall be established to encourage fluid intake and watch for symptoms of heat related injury.
6. The foreman shall monitor those individuals who have had a previous heat-related injury, are known to be on medication, or exhibits signs of possibly having consumed large amounts of alcohol in the previous 24 hours for signs, or indicating symptoms of heat related injuries.
7. Individuals who are not acclimatized shall be allowed additional breaks. The period and number should be determined by the SSHO and provided to the supervisor and employee for implementation.

Cold weather sheltering and clothing requirements include:

1. If wind chill is a factor at a work location, the cooling effect of the wind shall be reduced by shielding the work area or requiring employees to wear an outer windbreak layer garment.
2. An AHA and/or PHA shall be prepared as an attachment to the site-specific, cold-stress monitoring plan and shall identify specific controls to minimize employee exposure to extreme cold.
3. Extremities, ears, toes, and nose shall be protected from extreme cold by proper clothing such as hats, gloves, masks, etc.
4. Employees whose clothing may become wet shall wear an outer layer of clothing that is impermeable to water.
5. Outer garments must provide for ventilation to prevent wetting of inner clothing by sweat.
6. If clothing is wet, the employee shall change into dry clothes before entering a cold environment.
7. Employees shall change socks and removable felt insoles at regular daily intervals or shall use vapor barrier boots.
8. Due to the added danger of cold injury due to evaporative cooling, employees handling evaporative liquid (such as gasoline, alcohol, or cleaning fluids) at air temperatures below 40 °F (4 °C) shall take precautions to avoid soaking of clothing or contact with skin.

f. Contingency Plan for Severe Weather

When there are warnings or indications of impending severe weather (heavy rains, thunderstorms, damaging winds, tornados, hurricanes, floods, lightning, etc.), weather conditions shall be monitored using a weather station that is part of the National Oceanic and Atmospheric Administration (NOAA) weather radio all hazards network or similar notification system. Appropriate precautions shall be taken to protect personnel and property from the effects of the severe weather.

Notification of inclement weather in progress after working hours will be done by phone. Notifying employees at this time can assist management in letting workers know if and when to report to work.

10. RISK MANAGEMENT PROCESS

a. Standard Safe Work Practices

(1) General

The following general safe work practices will be followed:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited in the Work Zone.
- Spillage shall be prevented, to the extent possible. In the event that spillage occurs, the liquid shall be contained, if possible.
- Field crewmembers shall use all their senses to alert themselves to potentially dangerous situations (i.e., presence of strong, irritating, or nauseating odors).
- Field crew members shall be familiar with the physical characteristics of the site, including:
 - Wind direction in relation to the ground Work Zone
 - Accessibility to associates, equipment, and vehicles
 - Communications
 - Site access
 - Nearest water sources
 - Routes and procedures to be used during emergencies.
- All wastes generated during activities at the site must be disposed of as directed by the Project Manager.

(2) Personal Protective Equipment

Personnel Protective Equipment (PPE) is worn to minimize exposure to serious workplace injuries and illnesses. Injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. PPE include items such as gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits. PPE should be of sound design and construction, and well maintained.

- Work clothing - Minimum Requirements.
 - Employees shall wear clothing suitable for the weather however minimum requirements for work shall be short-sleeve shirt, long pants (excessively long or baggy pants are prohibited) and leather work shoes.
 - If analysis determines that safety-toed (or other protective) footwear is necessary (i.e., mowing, weedeating, chain saw use, etc.), they shall be worn. The Navy has requested that safety-toed shoes be worn while performing duties on these installations.
- Eye and Face Protection.
 - Eye and face protection shall be worn as determined by an analysis of the operations being performed
 - However, all involved in chain saw use, chipping, stump grinding, pruning operations, grass mowing, weedeating and blowing operations shall be provided safety eyewear (Z87.1) as a minimum.

- **Hearing Protection.**
 - Hearing protection must be worn by all those exposed to high noise activities (to include grass mowing and trimming, chainsaw operations, tree chipping, stump grinding and pruning). Ear plugs are required when working near operating beach replenishment equipment on Dam Neck Annex.
- **Head Protection.**
 - Hard hats shall comply with ANSI Z89.1 and shall be worn by all workers when a head hazard exists.
 - At a minimum, hard hats shall be worn when performing chain saw use, chipping, stump grinding, pruning operations, grass mowing, weedeating, and blowing operations.
 - Hard hats are required when working within the beach replenishment area on Dam Neck Annex.
- High Visibility Apparel shall comply with ANSI/ISEA 107, Class 2 requirements at a minimum and shall be worn by all workers exposed to vehicular or equipment traffic.
- Protective Leg chaps shall be worn by all chainsaw operators.
- Gloves of the proper type shall be worn by persons involved in activities that expose the hands to cuts, abrasions, punctures, burns and chemical irritants.
- If work is being performed around water and drowning is a hazard, PFDs must be provided and worn as appropriate.

(3) Machine Guards and Safety devices.

- Power tools must have appropriate guards and safety devices in place and operational.

(4) Buddy System

Workers will conduct all site activities with a buddy who is able to:

- Provide his or her partner with assistance.
- Observe his or her partner for signs of heat exposure.
- Notify the project manager if emergency help is needed.

b. Site Hazards and Standard Operation Procedures

(1) Noise

Noise, or unwanted sound, is one of the most pervasive occupational health problems. It is a by-product of many industrial processes.

Hearing protection is required of all field personnel throughout the course of this project when noise generating activities (e.g. saw cutting) are taking place. Exposure to high levels of noise causes hearing loss and may cause other harmful health effects as well. The extent of damage depends primarily on the intensity of the noise and the duration of the exposure.

Noise-induced hearing loss can be temporary or permanent. Temporary hearing loss results from short-term exposures to noise, with normal hearing returning after period of rest. Generally, prolonged exposure to high noise levels over a period of time gradually causes permanent damage.

Hearing protection will be provided to all workers exposed to 8-hour time-weighted average (TWA) noise levels of 85 dB or above. Employees must wear hearing protectors:

- For any period exceeding 6 months from the time they are first exposed to 8-hour TWA noise levels of 85 dB or above, until they receive their baseline audiograms if these tests are delayed due to mobile test van scheduling;
- If they have incurred standard threshold shifts that demonstrate they are susceptible to noise; and
- If they are exposed to noise over the permissible exposure limit of 90 dB over an 8-hour TWA.

(2) Venomous Snakebites

Of the 8,000 people bitten by snakes annually in the United States, fewer than 12 die. Most deaths occur because the victim has an allergic reaction, weakened body systems, or because too much time passes before the victim receives medical care. Reactions from snakebites are aggravated by acute fear and anxiety. Other factors that affect the severity of local and general reactions include: the amount of venom injected and the speed of absorption of venom into the victim's circulation; the size of the victim; protection from clothing including shoes and gloves; quick antivenin therapy; and location of the bite.

Elaborate care for a snakebite is usually unnecessary because in most cases the victim can reach professional medical care within 30 minutes. The most important step in first aid procedures is to transport the victim to the hospital quickly. Meanwhile, take action with the first aid procedures listed below.

First Aid for Snakebite:

- Call EMS (Emergency Medical System) for a victim of snakebite.
- Keep the victim calm. Monitor airway, breathing, and circulation.
- Wash the wound and keep the affected part still. Splint a bitten arm or leg. Keep the affected area lower than the heart to slow down the progress of the venom from the bite site to the heart.
- **Do not apply ice, do not cut the wound, and do not apply a tourniquet.** If in a remote area, contact EMS via radio, then carry the victim or have him or her walk slowly.

Other factors to consider in providing first aid treatment:

- Shock - Keep the victim lying down and comfortable if possible, and maintain his or her body temperature.
- Breathing and Pulse - Constantly monitor airway, breathing, and respiration. Administer artificial resuscitation or CPR if needed.
- Observing the Snake - If feasible without injuring additional persons, observe and take notes of the size, color, and markings of the snake.
- Medications - Do not give the victim alcohol, sedatives, aspirin, or any other medication while transferring to the medical facility.

Other Hazardous Bites

Mosquitoes

West Nile Virus has been spreading quickly throughout the United States, especially in areas with higher mosquito populations. Although this disease has been affecting immuno-compromised individuals, it is best to protect oneself against mosquito bites, which can carry other diseases besides the West Nile Virus.

Repellents containing DEET have been shown to be effective against mosquitoes when applied to exposed skin. Using a repellent with a higher percentage of DEET does not mean that one's protection is better, just that it will last longer. The Federal Centers for Disease Control and Prevention (CDC) has stated that a product containing an approximately 25% concentration lasts an average of five hours, whereas a product with much less DEET will last for one or two hours. Concentrations over 50% do not increase the length of protection.

When using DEET, be cautious against:

- Applying the product indoors. Apply the repellent outdoors and use sparingly.
- Spraying the product directly in one's face. Rather apply to your hands and rub the material on your face, but not on your mouth or around your eyes.
- Do not apply to cuts, irritated skin, or beneath clothing.

Products containing Permethrin, such as Permanone, have been effective when applied directly to clothing. Apply products specified for use on clothing outdoors. Do not apply it to your skin.

The CDC recently announced that products containing two other repellents — the chemical picaridin and natural oil of lemon eucalyptus — are also effective in repelling mosquitoes. In using these for Mosquito control, however, be aware that they are not alternatives to DEET when it comes to battling deer ticks that spread Lyme disease.

If feasible, control the amount of standing water on the site, emptying containers with accumulated water so as not to provide a breeding ground for mosquito larvae. Non-registered pesticides are available to kill larvae in pools of standing water if it is feasible to exercise this level of control over the surroundings.

Be cautious if spraying an insecticide inside a closed space such as in a construction trailer or inside the cab of an excavator or other piece of construction equipment. A toxic environment can quickly be created. Use pesticide sparingly and vacate the space for a short period of time immediately after application to allow the material to settle out of the air.

Spiders

Spiders in the United States are generally harmless, with two notable exceptions: the Black Widow spider (*Latrodectus Mactans*) and the Brown Recluse or violin spider (*Lox Osceles Reclusa*).

The symptoms of such a spider bite are: slight local reaction, severe pain produced by nerve toxin, profuse sweating, nausea, painful cramps in abdominal muscles, and difficulty in breathing and speaking. Victims recover in almost all cases, but an occasional death is reported. The bite of a Black Widow spider is the more painful and often the more deadly of the two.

Field personnel shall exercise caution when lifting covers off manholes or sumps or rummaging through wood, rock, or brush piles, etc. since both the Black Widow and Brown Recluse spiders are typically found in these areas.

(3) General First Aid for Poisonous Insect Bites

1. Minor Bites and Stings

- Cold applications.
- Soothing lotions, such as calamine.

2. Severe Reactions

- Give artificial respiration if indicated.
- Apply a constricting band above the injection site on the victim's arm or leg (between the site and the heart). Do not apply tightly. You should be able to slip your index finger under the band when it is in place.
- Keep the affected part down, below the level of the victim's heart.
- If medical care is readily available, leave the band in place; otherwise, remove it after 30 minutes.
- Apply ice contained in a towel or plastic bag, or cold cloths, to the site of the sting or bite.
- Give home medicine, such as aspirin, for pain.
- If the victim has a history of allergic reactions to insect bites or is subject to attacks of hay fever or asthma, or if he or she is not promptly relieved of symptoms, call a physician or take the victim immediately to the nearest location where medical treatment is available. In a highly sensitive person, do not wait for symptoms to appear, since delay can be fatal.
- In case of a bee sting, remove and discard the stinging apparatus and venom sac.

(4) Tick-borne Diseases

Lyme Disease

Lyme disease is an illness caused by a bacterium, which may be transmitted by the bite of a tick (*Ixodes scapularis*), commonly, referred to as the "Deer Tick." The tick is about the size of a sesame seed, as distinguished from the Dog Tick, which is significantly larger. The Deer Tick is principally found along the Atlantic coast, living in grassy and wooded areas, and feeds on mammals such as mice, shrews, birds, raccoons, opossums, deer, and humans. Not all ticks are infected with the bacterium, however. When an infected tick bites, the bacterium is passed into the bloodstream of the host, where it multiplies. The various stages and symptoms of the disease are well recognized and, if detected early, can be treated with antibiotics.

Removal of ticks is best accomplished using small tweezers. Do not squeeze the tick's body. Grasp it where the mouth parts enter the skin and tug gently, but not firmly, until it releases its hold on the skin. Save the tick in a jar labeled with the date, body location of the bite, and the place where it may have been acquired. Wipe the bite thoroughly with an antiseptic and seek medical attention as soon as possible.

The illness typically occurs in the summer and is characterized by a slowly expanding red rash, which develops a few days to a few weeks after the bite of an infected tick. This may be accompanied by flu-like symptoms along with headache, stiff neck, fever, muscle aches, and/or general malaise. At this stage

treatment by a physician is usually effective; but, if left alone, these early symptoms may disappear and more serious problems may follow. The most common late symptom of the untreated disease is arthritis. Other problems that may occur include meningitis and neurological and cardiac abnormalities. It is important to note that some people do not get the characteristic rash but progress directly to the later manifestations. Treatment of later symptoms is more difficult than early symptoms and is not always successful.

When in an area suspected of harboring ticks (grassy, bushy, or woodland area) the following precautions can minimize the chances of being bitten by a tick:

1. Wear long pants and long-sleeved shirts that fit tightly at the ankles and wrists.
2. Wear light colored clothing so ticks can be easily spotted.
3. Wearing tick repellents may be useful.
4. Inspect clothing frequently while in tick habitat.
5. Inspect your head and body thoroughly when you return from the field.
6. Remove any attached ticks by tugging with tweezers where the tick's mouth parts enter the skin. Do not squeeze or crush it.

Rocky Mountain Spotted Fever

In the United States this tick-borne disease is primarily transmitted by infected Dog Tick (*Dermacentor variabilis*). It is important to note that the Dog Tick is significantly larger than the Deer Tick. Nearly all cases of infection occur in the spring and summer, generally several days after exposure to infected ticks. The onset of illness is abrupt and often accompanied by high fever, headache, chills, and severe weakness. After the fourth day of fever, victims develop a spotted pink rash that usually starts on the hands and feet and gradually extends to most of the body. As with Lyme disease, early detection and treatment significantly reduces the severity of illness. The disease responds to antibiotic therapy with tetracycline or chloramphenicol.

(5) Poisonous Plants

Characteristic Reactions

The majority of skin reactions following contact with offending plants is allergic in nature and characterized by general symptoms of headache and fever, itching, redness, and a rash.

Some of the most common and most severe allergic reactions result from contact with plants of the Poison Ivy group including Poison Oak and Poison Sumac. The most distinctive features of Poison Ivy and Poison Oak are their leaves, which are composed of three leaflets each. Both plants also have greenish-white flowers and berries that grow in clusters. Such plants produce a severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim can also develop a high fever and become very ill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

First Aid Procedure

1. Remove contaminated clothing.
2. Wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol.
3. Apply calamine or other soothing skin lotion if the rash is mild.
4. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.

c. Activity Hazard Analyses

Tabular Activity Hazard Analysis (AHA) is presented here to prescribe hazards and controls associated with the work on the site. The AHAs are prepared based upon a review of the planned work on the site and the recognized physical and biological hazards associated with the work. The AHAs for this project are contained in Appendix F.

Appendix A
Job Safety Checklists

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Pre-Job Hazard Survey

A Tailgate Meeting is required every day before starting work in order to identify and minimize HAZARDS on the job. PLEASE place a check mark in the box next to each of the following HAZARDS that are most relevant to this particular job and DISCUSS them. Keep a copy of the completed form in an office file.

Date ____ Crew Leader _____ Job Location _____
Type of job _____

HAZARD

- day of the week
- extreme weather conditions
- inexperienced personnel
- improper use of PPE
- distance to electrical conductors
- terrain
- noise levels
- new equipment
- obstacles
- traffic control

- moving/lifting heavy objects
- chemicals
- (Other)

DISCUSS

- more accidents on Mon, Fri, & bef/aft holidays & vacation days
- frost bite, heat exhaustion, effect on driving their ability to detect hazardous conditions
- head, eye, hearing, foot, hand, leg injuries
- direct and/or indirect contact
- slips, trips, and falls
- necessity of hand signals
- proper use and maintenance
- overhead and/or ground level
- being struck, protection of the work area, cones & signs
- proper techniques and/or equipment
- contact with or exposure to

Crew members' signatures:

- | | |
|----------|----------|
| 1. _____ | 2. _____ |
| 3. _____ | 4. _____ |
| 5. _____ | 6. _____ |
| 7. _____ | 8. _____ |

Phone number in case of emergency: _____

New Employee Safety Checklist

Employee: _____ Department: _____

Date Hired: _____ Supervisor: _____

Supervisor: Check off each item as you discuss it with the new employee prior to having that employee start work.

1. Employee provided company safety policy statement and safety rule. _____
2. Explained functions of company safety committee. _____
3. Reviewed injury-reporting procedures. _____
4. Issued safety equipment - glasses, ear plugs, respirator, etc., and explained use and care. _____
5. Reviewed lock-out and tag procedures. _____
6. Reviewed safe lifting procedures. _____
7. Will forklift training be required? If yes, when _____ _____
8. Reviewed housekeeping and clean-up procedures. _____
9. Located first aid kits/medical service provider(s)/hospital. _____
10. Reviewed hazard communication program, location of material safety data sheets, and how to read an MSDS _____
11. Reviewed evacuation procedures and any specific duties. _____
12. Does the employee understand the above? _____

I acknowledge that information on the above subjects was furnished to me during my orientation.

Employees Signature _____ Department _____

I have instructed the above named employee in the fundamentals of safety practices.

Supervisor's Signature _____ Date _____

Appendix B
Certification Cards

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This certifies
BRIAN BISHOP
has successfully
completed a
NAUI First Aid / CPR
W/AED + O₂ PROVIDER
training program and
has met NAUI guidelines.

Instructor JAMES COOK
NAUI # 30063
Date 7/22/2014
Course Location UNDERWATER ADVENTURES

 
BRIAN E. BISHOP
Has successfully completed a
NAUI First Aid / CPR
W/AED + O₂ PROVIDER
training program
7/22/2014 J. Cook + J. Cook
Byline / Exam Date / In Instructor / NAUI #



American Red Cross

Christopher Lotts
has successfully completed requirements for
Adult First Aid/CPR/AED: 2 Years

Date Completed: 02/18/2014
conducted by: American Red Cross
Instructor: Alfred Machesney



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Scan code or visit:
redcross.org/online



Appendix C
Accident Report Forms

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Contractor Significant Incident Report (CSIR-1)				Page 1 of 4
Report Date:		Contracting Activity/ROICC Office		
I. Accident Classification:				
<input type="checkbox"/> Injury <input type="checkbox"/> Illness <input type="checkbox"/> Fatality <input type="checkbox"/> Property Damage <input type="checkbox"/> Procedural Issues <input type="checkbox"/> Environmental				
Involving:				
<input type="checkbox"/> Hazardous Materials <input type="checkbox"/> Electrical <input type="checkbox"/> Equip/Motor Vehicle/ Material Handling <input type="checkbox"/> Diving <input type="checkbox"/> Falls				
<input type="checkbox"/> Confined Space <input type="checkbox"/> Crane/Rigging <input type="checkbox"/> Trenching/Entrapment <input type="checkbox"/> Fire <input type="checkbox"/> Other				
<input type="checkbox"/> Waterfront Operations <input type="checkbox"/> Demolition/Renovation				
2. Personal Data:				
A. Name (Last, First, M.)		B. Age	C. Sex	D. Social Security Number
E. Job Description/Title		F. Employed By		G. Supervisor's Name
3. Witness Data (Attach Witness Summary Statements to Report):				
A. Name (Last, First, M.)			B. Age	C. Sex
D. Job Description/Title		E. Employed By		
4. General Information:				
A. Date of Accident (Month/Day/Year)		B. Time of Accident	C. Exact Location of Accident	D. Type of Construction Equipment (Make, Model, Serial Number, Vin #)
E. Contract Number/Title		F. Construction Activity SIC		G. Hazardous Material Spill/Release
H. Type of Contract <input type="checkbox"/> Construction <input type="checkbox"/> A/E <input type="checkbox"/> Service <input type="checkbox"/> RAC <input type="checkbox"/> CLEAN <input type="checkbox"/> JOC <input type="checkbox"/> OTHER		I. Contractor's Name/Address/Phone Number (1) Prime: (2) Sub:		
J. Safety Manager's Name Phone # (1) Prime: (2) Sub:		K. Insurance Carrier (1) Prime: (2) Sub:		

L. Work Activity at Time of Accident

M. Personal Protective Equipment?

- (1) Available & Used
- (2) Not Required
- (3) Available & not used
- (4) Not Related to mishap
- (5) Wrong PPE for job
- (6) List Type(s) used:

5. Injury/Illness/Fatality Information:

A. Severity of Illness/Injury	B. Estimated Days Lost	C. Estimated Days Hospitalized	D. Estimated Days Restricted Duty
E. List Body Part(s) Affected	F. Nature of Illness/Injury	G. Type and Source of Injury/Illness: (1) Type: (2) Source:	

6. A. Accident Description (Describe in your own words) (Use additional paper if necessary)

- B. Who provided first aid and/or cleanup of mishap site?
- C. Any blood borne pathogen exposure by other than EMT's? If so who?
- D. Was site secured and witness interviews taken immediately?
- E. List OSHA and EM 385-1-1 standards/requirements that were violated?

7. Causal Factors (Explain yes answers on a supplementary sheet)	YES	NO
Design - Was design of facility, workplace, or equipment a factor?		
Inspection/Maintenance - Were inspection & maintenance procedures a factor?		
Persons Physical Condition - In your opinion, was the physical condition of the person a factor?		
Operating Procedures - Were operating procedures a factor?		
Job Practices - Were any job safety/health practices not followed when the accident occurred?		
Human Factors - Did any human factors such as size or strength of person etc. contribute to the accident?		

Environmental Factors - Did heat, cold, dust, sun, glare, etc., contribute to the accident?		
Chemical & Physical Agent Factors - Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents such as noise, radiation, etc., contribute to the accident?		
Office Factors - Did office setting such as lifting office furniture, carrying, stopping, etc., contribute to the accident?		
Support Factors - Were inappropriate tools/resources provided to properly perform the activity task?		
Personal Protective Equipment - Did the improper selection, use, or maintenance of personal protective equipment contribute to the accident?		
Drugs/Alcohol - In your opinion, were drugs or alcohol a factor?		
Activity Hazard Analysis - Was the lack of an adequate (IAW EM 385-1-1 Sec 01.A.09) Activity Hazard Analysis a contributing factor? - Was it site specific and address the type of work/operations performed when the mishap occurred?		
Management - Did the lack of adequate supervision contribute to the accident? - Was inadequate information provided at pre-con meeting?		
8. Training:		
A. Was/were person(s) trained to perform activity/task?		
B. Type of training?		
C. Date of most recent formal training? / /		D. List topics discussed
9. Fully Explain What Allowed or Caused The Accident, Include Direct and Indirect Causes:		
A. Direct Cause		
B. Indirect Cause		
C. Action(s) taken to prevent re-occurrences or provide on-going corrective actions		
D. Corrective Action Dates		

(1) Beginning (Mo/Da/Yr) _____	(2) Anticipated Completion Date (Mo/Da/Yr) _____	
10. OSHA		
A. Date OSHA was notified _____	C. Date of OSHA Citation _____	
B. Date OSHA Investigated _____	D. \$ Amount of Penalties: _____	
11. Report Preparer:		
Print Name & Title of Supervisor Completing Report: _____		
Signature: _____	Date (Mo/Da/Yr) _____	
12. Management Review (Contracting Officer)		
A. <input type="checkbox"/> Accepted	B. <input type="checkbox"/> Amendments Required	C. <input type="checkbox"/> Comments (include program improvements required for your Command. NAVFACHQ Construction Safety Program and EM 385-1-1)
D. Print Name & Title of Official Completing Report: _____		
Signature: _____		Date: (Mo/Da/Yr) _____
13. Safety And Occupational Health Officer Review		
A. <input type="checkbox"/> Concur	B. <input type="checkbox"/> Non Concur	C. <input type="checkbox"/> Additional Actions/Comments
D. Print Name & title of Safety Personnel Reviewing: _____		
Signature: _____		Date (Mo/Da/Yr) _____

OSHA's Form 301 Injury and Illness Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.



Revised approval OSHA 301 (2)

This *Injury and Illness Incident Report* is one of the forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 304, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____
 Title _____
 Date () - () - ()

Information about the employee

- 1) Full name _____
- 2) Street _____
 City _____ State _____ ZIP _____
- 3) Date of birth _____
- 4) Date hired _____
- 5) Male
 Female

Information about the physician or other health care professional

- 6) Name of physician or other health care professional _____
- 7) If treatment was given away from the workplace, where was it given?
 Facility _____
 Street _____
 City _____ State _____ ZIP _____
- 8) Was employee treated in an emergency room?
 Yes
 No
- 9) Was employee hospitalized overnight as an inpatient?
 Yes
 No

Information about the case

- 10) Case number from the Log _____ (Obtain the case number from the Log after you finish this case.)
- 11) Date of injury or illness () / () / ()
- 12) Time employee began work _____ AM / PM
- 13) Time of exit _____ AM / PM Check if time cannot be determined
- 14) **What was the employee doing just before the incident occurred?** Describe the activity, as well as tools, equipment, or material the employee was using. Be specific. Examples: "climbing a ladder to carry roof materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."
- 15) **What happened?** Tell us how the injury occurred. Examples: "When ladder slipped on wet floor, I fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."
- 16) **What was the injury or illness?** Tell us the part of the body that was affected and how it was affected—more specific than "hurt," "pain," or "sore." Examples: "strained back"; "chemical burn, hand"; "tunnel syndrome."
- 17) **What object or substance directly harmed the employee?** Examples: "concrete floor"; "chlorine (radia) area sign." If this question does not apply to the incident, leave it blank.
- 18) **If the employee died, when did death occur?** Date of death _____

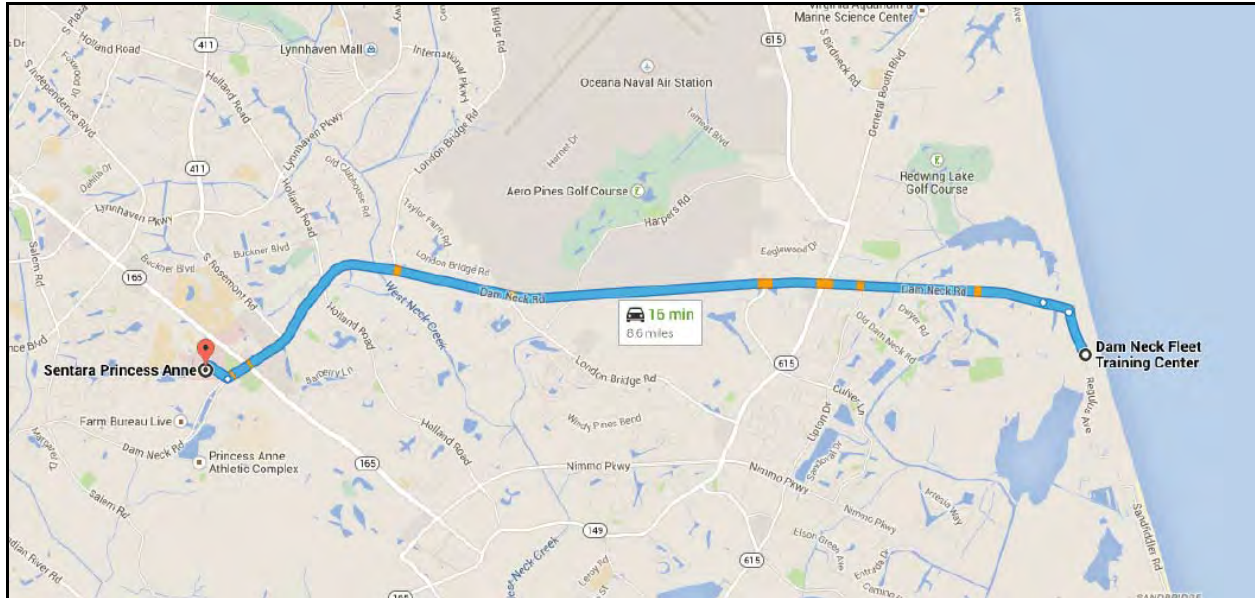
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Appendix D
Maps and Driving Directions to Local Hospitals

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Map and driving directions from Dam Neck Annex to Sentara Princess Anne Hospital



○ Dam Neck Fleet Training Center

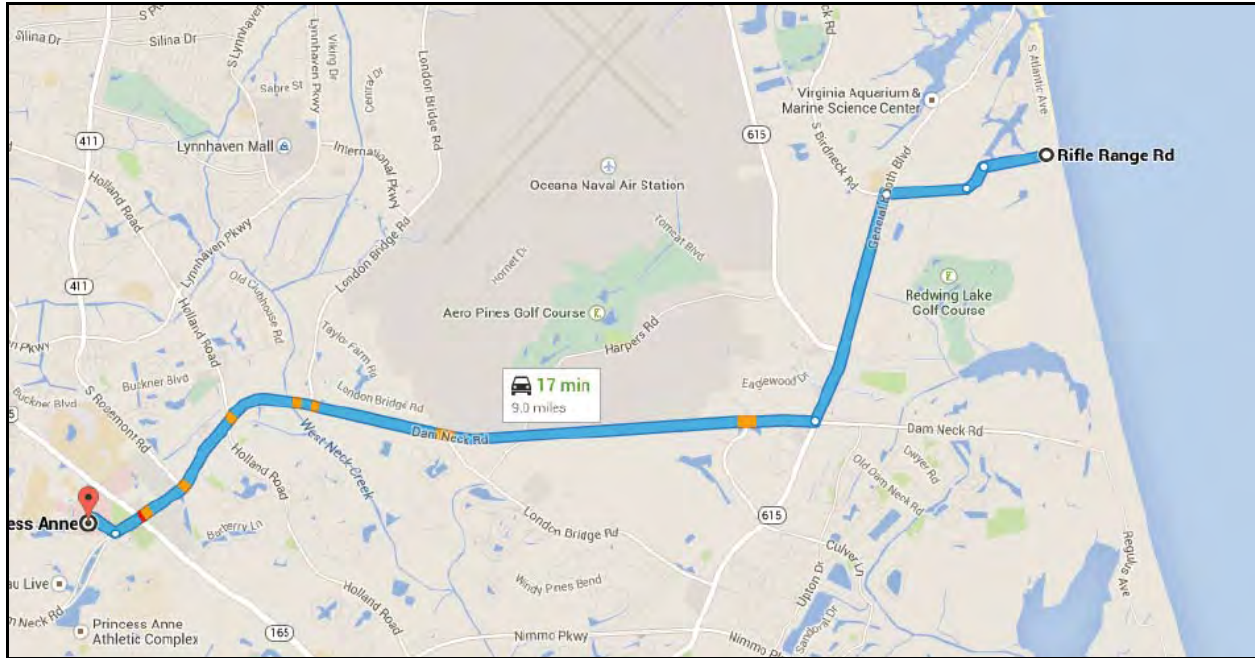
1912 Regulus Avenue, Virginia Beach, VA 23461

- ↑ 1. Head north on Regulus Ave toward Talos St
⚠ Restricted usage road
0.4 mi
- ↙ 2. Turn left onto Vanguard St
⚠ Restricted usage road
0.3 mi
- ↑ 3. Continue onto Dam Neck Rd
7.7 mi
- ↘ 4. Turn right onto Glenn Mitchell Dr
📍 Destination will be on the left
0.2 mi

◎ Sentara Princess Anne

1925 Glenn Mitchell Drive, Virginia Beach, VA 23456

Map and driving directions from Camp Pendleton to Sentara Princess Anne Hospital



○ Rifle Range Rd

Virginia Beach, VA 23461

1. Head west on Rifle Range Rd toward Regulus Ave
↑
▲ Restricted usage road
0.5 mi
2. Turn left at Jefferson Ave
↙
0.2 mi
3. Slight right onto S Birdneck Rd
↘
0.6 mi
4. Turn left onto General Booth Blvd
↙
1.8 mi
5. Turn right onto Dam Neck Rd
↘
5.7 mi
6. Turn right onto Glenn Mitchell Dr
↘
● Destination will be on the left
0.2 mi

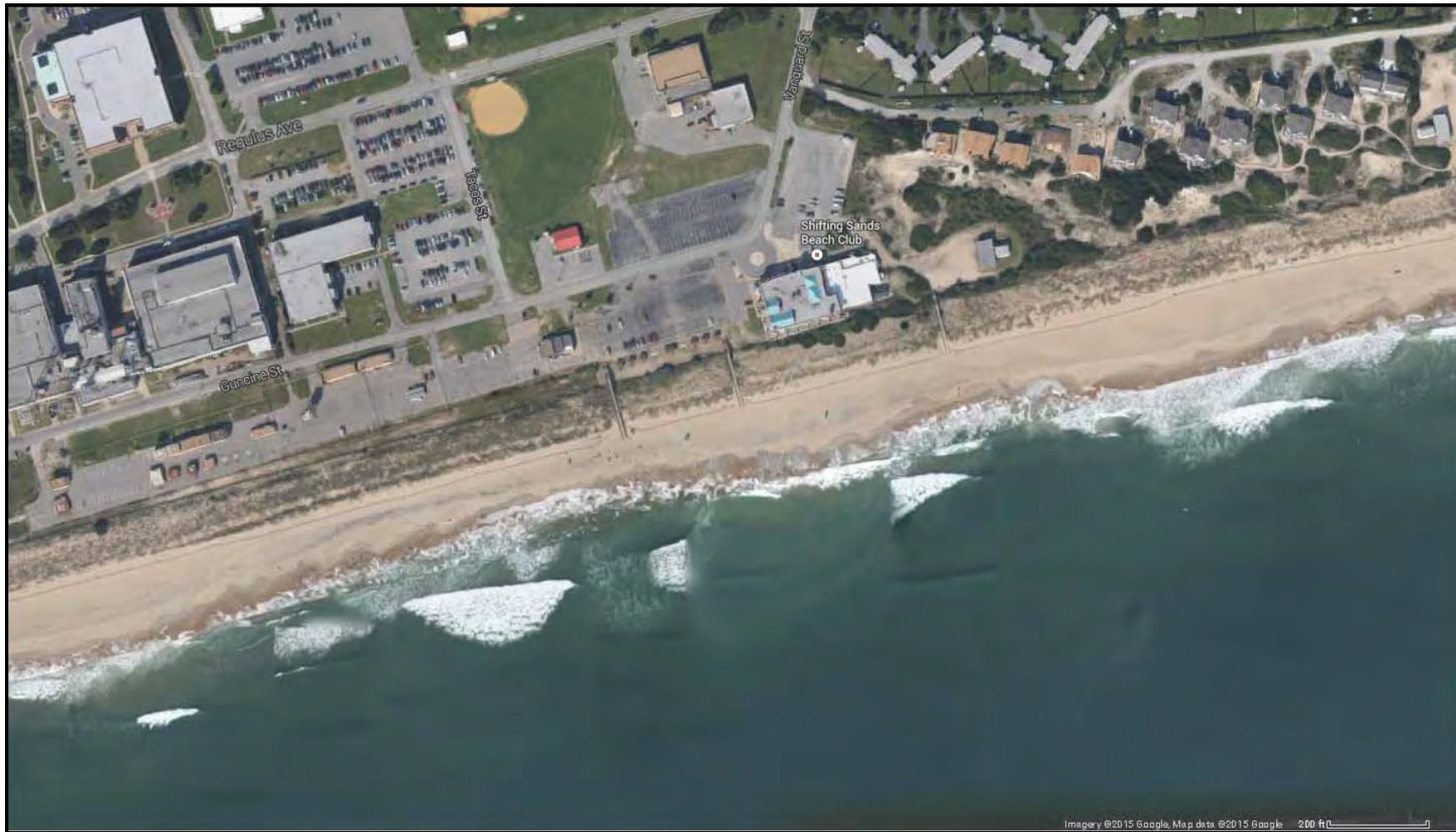
◎ Sentara Princess Anne

1925 Glenn Mitchell Drive, Virginia Beach, VA 23456

Appendix E
Maps and Driving Directions to Fresh Water and Restroom Facilities

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Location of nearest restroom and wash facilities on Dam Neck Annex.



Location of nearest restroom facilities on Camp Pendleton



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Appendix F
Activity Hazards Analysis

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Activity/Work Task: Lighting Survey for Sea Turtle Management		Overall Risk Assessment Code (RAC) (Use highest code)				M	
Project Location: Naval Air Station Oceana-Dam Neck Annex and VA Army National Guard Camp Pendleton		Risk Assessment Code (RAC) Matrix					
Contract Number: N62470-13-D-8017-WE04		Severity	Probability				
Date Prepared: 04/03/2015			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Brian Bishop / Project Manger		Catastrophic	E	E	H	H	M
Reviewed by (Name/Title): Mark Housand / Versar, Inc. Safety Manager		Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)		<p>Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)</p> <p>"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.</p> <p>"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible</p> <p>Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.</p>					
		RAC Chart					
		E = Extremely High Risk					
		H = High Risk					
		M = Moderate Risk					
		L = Low Risk					
Job Steps	Hazards	Controls				RAC	
General Safety	Slips, Trips and Falls	Use caution and pay particular attention to uneven and rough terrain while working on the site.				M	
	Muscle strain/ Back strain	Stretch muscles prior to working. Use proper methods for digging. Wear gloves. Stop work to rest if feeling strain or fatigue.				M	
	Wildlife	Avoid contact with wildlife. In case of animal bite, perform first aid and seek medical attention for bites from mammals or reptiles (snakes and lizards).				L	
	Insects	Utilize insecticide with DEET to eliminate mosquito bites, West Nile Virus and Lyme Disease. Treat clothing with Permethrin and allow appropriate amount of drying time prior to wearing the clothes.				M	
	Venomous Insect Stings/Bites	For minor stings/bites carefully remove stinger (if necessary) and wash area; apply dressing and cold pack. If the person seems to be having an allergic or anaphylactic reaction call 911 or Installation Emergency Response number.				M	
Walking on uneven ground	Trips, falls, sprains, broken bones, lacerations and contusions	Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles Slopes of 30 degrees or greater will be avoided. Climbing up or down vertical areas will be avoided				L	
Working near water	Stay cognizant of surf zone	Do not enter the water, stay cognizant of tides and surf Stay within eye sight of partner Wear high visibility vests				L	
Working at night	Hit by vehicles	Be observant while walking. Stay clear of oncoming traffic Wear high visibility vests				M	
Weather Hazards	Hypothermia	Watch for shivering, altered mental status. Care for life-threatening problems, get patient to a warm place if possible, remove wet clothing, warm patient slowly.				M	
	Heat Stress	Adjust work schedule to cooler hours of the day; Sufficient fluid intake; Monitor employees for heat related illness.				M	
	Sun Exposure	Besides head protection, use sunscreen of SPF 30 rating or better as protection against UVA and UVB. Reapply sunscreen often. Sunscreen should be no more than one year old. Wear sunglasses to protect eyes from UV exposure.				M	
Construction Areas	Struck by equipment, noise	Be observant Attend specialized orientation training Wear required PPE while inside construction zone				M	
Equipment to be Used		Training Requirements/Competent or Qualified			Inspection Requirements		
Long pants, shirt with sleeves		Only trained and authorized persons will use excavation equipment and power tools.			Pre-operation inspection on front end loader		
Hard hat, steel-toed boots, hearing protection is construction zones							
High visibility vests							
Designated Competent/Qualified Person(s):							
Brian Bishop							
Chris Lotts							
Susan Barco							
Sarah Rose							

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NASO DNA Restricted Access Coordination Area



Survey Area 1

Survey Area 2

Maneuver Training Area

Firing Range

Survey Area 3, with 3 potential subsections (A-north, B-center, C-south)

Firing Range

Firing Range

South of Red Line = Escort Required and must report to Building 301 via the installation main gate off of Dam Neck Blvd. Photo are NOT authorized in this area. Only under VERY special conditions will photos be authorized. DO NOT bring cameras, phones with cameras, IPads or other items with Camera like capabilities into this area. ***If you identify a must photo opportunity (e.g., T&E species) in a no PHOTO zone, take a point location and contact Mike Wright immediately.***

North of Red Line = An escort is NOT required and access to this area may be obtained via the Birdneck Road Gate. Photos are authorized in this area for individuals who obtain a photo authorization letter.

Orange Polygon is a Drone Launch Range. When active the beach will be posted with signs and lookout personnel that will deny access. Individuals can check to see if the range is active or is preparing to be active, before the range goes "hot" sometimes they will let personnel on official business access until they go "hot." There are also red flags posted on the two roads that surround the White Polygon that indicate the range is active.

Survey Area 4

Survey area 5

White Polygon is UXO Area. No Access without appropriately trained Explosive Safety Officer on site. Navy does not supply ESOs.



Attachment 2 Artificial Light Source and Fixture Descriptions

Source: Witherington, B. and R. E. Martin. 2003. Understanding, Assessing, and Resolving Light-Pollution Problem on Sea Turtle Nesting Beaches. FMRI Technical Report TR-2 Third Edition, Revised. Florida Fish and Wildlife Conservation Commission.

APPENDIX A

The following is a list of artificial light sources grouped by the level of disruption they are likely to cause sea turtles. The criteria used to group the sources came from studies of physiological spectral sensitivity (Granda and O'Shea, 1972), hatchling orientation with respect to laboratory light sources (Mrosovsky and Carr, 1967; Mrosovsky and Shettleworth, 1968; Mrosovsky, 1972; Witherington and Bjorndal, 1991a; Witherington, 1992b) and commercial light sources (Dickerson and Nelson, 1988, 1989; Witherington, 1989; Witherington and Bjorndal, 1991b; Ferreira *et al.*, 1992; Nelson, 1992; Witherington, 1992b), and spectral profiles of commonly used lamps (Anonymous, 1983; Rossotti, 1983; Anonymous, 1989; Witherington and Bjorndal, 1991b). Effects are described as being extremely disruptive, highly disruptive, moderately disruptive, or minimally disruptive.

White, broad-spectrum, short-arc lighting (*extremely disruptive*).—These light sources include xenon and mercury arc lamps and are the brightest and highest-energy light sources commonly used. They emit wavelengths rather evenly across the visible spectrum (which is why they appear white) and in the ultraviolet spectrum as well. They are used principally for temporary, intense lighting needs.

White, broad-spectrum, electric-discharge lighting (*extremely disruptive*).—Mercury-vapor, metal-halide, and fluorescent-tube lighting are included in this group. Like sources in the preceding group, these sources emit wavelengths across the visible spectrum. They are used both indoors and outdoors. Fluorescent-tube lighting is becoming more common as an indoor source and is frequently used to light porches and outdoor signs.

Color-phosphor and tinted-fluorescent lighting ("blacklight" ultraviolet, violet, blue, green, and mixtures of these colors) (*extremely disruptive*).—As revealed to some extent by their colors, these electric-discharge tube lamps emit light principally in the short-wavelength end of the visible spectrum. The so-called "blacklight"-type fluorescent tubes, however, emit much of their light in the near-ultraviolet region. These blacklight tubes appear as a dim violet color to humans but are very disruptive to sea turtle hatchlings. Blacklights are often used as insect attractants in insect-electrocuting "bug-zappers." Tubes of other colors are principally used for decorative applications.

White, broad-spectrum, incandescent lighting (*extremely disruptive*).—Light emitted from incandescent sources comes from a glowing filament. This group includes quartz-tungsten-halogen and simple tungsten-filament sources. Without tinting, these sources emit wavelengths throughout the visible spectrum but less so in the short-wavelength end of the spectrum than the sources described above. Incandescent sources are commonly used as outdoor

floodlights, as indoor lighting (*i.e.*, the common light bulb), and as transient lighting (flashlights, lanterns, and electric torches).

Color-tinted incandescent lighting (blue and green) (*extremely disruptive*).—These colored sources are tinted so that they emit principally short-wavelength light; they are often used in decorative applications.

White, pressurized-fuel, glowing-element lanterns (*extremely disruptive*).—These portable lanterns are used for camping, fishing, and other transient nighttime activities.

High-pressure sodium vapor (HPS) lighting (*highly disruptive*).—HPS sources emit light with minor wavelength peaks in the blue and green regions and major peaks in the yellow and orange regions of the visible spectrum. The color of HPS sources is whitish golden to peach. Although less disruptive than the broad-spectrum white sources above, HPS is one of the most commonly used outdoor light sources in the USA and many other countries and is one of the most common causes of hatchling misorientation and mortality.

Open fires (*moderately to highly disruptive*).—Although fires are temporary light sources and emit less short-wavelength light than the sources above, they have been documented as a significant source of hatchling mortality. Unlike other attractive light sources, fires can kill hatchlings quickly (hatchlings are known to crawl into fires and die). The size and temperature of a fire determines how attractive it is to hatchlings.

Yellow-phosphor and amber-tinted fluorescent lighting and red tubes (*moderately disruptive*).—Yellow and amber fluorescent tubes emit principally red, yellow, and green wavelengths but do not exclude light in the blue region of the spectrum as well as yellow incandescent bulbs do. Yellow and amber fluorescent tubes are not generally marketed as "bug lights." Although they are more disruptive to

sea turtles than yellow incandescent bulbs, yellow and amber fluorescents are far better than white or other colored tubes for use near nesting beaches. However, the hue of these yellow fluorescent lamps varies between manufacturers and can have a varied effect on sea-finding in hatchlings. Red tubes are typically used for decoration and can be of two types: red (or reddish), phosphor-fluorescent tubes and red, neon tubes. Reddish or red-purple fluorescent tubes can be very disruptive, depending upon the amount of short-wavelength light that they emit (purplish lights emit both blue and red light). Neon tubes are covered below.

Lamps with yellow or orange dichroic long-pass filters (*minimally to moderately disruptive*).—Because these filters are very good at attenuating short wavelengths, the type of lamp used with them matters little. Consequently, these filters may allow the use of lamps like metal-halide and HPS that have small and easily focused elements. These lamps can be used in more directional fixtures in order to reduce stray light. Dichroic filters are not standard off-the-shelf accessories for commercial fixtures but they have been used in some outdoor applications near nesting beaches.

Color-tinted incandescent lighting (yellow and red) (*minimally to moderately disruptive*).—Yellow or amber incandescent light bulbs (bug lights) are generally only weakly attractive to hatchlings for the same reason that they attract few insects — they emit little short-wavelength light. Although they are minimally disruptive for the most part, bug lights can interfere with sea-finding if they are numerous, of high wattage, or close to the nesting beach. Red-tinted incandescent sources are more variable in color than bug lights. Some red sources can turn purple or pinkish over time (an indication of greater short-wavelength emission) and become more attractive to hatchlings.

Low-pressure sodium vapor (LPS) lighting (*minimally disruptive*).—LPS is by far the least disruptive light source among those commonly used. LPS sources emit a light that is pure (monochromatic) yellow, a region of the spectrum that is only weakly attractive or even aversive (at higher intensities for loggerheads only) to orienting hatchlings. Because

LPS sources have poor color rendition, they are used principally for outdoor applications.

Red light-emitting diode (LED) lighting (*minimally disruptive*).—LEDs are miniature lamps that are not commonly used outdoors. In the future, LEDs may be used to a greater extent as sign lighting and pathway lighting. Red LEDs come close to being ideal for use near sea turtle nesting beaches. Red LEDs emit a pure-red light that does not vary in color over the life of the lamp, and because they are small, they light only a limited area. They are easy to hide from the beach and have a very long life. Green and amber LEDs are marketed but are much less preferred than red.

Neon tubes (*minimally disruptive*).—True neon tubes (not tinted tubes) are a pure-red light source. At present, neon is used almost exclusively for decorative purposes. Neon tubes can be difficult to shield, but their color makes them minimally disruptive. Potential applications include pathway and ground-level lighting.

Transient light sources (flashlights, electric torches, flash photography) (*disruptive characteristics vary*).—This lighting is placed in a separate category because it is generally in use for relatively short time periods. Most of these sources have white incandescent lamps and can be expected to affect sea turtles as the incandescent sources above do. Transient sources are well-known disruptors of sea-finding behavior in hatchlings and adults, but researchers are less certain about how transient sources may affect nesting turtles or those emerging from the ocean to nest. Many workers in the field believe that flashlights and flashes from cameras can turn emerging turtles back to the sea and alter the behavior of nesting turtles. Until additional evidence suggests otherwise, transient light sources should be used sparingly on sea turtle nesting beaches. If handheld lighting is to be used, deep-red filters should be fastened over the lens of the source. Red light appears much brighter to humans than it does to sea turtles and does not degrade the night vision of people using it. People using red light are able to acclimate to the dark, and most are surprised by how well they can see by starlight and moonlight alone.

APPENDIX E

Diagrams of common lighting fixtures showing mounting position, light distribution, and overall suitability for use near sea turtle nesting beaches. For purposes of recommending suitable mounting distances from nesting beaches, the crest of the primary dune is considered to be the landward limit of the beach. Fixtures are assessed for their suitability in minimizing direct and indirect lighting of the beach. For all fixtures, glowing portions of luminaires (including reflectors and globes) should not be visible from the nesting beach.

WALL-MOUNTED AREA LIGHTING

MOUNTING SUITABILITY:

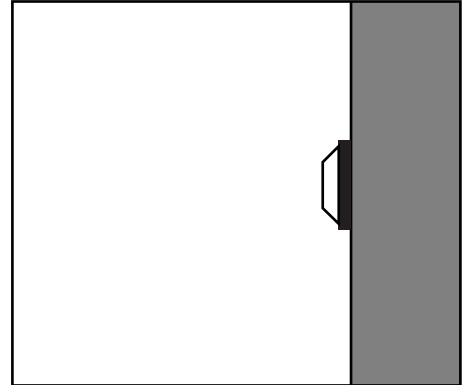
Poor. Very poor when mounted on upper stories.

DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Poor. Not suitable for the beach sides of buildings.



WALL-MOUNTED AREA LIGHTING, "WALL PAK"

MOUNTING SUITABILITY:

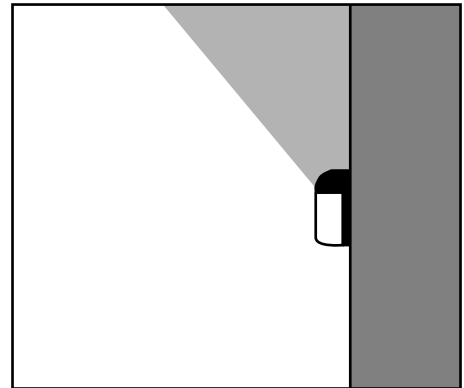
Poor. Very poor when mounted on upper stories.

DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Poor. Not suitable for the beach sides of buildings.



DECORATIVE CUBE LIGHT

MOUNTING SUITABILITY:

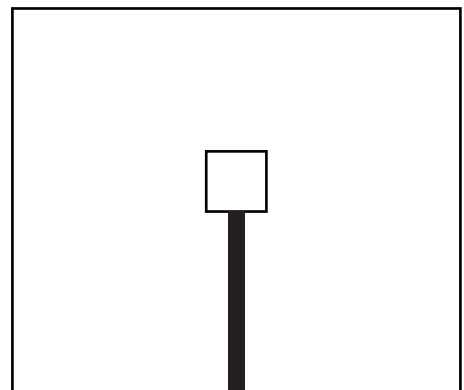
Fair if mounted at heights lower than 2 m. Poor if mounted higher.

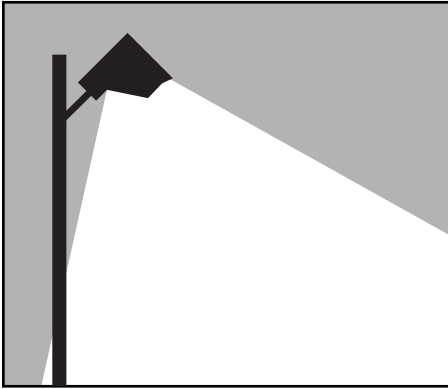
DIRECTIONAL SUITABILITY:

Very poor.

OVERALL SUITABILITY:

Very poor. This fixture is difficult to shield and should not be used near nesting beaches.





POLE-MOUNTED FLOODLIGHTING WITH FULL VISOR

MOUNTING SUITABILITY:

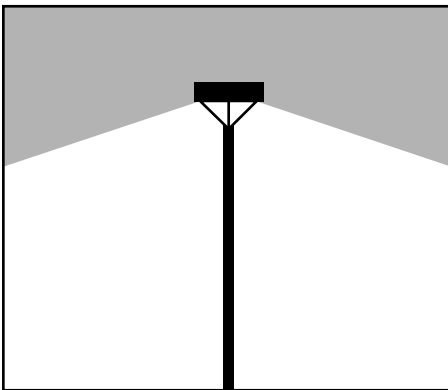
Good if directed downward and away from the beach.

DIRECTIONAL SUITABILITY:

Good.

OVERALL SUITABILITY:

Good if directed downward and away from the nesting beach and if light does not illuminate objects visible from the beach.



POLE-TOP-MOUNTED CUTOFF LIGHTING, "SHOEBOX" FIXTURE

MOUNTING SUITABILITY:

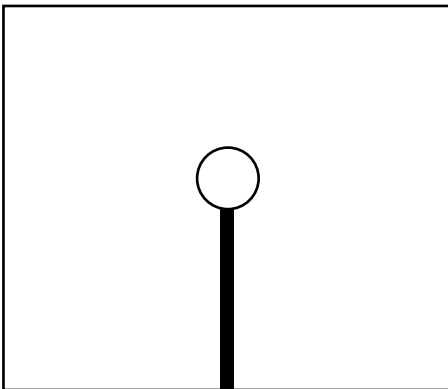
Good to poor, depending on mounting height. Mounting height should be no more than 5 m within 100 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Fair to good, as determined by reflectors.

OVERALL SUITABILITY:

Fair to good when mounting heights are low.



DECORATIVE GLOBE LIGHT

MOUNTING SUITABILITY:

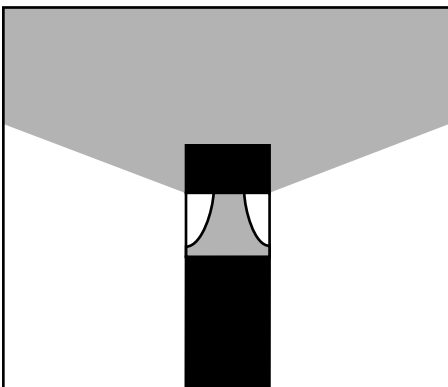
Fair if mounted at heights lower than 2 m. Poor if mounted higher.

DIRECTIONAL SUITABILITY:

Very poor.

OVERALL SUITABILITY:

Very poor. This fixture is difficult to shield and should not be used near nesting beaches.



LIGHTING BOLLARD WITH HIDDEN LAMP

MOUNTING SUITABILITY:

Good if mounting height is near 1 m.

DIRECTIONAL SUITABILITY:

Poor to fair.

OVERALL SUITABILITY:

Fair. Good if additional shields on the beach side of the fixture are used.

LOW-LEVEL “MUSHROOM” LIGHTING

MOUNTING SUITABILITY:

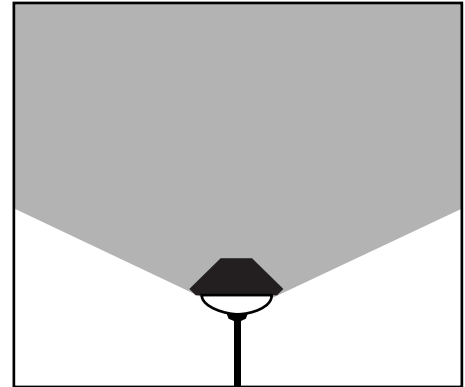
Good if mounted at foot level.

DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Fair. Good to excellent if used so that vegetation and topography block its light from the beach.



LOW-LEVEL “TIER” LIGHTING

MOUNTING SUITABILITY:

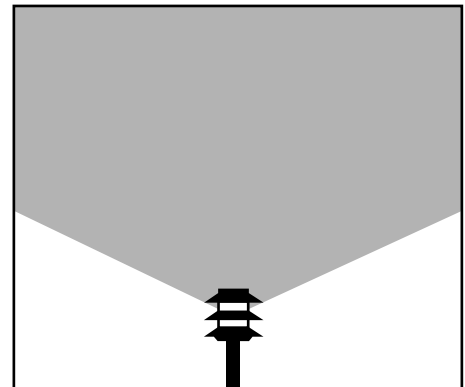
Good if mounted at foot level.

DIRECTIONAL SUITABILITY:

Poor but can be good if the fixture has louvers that eliminate lateral light.

OVERALL SUITABILITY:

Fair. Good to excellent if used so that vegetation and topography block its light from the beach.



LIGHTING BOLLARD WITH LOUVERS

MOUNTING SUITABILITY:

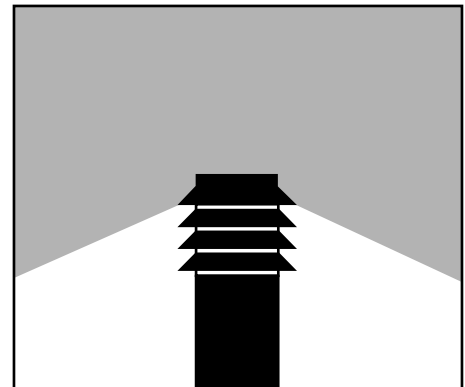
Good if mounting height is near 1 m.

DIRECTIONAL SUITABILITY:

Good.

OVERALL SUITABILITY:

Good.



GROUND-MOUNTED FLOODLIGHTING

MOUNTING SUITABILITY:

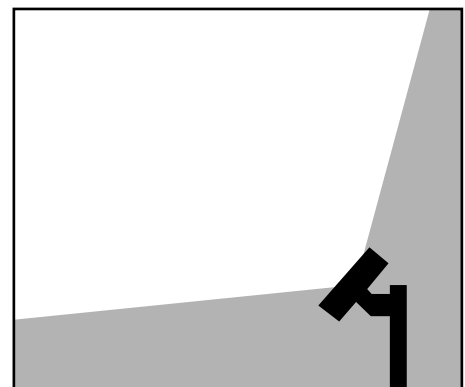
Poor, because of its upward aim.

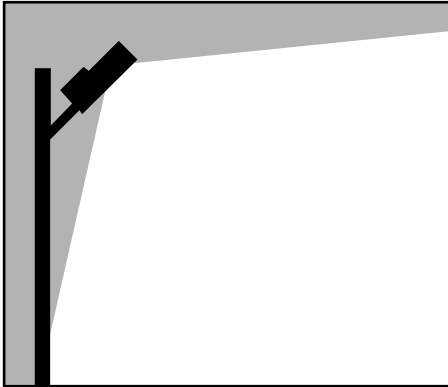
DIRECTIONAL SUITABILITY:

Fair to good.

OVERALL SUITABILITY:

Fair to poor if directed away from the beach. Very poor if directed toward the beach.





POLE-MOUNTED FLOODLIGHTING

MOUNTING SUITABILITY:

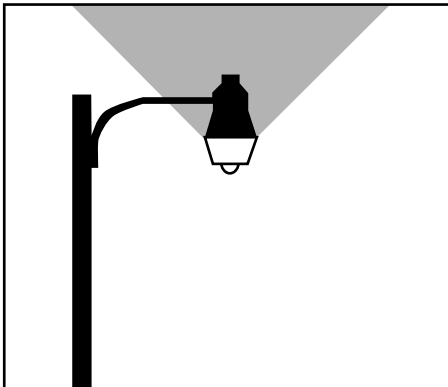
Fair if directed downward and away from the beach.

DIRECTIONAL SUITABILITY:

Fair to good.

OVERALL SUITABILITY:

Fair to good if aimed downward and directly away from the nesting beach and if light does not illuminate objects visible from the beach. Otherwise, poor to very poor.



ARM-MOUNTED AREA LIGHTING, "OPEN-BOTTOM" OR "BARN LIGHT" FIXTURE

MOUNTING SUITABILITY:

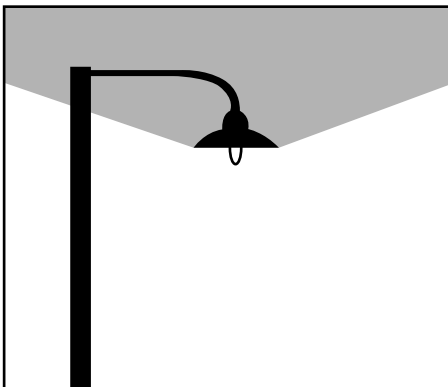
Poor to very poor, depending upon mounting height. Should not be mounted higher than 5 m within 150 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Poor if unshielded. Fair if shielded.

OVERALL SUITABILITY:

Poor.



ARM-MOUNTED AREA LIGHTING, DECORATIVE "PENDANT" FIXTURE

MOUNTING SUITABILITY:

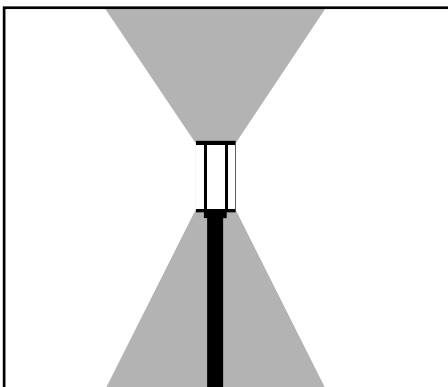
Poor to very poor, depending upon mounting height. Should not be mounted higher than 5 m within 150 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Poor. Difficult to shield properly.

OVERALL SUITABILITY:

Poor.



DECORATIVE "CARRIAGE" LIGHTING

MOUNTING SUITABILITY:

Fair if mounted at heights lower than 2 m. Poor if mounted higher.

DIRECTIONAL SUITABILITY:

Very poor. Fair if properly shielded.

OVERALL SUITABILITY:

Poor.

ARM-MOUNTED CUTOFF LIGHTING, "SHOEBOX" FIXTURE

MOUNTING SUITABILITY:

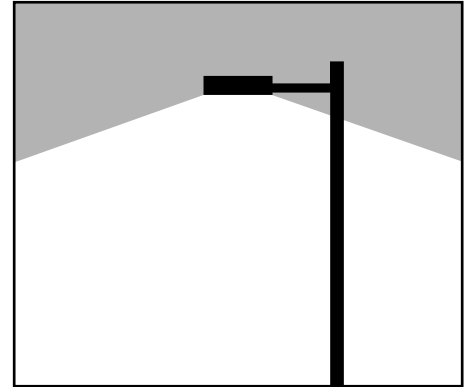
Good to poor, depending on mounting height. Mounting height should be no more than 5 m within 100 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Fair to good, as determined by reflectors.

OVERALL SUITABILITY:

Fair to good when mounting heights are low and fixtures are aimed directly downward.



ARM-MOUNTED AREA LIGHTING, "COBRAHEAD" FIXTURE

MOUNTING SUITABILITY:

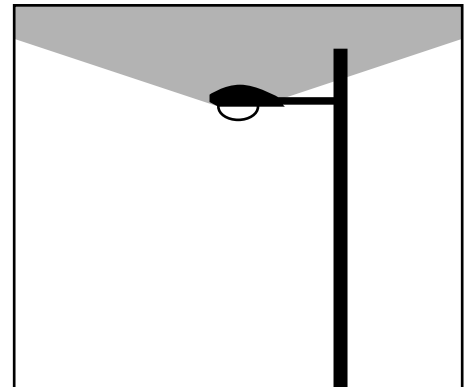
Poor to very poor, depending on mounting height. Mounting height should be no more than 5 m within 150 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Poor. Difficult to shield properly.

OVERALL SUITABILITY:

Poor.



ARM-MOUNTED AREA LIGHTING, "FLAT-FACE" CUTOFF FIXTURE

MOUNTING SUITABILITY:

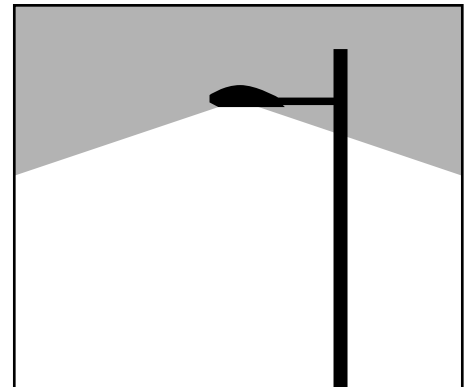
Good to poor, depending on pole height. Mounting height should be no more than 5 m within 100 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Fair to good, as determined by reflectors.

OVERALL SUITABILITY:

Fair to good when mounting heights are low.



SIGN LIGHTING, BOTTOM-UP STYLE

MOUNTING SUITABILITY:

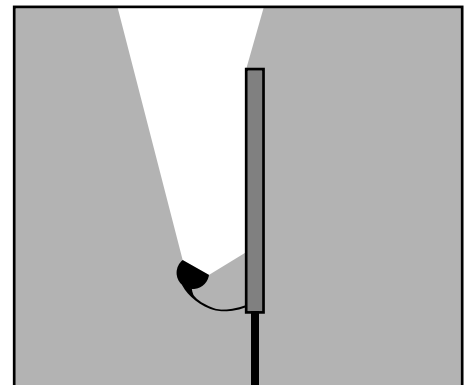
Poor, because of its potential for producing uplight scatter.

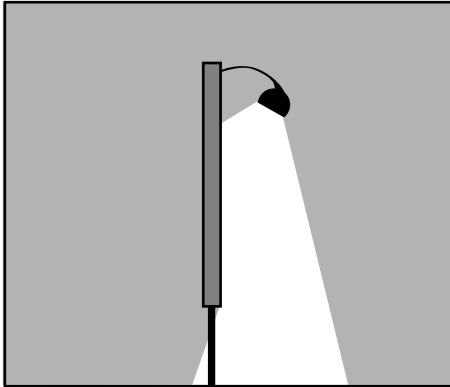
DIRECTIONAL SUITABILITY:

Poor to good.

OVERALL SUITABILITY:

Poor. Signs near nesting beaches should be lighted from the top down. In no case should lighted signs be visible from the beach.





SIGN LIGHTING, TOP-DOWN STYLE

MOUNTING SUITABILITY:

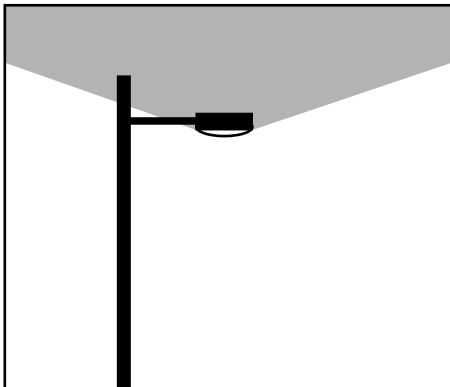
Good.

DIRECTIONAL SUITABILITY:

Poor to good.

OVERALL SUITABILITY:

Generally good if the sign is not visible from the beach and if the lighting is well aimed.



ARM-MOUNTED AREA LIGHTING, FIXTURES WITH REFRACTING GLOBES OR CONVEX LENSES

MOUNTING SUITABILITY:

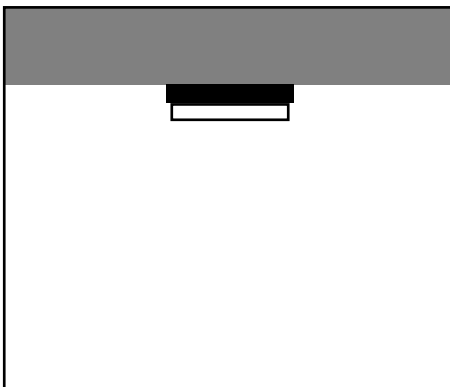
Poor to very poor, depending upon mounting height. Mounting height should be no more than 5 m within 150 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Poor. Fair to good if shielded properly.

OVERALL SUITABILITY:

Poor.



CEILING-MOUNTED AREA LIGHTING, FIXTURES WITH REFRACTING GLOBES OR CONVEX LENSES

MOUNTING SUITABILITY:

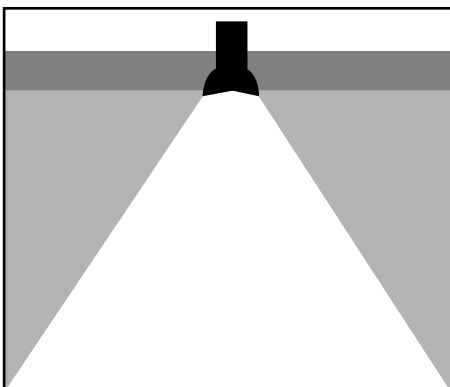
Poor if mounted on the beach sides of buildings or on upper stories. Good if shielded from the beach by buildings.

DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Poor to fair, depending upon mounting location.



CEILING-RECESSED DOWNLIGHTING WITH BAFFLES TO ELIMINATE LATERAL LIGHT

MOUNTING SUITABILITY:

Good to excellent when mounted in lower-story ceilings and soffits.

DIRECTIONAL SUITABILITY:

Excellent.

OVERALL SUITABILITY:

Good to excellent.

**WALL-MOUNTED AREA LIGHTING,
“JELLY-JAR” PORCH LIGHT FIXTURE**

MOUNTING SUITABILITY:

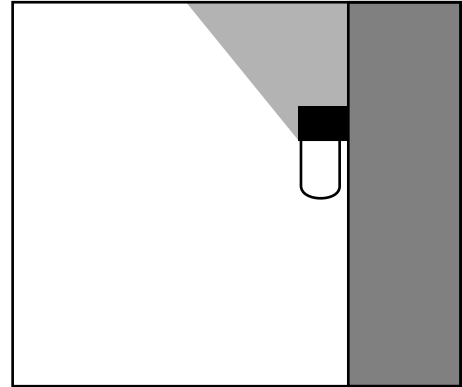
Poor. Very poor when mounted on upper stories.

DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Poor.



LINEAR TUBE LIGHTING

MOUNTING SUITABILITY:

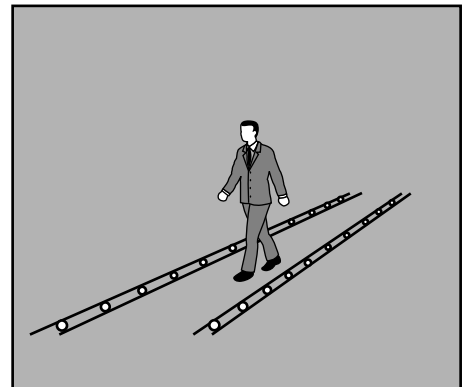
Excellent if mounted at foot level.

DIRECTIONAL SUITABILITY:

Fair to poor, but this lighting is of concern only if mounted high or if large numbers of high-wattage (>3 W) lamps are used.

OVERALL SUITABILITY:

Excellent if low-wattage strips are used sparingly in recessed areas.



LOUVERED STEP LIGHTING

MOUNTING SUITABILITY:

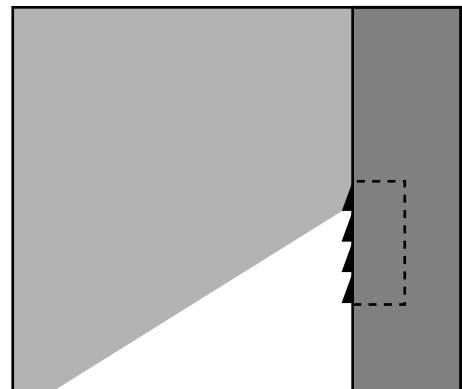
Excellent if mounted at foot level.

DIRECTIONAL SUITABILITY:

Excellent.

OVERALL SUITABILITY:

Excellent.



WALL-MOUNTED DOWNLIGHTING

MOUNTING SUITABILITY:

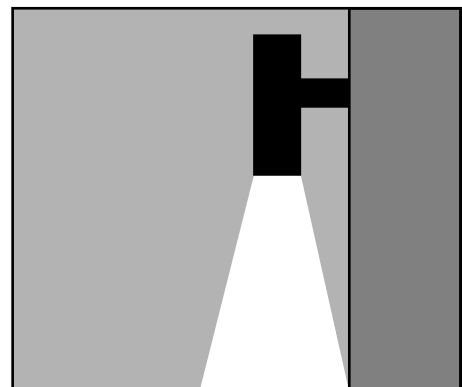
Good to excellent when mounted on lower-story walls.

DIRECTIONAL SUITABILITY:

Excellent.

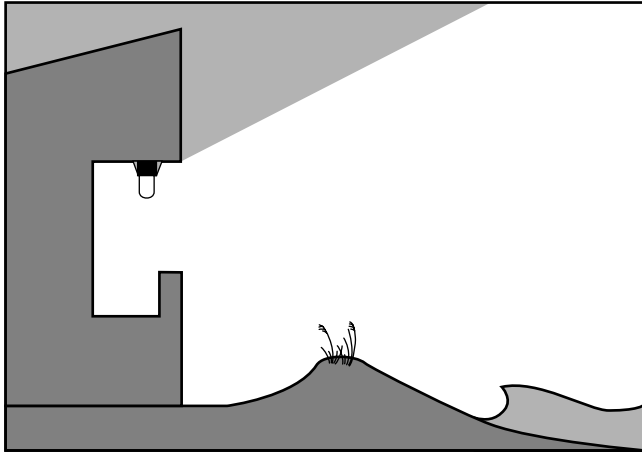
OVERALL SUITABILITY:

Good to excellent.



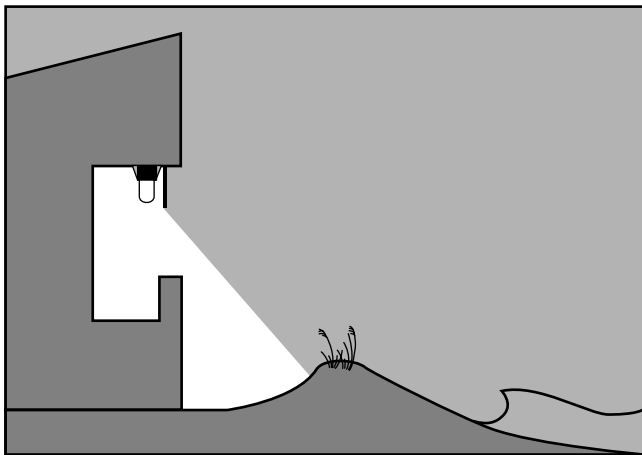
APPENDIX F

Diagrams depicting solutions to two common lighting problems near sea turtle nesting beaches:
balcony or porch lighting and parking-lot lighting.



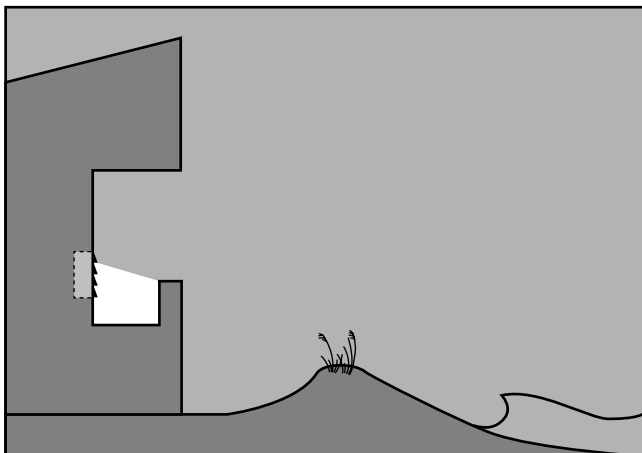
POOR

Poorly directed balcony lighting can cause problems on sea turtle nesting beaches.



BETTER

Completely shielding fixtures with a sheet of metal flashing can reduce stray light reaching the beach.

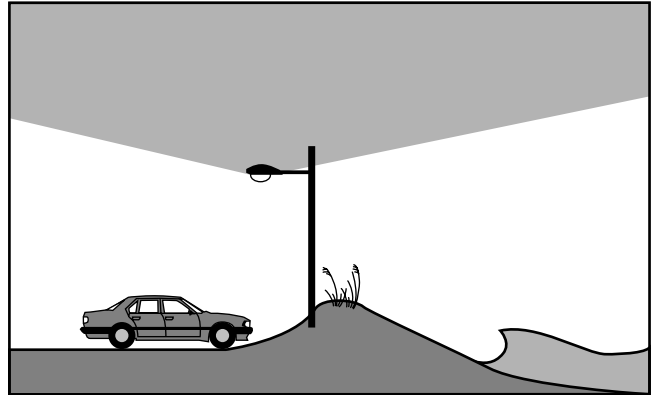


BEST

Louvered step lighting is one of the best ways to light balconies that are visible from nesting beaches.

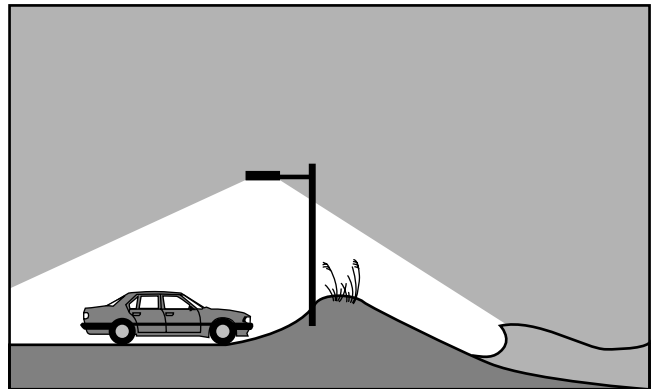
POOR

Poorly directed parking lot lighting can cause problems on sea turtle nesting beaches.



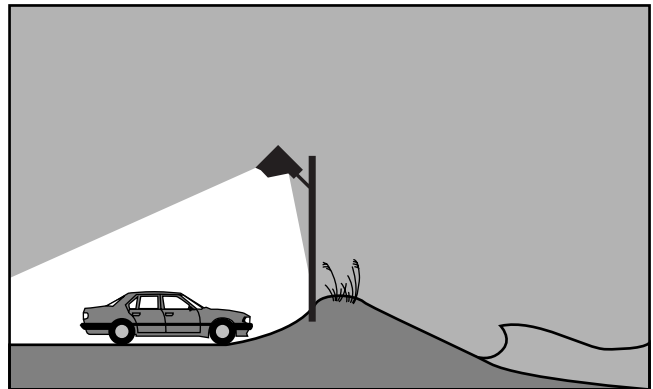
BETTER

Fixtures with 90° cutoff angles can reduce the amount of stray light reaching the beach.



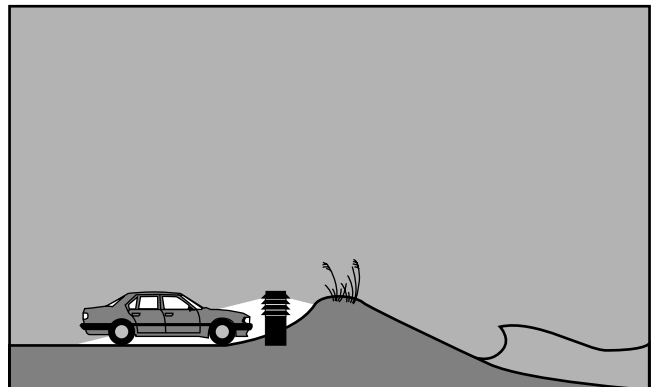
MUCH BETTER

Fully hooded floods can direct light accurately and reduce stray light even more.



BEST

Low-mounted, louvered bollard fixtures are the best way to light parking lots near nesting beaches.




Appendix K


Nest Management Units of NASO Dam Neck Annex

NASO DNA Sea Turtle Nest Management Reference Map (Rev Aug 2015)


Legend

 Installation Boundary Line

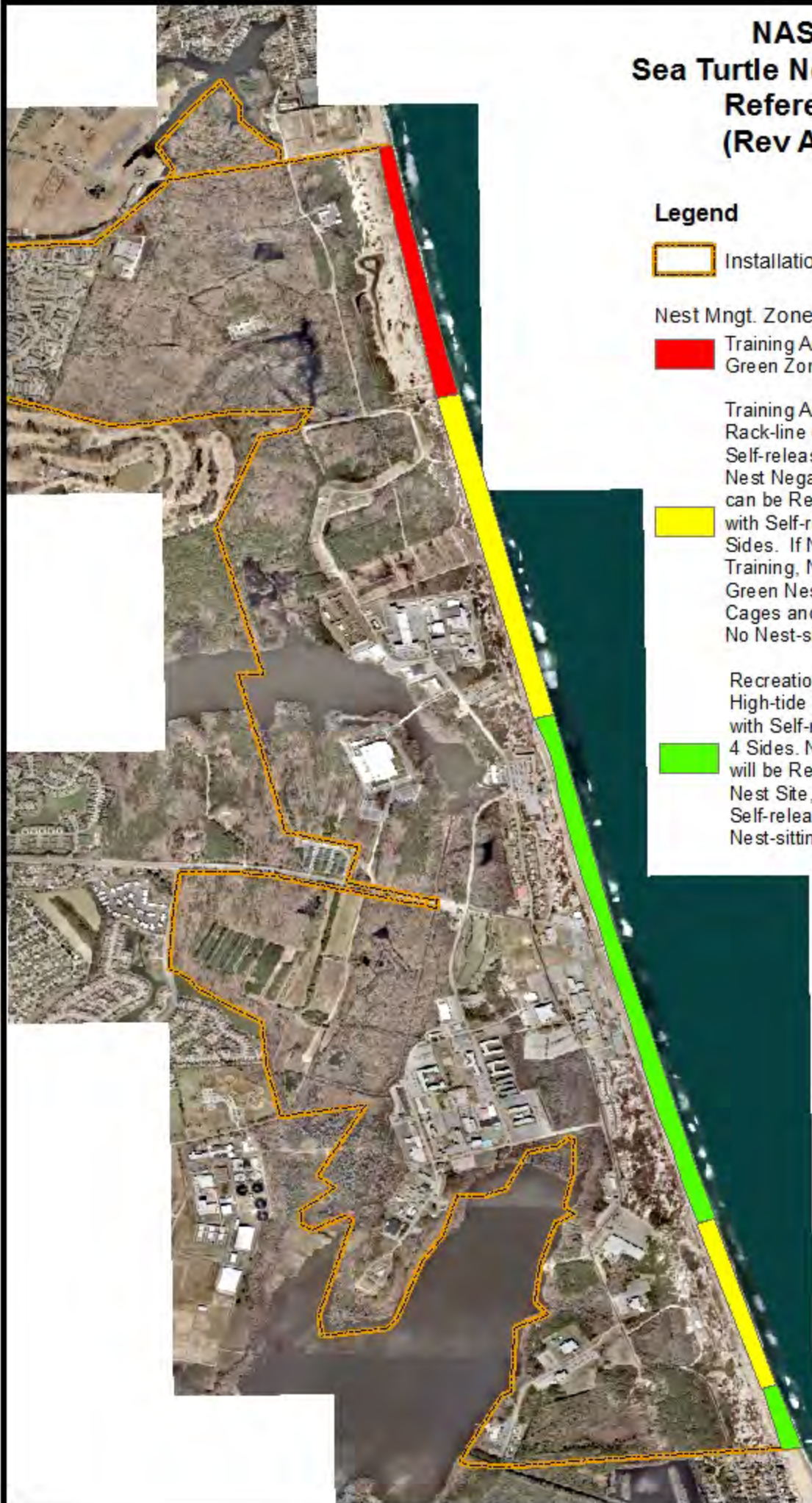
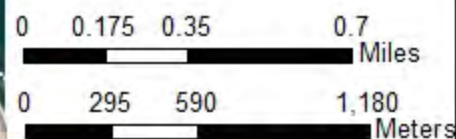
Nest Mngt. Zones

 Training Area. Nests to be Relocated to a Green Zone.

Training Area. Nest Above High-tide Rack-line can be Left in Place with Self-release Cage and Posts on All 4 Sides. Nest Negatively-Inhibiting Training Routes can be Relocated West, Closer to Duneline, with Self-release Cage and Posts on All 4 Sides. If Number of Nests Negatively Inhibit Training, New Nests will be Relocated to Green Nest Mngt. Zones with Self-release Cages and Posts on All 4 Sides. No Nest-sitting.

 Training Area. Nest Above High-tide Rack-line can be Left in Place with Self-release Cage and Posts on All 4 Sides. Nest below High-tide Rack-line will be Relocated Due West of the Original Nest Site, Above the Rack-line with Self-release Cage and Posts on All 4 Sides. Nest-sitting is Authorized.

Recreational Use Area. Nest Above High-tide Rack-line can be Left in Place with Self-release Cage and Posts on All 4 Sides. Nest below High-tide Rack-line will be Relocated Due West of the Original Nest Site, Above the Rack-line with Self-release Cage and Posts on All 4 Sides. Nest-sitting is Authorized.



Appendix L

Project Review SOP

Review each project proposed in the INRMP or by the installation or tenant of the installation (Env. Checklist Reviews, Site Approval Reviews, Site Work Induction Board Project Reviews, Work Permits, etc.) for potential concerns associated with Sea Turtles.

Federally Listed Threatened and Endangered Sea turtles utilize the beaches and nearshore environment of NASO Dam Neck Annex. These species are influenced/impacted by lights utilized at night. During the months of Apr-Sept no Bright Lights should be utilized at night to avoid conflicts with Nesting or hatching Sea Turtles at night. If light utilization is required at night at this facility, lights should be outfitted with devices to minimize eastwardly shine and direct the glow of the light downwards not outward. Lighting should be kept to a minimum and not exceed the current glow/intensity currently seen from the beach/ocean.

A lighting Assessment is to be awarded in FY15 along with a total Sea Turtle Biological Assessment (BA) for the 4 miles of NASO DNA beach front property. A programmatic USFWS Biological Opinion (BO) is anticipated to be received pending submittal of the BA. The lighting assessment will be inserted into Appendix J of this document (Sea Turtle SOP). The BO will be added to Appendix A of this document (Sea Turtle SOP). The information and materials in Appendix J and A will be utilized as appropriate to advise facilities management of existing facility modifications that need to be made and for advising requirements for future projects on the installation to maintain compliance under the endangered species act.

Training missions and recreational beach utilization during breeding season.

All individuals conducting training in the LCAC training area of the installation should receive training on sea turtle and sea turtle crawl identification. If a turtle or crawl is observed, the activity should stop, the Installation Natural Resources Manager (INRM) should be notified immediately via the Command Duty Officer, and the activity should not resume until the INRM has cleared the site for training to continue.

Nesting sea turtle surveys are conducted on all NASO DNA beaches (4 miles) each day during sea turtle nesting season (15 May - 31 Aug annually). Surveys start 1/2 hour before sunrise and typically end (if nothing is found) 1 to 2 hours later. If a sea turtle nest/crawl is found it must be cordoned off and USFWS (until Navy obtains appropriate permits) must come to collect biological data and relocate the nest if conditions dictate that relocation is warranted; otherwise the nest is caged, marked and left on site (and monitored each day until it has hatched).

These surveys allow us to clear the beaches to allow maximum training opportunities within the constraints of the law.

Daily sand smoothing activities (e.g., MWR beach clean-up) should occur immediately after the NASO Environmental Staff has completed their patrol and cleared the beach for daily use. No smoothing activities are authorized from dusk until morning turtle patrols are completed daily from 15 May - 31 Aug, unless prior coordination and authorizations have been made with the CO's designated INRM.

Fires are not authorized on the beach at Night, from May - October.

Outdoor lighting should be kept to a minimum at Night, from May-October. Use of lighting on the beach should be restricted to red-light conditions (e.g., red lenses, or white lights that have been covered with red film/tape), unless there is an emergency.

Appendix B

Final Report, Lighting Surveys for Sea Turtle Nest Management, Naval Air Station Oceana – Dam Neck Annex and Virginia Army National Guard Camp Pendleton, Virginia Beach, Virginia

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FINAL REPORT

Lighting Surveys for Sea Turtle Nest Management

Contract # N62470-13-D-8017, Task Order WE04

Naval Air Station Oceana – Dam Neck Annex and Virginia Army
National Guard Camp Pendleton, Virginia Beach, Virginia

January 2016

FINAL REPORT

Lighting Surveys for Sea Turtle Nest Management

Contract # N62470-13-D-8017, Task Order WE04

Prepared for:



Naval Facilities Engineering Command – MIDLANT

N62470-13-D-8017, Task Order WE04, 23 Jan 2015

Recommended Citation:

Department of the Navy. 2016. Lighting surveys for sea turtle nest management, Naval Air Station Oceana – Dam Neck Annex and Virginia Army National Guard Camp Pendleton, Virginia Beach, Virginia. Draft report. Prepared for Naval Facilities Engineering Command, Mid-Atlantic Region by GMI-AECOM Joint Venture; Versar, Inc.; Azura Consulting, LLC; and Virginia Aquarium & Marine Science Center Foundation.

EXECUTIVE SUMMARY

Artificial night lighting is known to negatively impact many wildlife species and can lead to changes in orientation, disorientation, and attraction or repulsion from illuminated areas. Light pollution along shorelines is particularly detrimental to sea turtles which almost exclusively nest and hatch at night. Artificial illumination on or near nesting beaches can deter adult females from emerging from the water, affect nest site selection, disrupt the seaward orientation of adult females after nesting, and disrupt the seaward orientation of hatchlings after emergence from the nest.

Five federally threatened or endangered sea turtle species are known to occur in the Chesapeake Bay and along the Virginia coastline: the leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), green (*Chelonia mydas*), and hawksbill (*Eretmochelys imbricata*) turtles. Sea turtles occur in Virginia waters from May through October or early November although a few strandings have been recorded as early as April and as late as December. Nesting occurs during the spring and summer months, particularly June, July, and August. Loggerhead and Kemp's ridley turtles have nested on Naval Air Station Oceana – Dam Neck Annex (NASO-DNA). One green turtle nest has been recorded on Sandbridge Beach just south of NASO-DNA. No sea turtle nests have been documented on Virginia Army National Guard – Camp Pendleton (VAARNG-CP).

Daytime and nighttime surveys were conducted on NASO-DNA and VAARNG-CP from April through October 2015 to identify artificial lighting sources that emit light visible from the beaches of these installations. Surveys were conducted along the beach face and behind the rear dunes to locate direct light sources (e.g., lamps, globes, reflectors) and indirect lights that reflect off buildings and other objects.

A total of 236 direct, indirect, and other light sources expected to have an impact if turned on were visible from the beaches on NASO-DNA, while 3 sources were visible from VAARNG-CP beaches. Expected light sources are those that were not on at the time of surveys, but it was determined to be reasonably certain that when on they would produce either a direct or indirect impact. These were classified as “Direct-if on” if the fixtures could be seen from the beach or “Indirect-if on” if factors such as their height and proximity to the beach, they were located near similar light sources that were classified as indirect, or it was apparent that they would likely illuminate structures that were visible from the beach. An additional 36 light sources were identified on NASO-DNA that were relatively close to beaches but their specific impact could not be determined. These lights were not on during surveys and were either located in areas that had no other lights turned on to use as a frame of reference or the light intensity was not known in order to determine if they would produce enough light to illuminate adjacent building walls or other objects that are visible over the dunes.

The majority of light sources identified at NASO-DNA were elevated fixtures such as street, parking lot, and stadium lights around sports fields that rise above the dunes and scatter light over a wide area. Other sources included wall-mounted area and flood lights located on upper levels of buildings and areas of concentrated light sources that created localized sky glow. Common lamp types included high-pressure sodium lamps and white broad-spectrum lamps; both lamp types are known to be highly or extremely disruptive to sea turtles. The lights identified at VAARNG-CP included two lights that indirectly illuminated the upper wall and roof peak of a building on the leased Croatan Beach property and a solar flood lamp that illuminated a United States flag mounted on a fence post on the northern base boundary.

Based on the results of the lighting surveys, it is recommended that NASO-DNA and VAARNG-CP develop and implement comprehensive management strategies to minimize the potential impacts of artificial light sources on sea turtles at each installation. An effective strategy would include protocols for eliminating unnecessary lights, minimizing lighting from outdoor and indoor sources, using alternative long-wavelength light sources, using light screens, and enhancing dune profiles. Both installations should also consider the recommendations presented in this report for future additions or replacement of lighting fixtures near the beach.

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ACRONYMS AND ABBREVIATIONS

BRWL	blue-rich white light
CCT	correlated color temperature
ft	foot (feet)
FWC	Florida Fish and Wildlife Conservation Commission
GIS	geographic information system
GPS	global positioning system
HPS	high-pressure sodium
K	Kelvin(s)
km	kilometer(s)
LED	light emitting diode
LPS	low-pressure sodium
m	meter(s)
MACS	Marine Air Control Squadron
mi	mile(s)
NASO-DNA	Naval Air Station Oceana - Dam Neck Annex
nm	nanometer(s)
NSWDG	Naval Special Warfare Development Group
PDOP	Position Dilution of Precision
VAARNG-CP	Virginia Army National Guard – Camp Pendleton
VDGIF	Virginia Department of Game and Inland Fish
VIMS	Virginia Institute of Marine Science

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INTRODUCTION

The presence of artificial night lighting is known to negatively impact many wildlife species. Ecological light pollution can lead to changes in orientation, disorientation, and attraction or repulsion from an area having an altered light environment (Longcore and Rich 2004). These changes may affect the foraging, reproduction, migration, and communication behaviors of individual species, and the cumulative behavioral changes caused by artificial night lighting on competition and predation may disrupt entire ecosystems (Longcore and Rich 2004). Coastal light pollution is particularly detrimental to sea turtles which almost exclusively nest and hatch at night (Witherington and Martin 2003), although Kemp's ridleys (*Lepidochelys kempii*) and some populations of hawksbills (*Eretmochelys imbricata*) nesting during daylight hours (DON 2015, Plotkin 2007, Brooke and Garnett 1983).

Adult female turtles exhibit a general behavioral pattern during the nesting process. They emerge from the surf zone and typically move to a location between the high-tide line and the primary dune (Witherington and Martin 2003). The female turtle prepares the nest site by digging away the surface sand to create a "body pit" and then digs an "egg cavity" within the body pit. She deposits eggs within the egg cavity and covers the eggs with sand. After the eggs have been buried, the turtle will camouflage the nest by casting sand with her front flippers over the buried nest. After the nest has been completed, the female turtle typically returns to the sea. These activities and the decisions of timing, duration, and accuracy of the behaviors are affected greatly by external stimuli, such as human activity and visible artificial light (Witherington and Martin 2003). Artificial illumination on or near nesting beaches can affect nesting females and hatchlings. After emerging from the nests, sea turtle hatchlings move rapidly toward the sea to avoid predation; they seem to use mainly visual cues and are attracted to the brightest area within

their field of view and move away from elevated dark silhouettes (Salmon et al. 1992). Artificial lights on nesting beaches can deter adult females from emerging from the water, affect nest site selection, disrupt the seaward orientation of adult females after nesting, and disrupt the seaward orientation of hatchlings after emergence from the nest (Witherington and Bjorndal 1991, Witherington 1992, Witherington and Martin 2003, Tuxbury and Salmon 2005, Brei et al. 2014, Rivas et al. 2015).

Five sea turtle species are known to occur in the Chesapeake Bay and along the Virginia coastline: the leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), Kemp's ridley, green (*Chelonia mydas*), and hawksbill turtles. All sea turtles are designated as either threatened or endangered under the Endangered Species Act. Sea turtles occur in Virginia waters from May through October or early November although a few strandings have been recorded as early as April and as late as December (Byles 1988, Keinath 1993, Coles 1999). Most of the sea turtles found in the Bay are either immature loggerhead or Kemp's ridley turtles utilizing the bay as a seasonal foraging ground (Lutcavage and Musick 1985, Musick 1988). The Bay is considered an important developmental habitat for juvenile loggerhead turtles (Musick and Limpus 1997, Mansfield et al. 2009). Leatherback and green turtles occur less frequently, and hawksbill turtles are considered extremely rare in Virginia waters. Reports of hawksbills in Virginia include three strandings in the Bay and one along the coast of Virginia north of the mouth of the Bay (Keinath et al. 1991, VIMS 2008, Barco and Swingle 2014).

Sea turtle nesting habitat in Virginia includes beaches along the Atlantic side of the Eastern Shore and beaches south of the Chesapeake Bay mouth from the Virginia Beach oceanfront to the Virginia/North Carolina border. Nesting occurs during the spring and summer months, particularly June, July, and August (Virginia Department of Game and Inland Fisheries [VDGIF]

data). The loggerhead is the only turtle species that nests regularly on Virginia's beaches; approximately 5 to 15 nests are reported annually along Virginia's ocean-facing beaches (Barco and Swingle 2014). Based on VDGIF nesting data between 2000 and 2014, the dates of the earliest and latest reported loggerhead nest in Virginia were 15 May 2006 and 2 September 2013, respectively. Only two Kemp's ridley nests have been recorded in Virginia: one on Naval Air Station Oceana - Dam Neck Annex (NASO-DNA) in June 2012 and one on False Cape State Park near the North Carolina/Virginia border in July 2014 (Boettcher 2015). One green turtle nest was recorded in Virginia in August 2005 (Boettcher 2015).

Loggerhead and Kemp's ridley turtles have been documented to nest at NASO-DNA. Records maintained by the VDGIF, United States Fish and Wildlife Service, and the Navy include two loggerhead nests, one Kemp's ridley nest, and five loggerhead false crawls on NASO-DNA between 1970 and 2014. The loggerhead nests were recorded in 1992 and 2002; the false crawls were in 2002 and 2014 (VDGIF data; Navy data). The Kemp's ridley nest was documented in June 2012 (VDGIF data) and was the first successful hatching of this species in Virginia (DON 2015). One green turtle nest was recorded on Sandbridge Beach just south of NASO-DNA in August 2005 and was subsequently moved to Back Bay National Wildlife Refuge (VDGIF data). One loggerhead nest was documented at Virginia Army National Guard – Camp Pendleton (VAARNG-CP) in August 2015 (R. Boettcher, VDGIF, unpublished data). This is the first confirmed sea turtle nest to be documented on VAARNG-CP.

Because artificial illumination on or near the beaches of NASO-DNA and VAARNG-CP can affect nesting females and hatchlings, lighting surveys were conducted to identify artificial lighting sources that emit light visible from the beaches of these installations. Potentially problematic lighting may include direct light sources (e.g., lamps, globes, reflectors) that are

visible by surveyors and indirect lights that reflect off buildings and are visible from the beach. Light sources that illuminate mist or low clouds may also interfere with sea turtle nesting and hatching behavior (Witherington and Martin 2003).

NAVAL AIR STATION OCEANA - DAM NECK ANNEX SURVEY AREA

NASO-DNA is located in the tidewater area of southeastern Virginia in the southeastern portion of the City of Virginia Beach (Figure 1). This installation is situated along the Atlantic Ocean and has approximately 6.4 kilometers (km; 4.0 continuous miles [mi]) of primary and secondary coastal dune habitat. (DON 2015). The beaches and dunes on NASO-DNA encompass about 77 hectares (164 acres) of dune protection area consisting of undeveloped primary and secondary dunes, natural communities, potential habitat for the federally listed piping plover and red knot, and habitat for several state-listed rare species. The northern and southern shorelines of NASO-DNA and facilities that are adjacent to the shoreline and could be potential sources of light are shown on Figures 2 and 3, respectively.

METHODS

Desktop Analysis

A desktop analysis was performed using Navy-provided geographic information system (GIS) layers and aerial imagery of base boundaries, the coastline, and facilities (e.g., buildings, roads, parking lots) and utilities that may generate either direct or indirect light that is visible from the beach. A quarter-mile buffer from the shoreline inland was overlaid on the aerial images so that surveyors could focus on sources that had the highest potential to be a source of direct or indirect

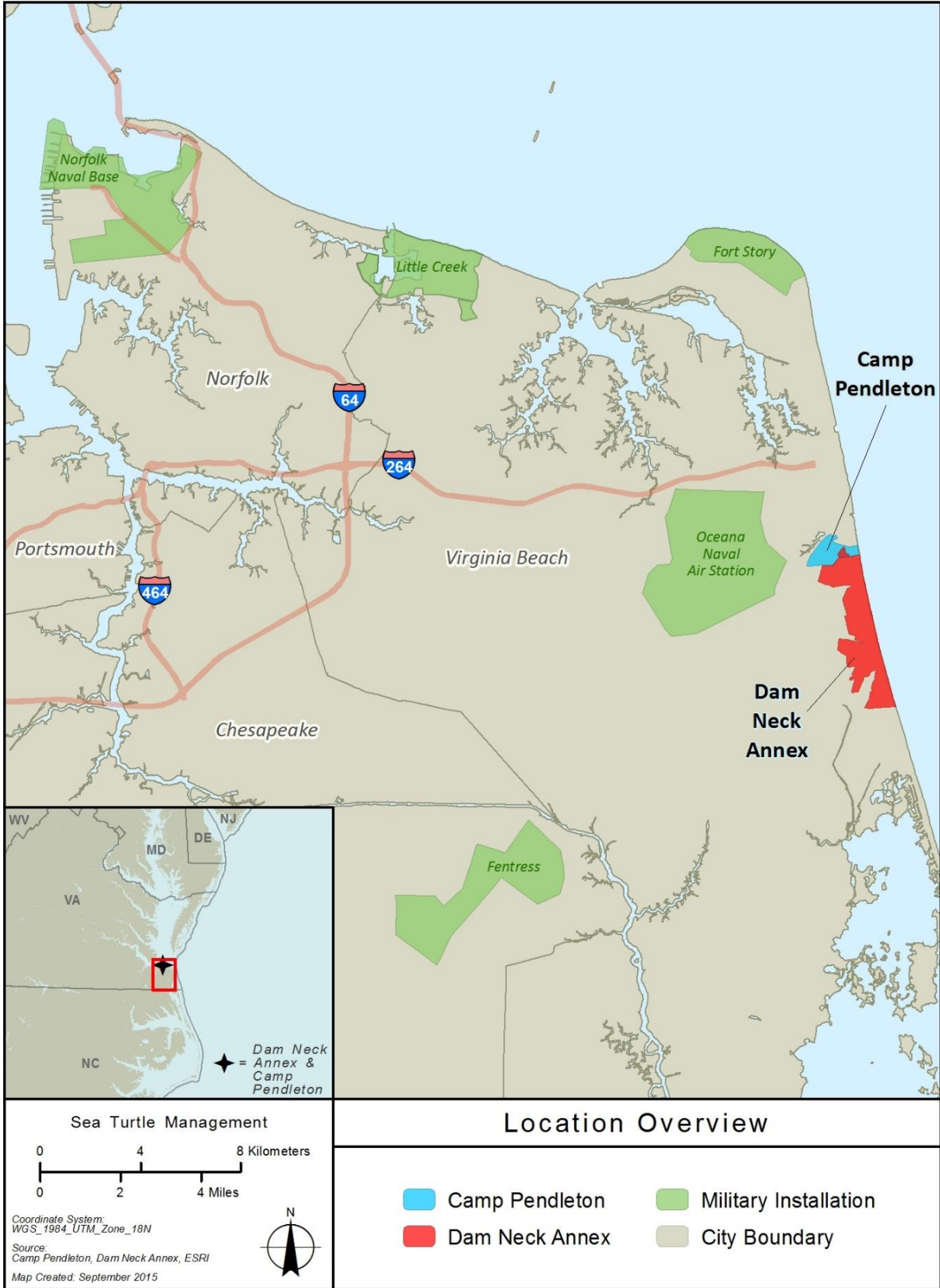


Figure 1. Geographic location of Naval Air Station Oceana - Dam Neck Annex

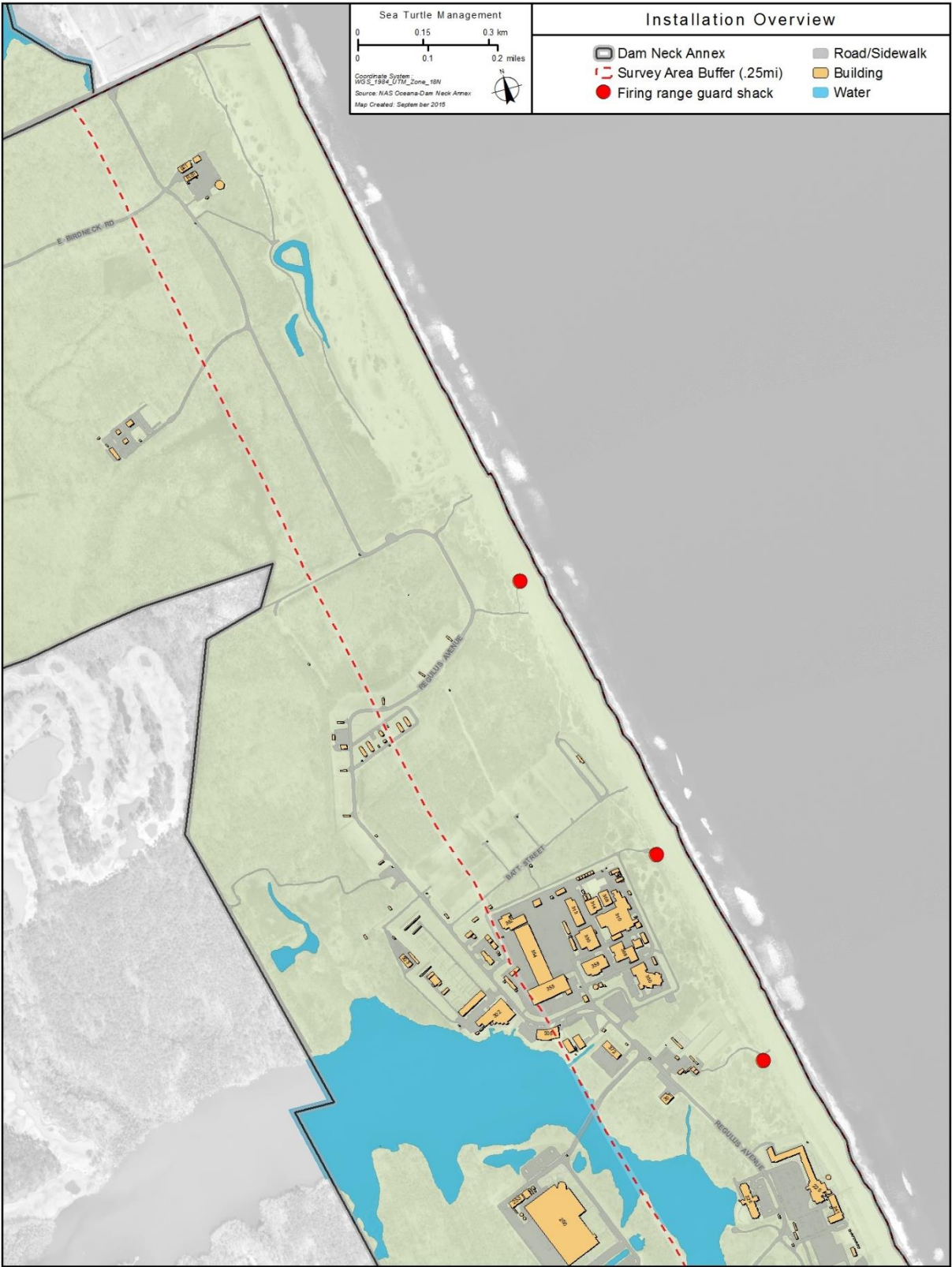


Figure 2. Naval Air Station Oceana - Dam Neck Annex Survey Area (north)



Figure 3. Naval Air Station Oceana - Dam Neck Annex Survey Area (south)

light. Based on this desktop analysis, both areas of interest for the field surveys and light sources outside of these areas were identified. Surveyors used the aerial images to orient themselves on the beach and identify the potential light sources observed from the beach.

Initial Daytime Surveys

Daytime surveys were conducted along the beach face and behind the rear dunes. These surveys allowed the surveyors to familiarize themselves with the areas to be surveyed at night and identify the likely sources of light to be investigated at night. During the beach surveys, surveyors walked just above the swash zone¹ looking inland to identify potential light sources (e.g., street lights, security lights, buildings) and noted their findings for follow up during surveys behind the dunes. The region behind the dunes was surveyed by evaluating the facilities and utilities identified during the beach surveys and the desktop analysis. The primary focus were those facilities and utilities surveyors identified during the beach survey, those closest to the beach, as well as those thought to have the highest potential to produce direct or indirect light visible from the beach. All potential sources of light were documented by noting the building number and/or its global positioning system (GPS) location and type of fixture. GPS coordinates were recorded using a Trimble GeoXT™ handheld (Datum WGS 1894; Latitude/longitude; sub-meter accuracy in real time; 50 centimeter accuracy post processed; Position Dilution of Precision [PDOP] – 8 resulting in a lowest acceptable distance error of 10 meters). Surveyors obtained a reference photograph for each fixture type and recorded the photograph number to document potential light sources. A predicted impact was assigned to each light (i.e., direct or indirect) if a reasonable certainty existed to potentially impact sea turtles. Other potential light

¹ Swash zone is the thin layer of water that remains of a wave as it rolls up the beach and loses energy.

sources were identified by location that were less likely to impact sea turtles for verification during nighttime surveys.

Daytime surveys at NASO-DNA occurred on 1 and 3 April 2015 between the hours of 0800 and 1600. Surveys were divided into several separate events due to the requirement for escorts into some locations, the number and locations of usable beach access points, and unplanned interruptions. Surveys on 1 April 2015 began at the north end of the base from the north firing range guard shack access (see Figure 2). Surveyors walked south until reaching the central firing range guard shack. Because the southern Naval Special Warfare Development Group (NSWDG) firing range was being utilized, surveyors returned north and continued up the beach until reaching the NASO-DNA and VAARNG-CP installation boundaries. At this point, they returned to the beach access at the north firing range guard shack. Upon completion of this portion of the beach survey, the facilities and utilities within the NSWDG compound were assessed, particularly the perimeter security lighting and facilities visible or adjacent to the beach (i.e., Buildings 309, 310, 311, 313, 350, 368, 382, TPS9, and TPS10) (Appendix A, Maps 2 and 3).

The second portion of the beach survey on 1 April 2015 started at the beach access point located at Building 187. Surveyors walked northwards to the south firing range guard shack (see Figure 2). Since the range was still active, they turned south and continued the survey to the NASO-DNA southern boundary and then turned north and returned to the beach access at Building 187. The surveys behind the dunes started at Building 187 and then moved to Buildings 225 and 241 since these facilities are visible from the beach. The parking lot lighting for these facilities was also assessed due to the number of lighting fixtures and their proximity to the beach. After surveying these locations, the picnic pavilion just north of Building 187 and the pavilion near Building 187's parking lot (Building 1738) were assessed. The survey continued south through

the Morale, Welfare, and Recreation rental cottages located adjacent to the dunes (between Buildings 187 and 241). The last areas evaluated on 1 April were the ball fields located on either side of Regulus Avenue near Building 180.

The daytime beach surveys continued at NASO-DNA on 3 April 2015 was conducted between the central and south firing range guard shacks that was not assessed on 1 April. They returned to the NSWDC compound to assess the facilities and utilities identified during the beach survey and to obtain additional location data and pictures for facilities and utilities. The new facilities under construction south of the compound were also assessed; these included Buildings 370, 383, 384, and 385. The aprons and/or parking areas for these new facilities were also assessed. Upon completion of the NSWDC compound, the surveyors assessed all of Viking Avenue, Buildings 102 and 127 and their parking areas, and Buildings 420 and 430 and their parking areas. Buildings 475 and 404 at the south end of the base were also assessed. They completed the base survey by evaluating the Marine Air Control Squadron (MACS) 24 compound at the north end of NASO-DNA and focusing on the large radar dome visible from the beach.

Nighttime Surveys

The intent of the nighttime surveys was to identify the light sources that are visible on NASO-DNA beaches with the potential to impact sea turtles and classify them as either direct or indirect light sources. Four nighttime surveys were conducted: one during the pre-nesting season, two during nesting season, and one at the end of nesting season and the beginning of hatching. Surveys occurred within 2 to 14 days after a full moon and started after 2100 hours Eastern Standard Time. The specific dates of each survey are provided below.

The same basic procedures described for daytime procedures were followed for nighttime surveys although specific routes changed due to access schedules for different facilities.

Surveyors walked just above the swash line looking inland to identify sources and impact of lights visible from the beach. Afterwards, the surveys continued inland. During inland surveys, surveyors located the sources identified during the beach survey and characterized them by the observed impact, type of fixture, type of light, and specific location of the light source. Where possible, coordinates for all light sources were collected using a Trimble GeoXT™ handheld (Datum WGS 1894; Latitude/longitude; sub-meter accuracy in real time; 50 centimeter accuracy post processed; PDOP – 8 resulting in a lowest acceptable distance error of 10 meters). In cases where it was not possible to collect GPS coordinates (e.g., location not accessible, location blocked satellite acquisition), surveyors either used the map on the GPS to estimate the location of the light and document coordinates or marked the light source locations on survey maps and documented them in data collection sheets.

Pre-nesting Season Surveys

Pre-nesting nighttime surveys at NASO-DNA occurred on 14 and 15 April 2015 between 2100 and 0400 hours. The nighttime survey on 14 April 2015 began at the Building 187 beach access. Surveyors walked north until reaching the south firing range guard shack. Since beach replenishment activities were taking place at this time, they were restricted to walking directly in front of the foredune to avoid equipment for approximately 1,000 meters (m) (3,208 feet [ft]) to just north of Building 225. At this point, they turned south and surveyed to the NASO-DNA southern boundary and then turned north and returned to the beach access at Building 187. The surveys behind the dunes started at Building 187 and the parking lot and moved north to Viking Avenue and Building 102 and 127 and their parking areas. They completed the southern portion of the base at Building 475; assessed Buildings 241, 225, and 226 and their parking areas; and finished this survey event by collecting data for the ball field lights.

The nighttime survey on 15 April 2015 began at the MACS-24 compound where the radar dome visible from the beach was assessed. Afterwards, some additional information on light sources at Building 187 was obtained. The NSWDG escort met the surveyors at midnight to survey the beach area adjacent to the NSWDG compound between the north and the south firing range guard shacks (see Figure 2) and collect data for the NSWDG facilities and utilities that were identified as direct and indirect lighting. They focused on perimeter security lighting and beach-facing light sources. The new facilities being constructed in the NSWDG compound were also assessed, and although the majority of the lights of these facilities were not on, data for these potential light sources were collected.

Nesting Season Surveys

Two nesting season surveys were conducted (one on 5 June 2015 and the other on 12 June 2015) to document any changes or additions to light sources, particularly as a result of new construction in the NSWDG compound and from the change in beach length from the beach replenishment that was completed in April. Maps generated from the pre-nesting nighttime survey data were used to identify new and changed impacts. Surveys started at 2100 hours on both nights and ended at 0200 and 0030 hours the mornings of 6 and 13 June, respectively. Surveys on both nights started on the beach at the north firing range guard shack beach access (see Figure 2). Surveyors walked south, ending at the south firing range guard shack and returned to the access point. Afterwards, the surveyors entered the NSWDG compound to assess the new or changed light sources identified during the beach survey and documented the observed impact, type of fixture, type of light, and specific location of the light source.

The southern portion of the beach was accessed from the Building 187 beach access. Surveyors walked south to the southern installation boundary, returned north ending at the south firing

range guard shack. The portion of the beach north of NSWWDG was accessed from the VAARNG-CP beach access at the end of Range Road. Surveyors walked south to the north firing range guard shack and returned to the VAARNG-CP beach. After completing the beach surveys, surveyors located and documented any new or changed light sources identified from the beach surveys.

Post-nesting/Hatching Season Surveys

Due to limited access, two surveys were required to complete the post-nesting/hatching season survey for all of the NASO-DNA beaches. The majority of these beach survey was accomplished on 11 September 2015. This survey started at 2100 hours and ended at 0200 hours. Due to escort scheduling necessities, this survey started in the MACS-24 compound (Building 921). Data from previous surveys were verified to ensure nothing had changed from previous surveys.

After completing MACS-24, the surveyors began the beach survey at NSWWDG at 2300 hours, accessing the beach at the north firing range guard shack (see Figure 2). The same route was taken as before, walking south to the south firing range guard shack and returning to the access point. After completing the NSWWDG beach, surveyors assessed new or changed sources identified during beach surveys and documented the observed impact, type of fixture, type of light, and specific location of the light source.

The southern portion of the beach was also surveyed on 11 September 2015. As with past surveys, starting at the Building 187 beach access, walking south to the southern installation boundary, returning north and ending at the south firing range guard shack.

The northern portion of NASO-DNA beach could not be accessed on 11 September and was completed on 10 October 2015. Access to this portion of the beach was gained from the VAARNG-CP beach access. As with past surveys, surveyors walked south to the north firing

range guard shack and returned to the VAARNG-CP beach. Inland surveys included locating and documenting light sources that had changed or were not seen during previous surveys.

RESULTS

The results presented here are the culmination of all surveys. The number of light sources identified varied between each survey event. This was due to factors such as the beach replenishment that added several hundred feet new beach and altered the perspective of surveyors, the addition of several new light sources from the construction of new facilities in the NSWDC compound, the variation of lights that were lit at the time of surveys, and weather events (e.g., rain, mist, and fog) that may have either obscured or enhanced light sources. Of the data collected using the Trimble GeoXT™ handheld, 84 percent of all points were accurate to within less than 1 meter, 98 percent were accurate to within less than 5 meters, and 100 percent were accurate to within less than 9 meters.

A total of 236 direct, indirect, and other light sources expected to have an impact if turned on were identified during surveys on NASO-DNA (Table 1). Most (101) of the artificial lights visible from the beach were direct light sources. An additional 54 light sources identified as indirect either constituted a glow that could be seen above the dunes or illuminated structures, such as building walls, that were visible from the beach. A total of 81 light sources were categorized as either “Direct-if on” or “Indirect-if on”. Those classified as “Direct-if on” were not on at the time of nighttime surveys, but the fixtures could be seen from the beach. Those classified as “Indirect-if on” were not on during the nighttime surveys and were classified due to factors such as: their height and proximity to the beach, they were located near similar light sources that were classified as indirect, or it was apparent that they would likely illuminate structures that were visible from the beach. The cumulative data for the light sources identified

on NASO-DNA with a direct, indirect, or expected impact if on are included in Appendix B, Table B-1.

An additional 36 light sources were identified on NASO-DNA that were not on at the time of surveys and whose potential impact could not be determined (Appendix B, Table B-2). These lights were relatively close to the beach but were either located in areas that had no other lights turned on to use as a frame of reference or the light intensity was not known in order to determine if they would produce enough light to illuminate adjacent building walls or other objects that are visible over the dunes.

Overall, the arm-mounted area – cobrahead fixture varieties (Figure 4) and arm-mounted cutoff – shoebox varieties (Figure 5) often used for street and parking illumination were the most numerous light source fixtures (Table 1). Beach-facing windows (39) were identified most often as a source of direct light; this was followed by the arm-mounted cutoff – shoebox (18) and wall-mounted area “wall pak” lighting (14) (Figures 5 and 6, respectively). In addition, the ball field lighting (Figure 7) would contribute a significant amount of direct lighting when in use.

Reference photographs of the light fixtures identified at NASO-DNA can be found in Appendix C.

Table 1. Observed or expected impact and types of light fixtures identified at Naval Air Station Oceana – Dam Neck Annex

Light fixture description	Observed or expected impact				
	Direct	Direct - if on	Indirect	Indirect - if on	Fixture Total
Arm-mounted area - cobrahead	7	5	13	1	26
Arm-mounted area - cobrahead (double)	1		3		4
Arm-mounted area – cobrahead (flat faced)	1	4	2		7
Arm-mounted area - cobrahead flat faced) Light-emitting diode	2		2		4
Arm-mounted area – cobrahead (flat faced) Solar		3		6	9

Light fixture description	Observed or expected impact				
	Direct	Direct - if on	Indirect	Indirect - if on	Fixture Total
Arm-mounted area – cobrahead (flat faced; double) Light-emitting diode			2		2
Arm-mounted cutoff - shoebox	8	5	1	13	27
Arm-mounted cutoff - shoebox (double)	10		1	3	14
Arm-mounted flood				1	1
Beach-facing windows	39	4			43
Ceiling-mounted fluorescent tubes			2		2
Dome skylights	1				1
Pole-mounted cutoff, round	1		3	2	6
Pole-mounted flood		1		1	2
Pole-mounted flood (double)	6	4	7		17
Pole-mounted stadium lighting arrays		16			16
Pole-mounted strobe - solar		2			2
Red marker	1	1			2
Wall-mounted area			4		4
Wall-mounted area "Wall pak"	14	3	11	1	29
Wall-mounted flood	8		3	1	12
Wall-mounted flood lamp	2			4	6
Total	101	48	54	33	236



Figure 4. Typical arm-mounted area – cobrahead fixtures identified at Naval Air Station Oceana – Dam Neck Annex.



Figure 5. Typical arm-mounted cutoff - shoebox fixtures identified at Naval Air Station Oceana – Dam Neck Annex.



Figure 6. Typical wall-mounted area “wall pak” fixtures identified at Naval Air Station Oceana – Dam Neck Annex.



Figure 7. The pole-mounted stadium lighting arrays identified at Naval Air Station Oceana – Dam Neck Annex.

The most common lamp type identified as producing light visible from the beach was high-pressure sodium (HPS) lamps, with 39 direct and 37 indirect sources identified (Table 2). These lamps produce a distinctive gold-peach colored light (Figure 8). White, broad-spectrum lights were the second most identified lamp type; these typically consisted of metal-halide, fluorescent, incandescent, and light-emitting diode (LED) lamps. Although not in use at the time of the surveys, 13 of the 16 ball field lights were classified as “likely to be white, broad-spectrum lamps” because 3 of the 16 ball field light arrays were identified as having metal-halide lamps in Navy-provided utility data and the older stadium lighting typically use metal-halide lamps (General Electric n.d.). In addition, there were 41 sources of interior lights documented, 38 of which are located at Building 241.

Eighty-one light sources that were not on at the time of surveys were identified as expected to have either a “Direct – if on” or “Indirect – if on” (Table 2). The lamp types of 27 could be

determined from Navy-supplied data or the fixture was positioned so that the lamp could be seen and identified. The remaining 54 lamp-types that were not on but expected to have an impact could not be determined.

Table 2. Observed or expected impact and observed lamp types at Naval Air Station Oceana – Dam Neck Annex

Lamp type	Observed or expected impact				
	Direct	Direct - if on	Indirect	Indirect - if on	Lamp Total
Gold-peach, indicative of high-pressure sodium	39		37		76
White, broad-spectrum	19	8	17	4	48
Likely white, broad-spectrum		13			13
Yellow, halogen lamp	2				2
Not on (could not be determined)		25		29	54
Interior lights	40	1			41
Red lens	1	1			2
Total	101	48	54	33	236



Figure 8. Examples of high-pressure sodium lamp light sources at Naval Air Station Oceana – Dam Neck Annex

Overall, the majority of observed and potential light sources identified at NASO-DNA were within the NSWDC compound and also included the new NSWDC facilities currently being constructed (Table 3; Appendix A, Maps 2 and 3). Perimeter security and parking lighting composed most of the light sources identified within the NSWDC compound area. The NSWDC compound also contained the greatest number of indirect light sources. Building 241 had the

second greatest number of light sources due to the number of windows that are visible above the dunes, followed by Building 187 (Shifting Sands Club) and Building 127 and their surrounding parking areas (Figure 9; Appendix A, Maps 3 and 4). When in use, the stadium lights could add up to 16 sources of direct light. Due to their proximity to the dunes and height of the lights, Buildings 187, 127, and 465A had light sources that could be seen over the greatest distance at the time of the surveys (Figure 10). An additional table that details the type of fixture and lamp type and its observed or expected impacts by location is contained in Appendix D.

Table 3. Observed or expected impact and light source locations at Naval Air Station Oceana – Dam Neck Annex

Location	Observed or expected impact				
	Direct	Direct - if on	Indirect	Indirect - if on	Location Total
Ball fields		16			16
Beach access at the north end of Regulus Avenue		1			1
Building 102	6				6
Building 102 parking	1		2		3
Building 127	6				6
Building 127 parking	3	3	6		12
Building 127 tower	1				1
Building 132/114 parking		5			5
Building 153 parking		2			2
Building 170		3		1	4
Building 183 Parking		2			2
Building 187	8	2			10
Building 187 parking	2	1	5	1	9
Building 187 patio			2		2
Building 187 pavilion	1			1	2
Building 225				2	2
Building 225 parking	5		3	1	9
Building 241	38		5	1	44
Building 241 parking	2		2	6	10

Location	Observed or expected impact				Location Total
	Direct	Direct - if on	Indirect	Indirect - if on	
Building 404 parking			1		1
Building 404 gate guard				4	4
Building 465A	4				4
Building 923	1	1			2
Naval Special Warfare Development Group Compound (NSWDG)					
Building 310			9		9
Building 310 (rock wall)		1			1
Building 350			2		2
Building 350 parking			1		1
Buildings 384/385				8	8
Building 382		1			1
Building 382 perimeter	3				3
Building 370 parking	5			3	8
Building 383	1				1
Building 383 parking	4	5		1	10
Perimeter security	6		7		13
All beach firing range guard shacks		5			5
TPS10			1		1
TPS9			2		2
Regulus Ave at Building 385				4	4
Regulus Ave at Viking			3		3
Viking Ave	4		3		7
<i>Total</i>	<i>101</i>	<i>48</i>	<i>54</i>	<i>33</i>	<i>236</i>

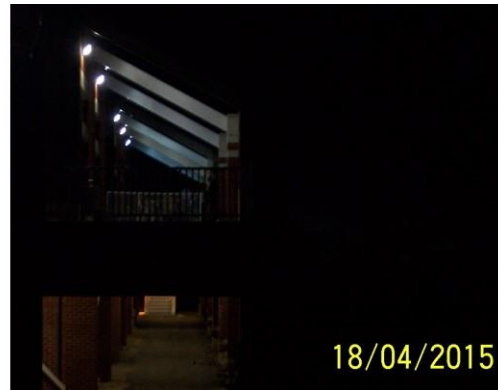


Figure 9. Direct lighting sources on the south and east facing sides of Building 187 (Shifting Sands Club) at Naval Air Station Oceana – Dam Neck Annex



Figure 10. Direct lighting sources from Buildings 465A, 127, and 187 (left to right) as seen from the south end of the Naval Air Station Oceana - Dam Neck Annex beach from a distance of approximately 750, 1,880, and 2,220 meters, respectively

DISCUSSION

Light pollution on or near beaches can reduce the reproductive success of sea turtles by disrupting the behaviors of nesting females and hatchlings. Artificial lights on nesting beaches can deter adult females from emerging from the water, affect nest site selection, disrupt the seaward orientation of adult females after nesting, and disrupt the seaward orientation of

hatchlings after emergence from the nest (Witherington and Bjorndal 1991, Witherington 1992, Witherington and Martin 2003, Tuxbury and Salmon 2005, Brei et al. 2014, Rivas et al. 2015).

During the surveys, surveyors identified a variety of lighting sources that contribute to the direct and indirect artificial light visible or that would likely be visible from NASO-DNA beaches. The majority of these sources were on elevated fixtures such as street, parking lot, and stadium lighting (see Table 1). These sources rise above the dunes and scatter light over a wide area. Other sources included wall-mounted area and flood lights located on upper levels of buildings and areas of concentrated light sources that created localized sky glow.

The best method of solving light pollution is to manage the light rather than eliminating it (Witherington and Martin 2003). The principal sources of light that cause problems for sea turtles is that which “spills over” onto the beach from the areas that are intended to be illuminated. Managing this spillage can resolve many of the impacts identified during the surveys.

There is no set criteria for the acceptable level of light intensity to mitigate potential impacts to turtles; factors such as the level of natural light and the availability of other visual clues such as dunes and vegetation vary widely, and the amount of artificial lighting that may interfere with nesting or disorient hatchlings differs greatly from one location to the next (Witherington and Martin 2003). The most effective mitigation method is to minimize the amount of artificial light as much as possible using the best available technology. NASO-DNA should undertake a comprehensive management strategy to minimize the potential impacts of the 236 direct, indirect, and other light sources expected to have an impact on sea turtles identified at this installation. An effective strategy for managing light includes eliminating unnecessary lights,

minimizing lighting from outdoor and indoor sources, using alternative long-wavelength light sources, using light screens, and enhancing dune profiles (Witherington and Martin 2003).

General Recommendations

The general recommendations listed below should be considered individually or together based on the need, type, intensity, and orientation of the light source without compromising safety and security. Some of the changes discussed below can reduce the impact to beaches and are illustrated on Figure 11. These measures should also be considered for any future construction of facilities near the beach.



Figure 11. Examples illustrating the results of strategies to reduce and change light sources to minimize impacts to sea turtles.

Eliminating Unnecessary Lights

All of the direct, indirect, and potential light sources identified during these surveys should be evaluated based on their effectiveness and the lighting needs of this installation. Reducing the

use of lights is the easiest and least expensive method to reduce the amount of light visible from the beach. This may be an option in some areas of NASO-DNA although safety and security requiring the use of artificial lighting must remain a priority in certain areas of the base. Where possible, unnecessary light sources should be eliminated. Unnecessary light sources may include those that illuminate areas which do not require security and areas that are vacant and do not have foot traffic, as well as decorative light sources and those light sources that provide more than adequate lighting for a particular function (Witherington and Martin 2003).

Minimizing Lighting from Outdoor Sources

The simplest method to reduce the impact of artificial lighting on sea turtles is to prevent light from reaching the beach although this is not always a practical solution. Fixtures that are directly visible from the beach can be realigned, modified, repositioned, or shielded to keep light from reaching the beach (Florida Power & Light Company 1998). The following is a list of recommended solutions compiled from the Florida Fish and Wildlife Conservation Commission (2011), Witherington and Martin (2003), and Florida Power & Light (1998) to minimize the amount of light reaching the beach from existing light sources:

1. Turn off lights that are not essential for safety or security. This is the simplest and less expensive method to minimize light trespass onto beach areas. Lighting only needs to be turned off during the nesting and hatching season.
2. Reduce the wattage of the lamps used to the lowest level necessary to fulfill the purpose for the light and remain within the manufacture's guidelines. This will reduce the amount of light emitted and, subsequently, reaching the beach.
3. Reposition luminaires to better focus the light to where it is most needed.

4. Substitute high-watt, multidirectional luminaires with low-watt, directional luminaires that are directed away from the beach.
5. Install shields on light sources that are sufficiently opaque, large, and positioned to prevent light from reaching the beach.
6. Recess light sources and position them to direct the light downward and away from the beach.
7. Reduce the height of pole- and arm-mounted luminaires. The lower a light source is mounted, the less area it will illuminate. In addition, lower-mounted luminaires may also be better shielded by dunes, vegetation, and buildings.
8. Take advantage of natural light screens, such as dunes and vegetation, to shield luminaires.
9. Install timers or motion detectors so that the light is illuminated only when it is most needed. These are relatively inexpensive solutions, yet they have some limitations in their use and efficacy. Timers are minimally effective since nesting and hatching can take place throughout the night and should be set to turn off early in the evening. Motion detectors can be a better solution than timers, but they should not be used in high traffic areas visible from the beach and can only be used with incandescent lighting. If used, motion detectors work well with yellow bug-light bulbs.

Minimizing Lighting from Indoor Sources

Indoor lighting that is visible from the beach, such as that identified from Buildings 241, 382, 383, 923, and the firing range guard shacks, also has the potential to disrupt sea turtle nesting and hatching. These sources are typically from buildings located close to the beach with windows that are visible above the dunes. Indoor lighting that trespasses onto the beach is easily

eliminated and typically involves a few simple and inexpensive methods. Lights in rooms that are not in use should be turned off, and lamps can be repositioned away from windows that are visible from the beach. Windows that are visible from the beach can be tinted to reduce the amount of light passing through the glass using either manufactured tinted glass or with applied film. Installing and closing opaque curtains or blinds and closing them after dark can block a majority of light that might otherwise trespass onto beaches.

Using Alternative Long-Wavelength Light Sources

As previously discussed, it is not always practical to eliminate all light sources that are visible from the beach. In these instances, steps should be considered to minimize the use of light sources that produce the most disruptive wavelengths of light. In areas where light is needed in areas close to the beach, the use of long-wave length light sources should be considered (Florida Power & Light Company 1998).

The most common lamp type identified during the lighting surveys as producing light visible from the beach was HPS lamps. A total of 76 sources of this type of light were observed, 39 of which were identified as direct impacts. Based on studies on physiological spectral sensitivity, hatchling orientation with respect to laboratory and commercial light sources, and spectral profiles of commonly used lamps, HPS light sources are thought to be highly disruptive to sea turtles. Although less disruptive than the white, broad-spectrum sources, HPS is one of the most common causes of hatchling disorientation and mortality (Witherington and Martin 2003).

Nineteen direct white, broad-spectrum lighting sources were observed and up to an additional twenty-one would have direct impacts if turned on. White, broad-spectrum lights are known to be extremely disruptive to sea turtles (Witherington and Martin 2003).

The use of alternative light sources in place of these HPS and white, broad-spectrum light sources should be evaluated. Alternative light sources which are known to be minimally disruptive to sea turtles include low-pressure sodium (LPS) vapor lighting, yellow filters, yellow or amber incandescent light bulbs (bug lights), and red, orange, or amber LED lighting (Witherington and Martin 2003; FWC 2011). These types of light bulbs and sources are on the Florida Fish and Wildlife Conservation Commission's (FWC) list of approved sea turtle lighting (FWC 2011). The FWC (2011) approves lamps that produce light that measures greater than 560 nanometers (nm) for sources visible from and adjacent to turtle nesting beaches. Acceptable lamps include:

- LPS 18w and 35w;
- red, orange, or amber LED (true red, orange, or amber diodes, NOT filters);
- true red neon; and
- other lighting sources that produce light of 560 nm or longer.

The installation or replacement of luminaire lens on the typical arm-mounted cutoff and cobrahead fixture typically used as street and parking lot lighting should also be considered. Examples include replacing existing clear lens and dropdown globes with yellow, dichroic “long-pass” filters that exclude short wavelengths well and are less likely to degrade overtime. If dichroic filters are considered, they should filter all wavelengths (have a stopband) below 520 nm.

Enhancing Dune Profile and Using Light Screens

Natural dune systems are highly variable; dunes grow, shrink, and move in the direction of prevailing winds over time (Broome 2002). Dune systems may have areas with large dunes and

small, low dunes only a few hundred yards away. In addition, foredunes often contain natural gaps such as blowouts and overwash passes.

As reviewed in Witherington and Martin (2003), several researchers have found that improper orientation is exacerbated when the dune profile is low or sparsely vegetated. The dune silhouette may influence hatchling behavior by providing visual cues, shielding light, or both since hatchlings tend to move away from darkly silhouetted objects. In areas that may have a low dune profile, restoring dunes to be similar in appearance to the preexisting or adjacent natural dunes may be an option to provide more natural orientation cues for hatchlings. This method may be considered in locations such as old, unused beach access points or in areas where erosion has reduced the profile to an extent that it no longer provides sufficient visual cues for sea turtle hatchlings.

Small areas can be restored using methods such as planting native pioneer dune vegetation (e.g., American beachgrass, sea oats, and bitter panicum) and installing sand fencing (Broome 2002). If the restoration of larger areas is considered, methods such as bulldozing and dredging may be necessary. It must be noted, however, that any dune manipulation should be carefully considered and planned. Sand fencing should not be installed in areas where turtles may nest. Moreover, dune restoration typically requires several years of continuous actions. For example, dune building with sand fencing requires the installation of an additional rows of fencing over several years, placing new fencing at the seaward dune toe when the preceding fence is filled approximately two-thirds high (O'Connell 2008). The use of bulldozing and dredging are expensive and can be extremely damaging to the coastal environment (Broome 2002). In addition, large dune building projects may affect adjacent ecology by changing the micro-climate and negatively impacting plant communities (O'Connell 2008).

Light screens may be considered to prevent beachfront lighting from shining directly on the beach, created from vegetation buffers, natural features, or artificial screens such as shade cloth and privacy fencing. Light screens, also known as ground level barriers, are used extensively in Florida to block existing light sources and are required in accordance with coastal city and county ordinances. Ground level barriers should be placed so that they do not interfere with nesting sea turtles or hatchlings or cause short- or long-term damage to the beach-dune system. Artificial screens would only be necessary during nesting and hatching season or until vegetation has become tall and dense enough to block the light (Martin 2000).

Specific Recommendations

One of the greatest challenges will be mitigating the impacts of the stadium lighting identified at the NASO-DNA ball fields. This light source is located within 120 m (400 ft) of the beach (Appendix A, Map 3). This lighting uses intense, white, broad-spectrum lamps that are mounted on tall poles, many of which are directly visible from the beach. In addition, the glow created from stadium lighting can affect nesting beaches many kilometers away (Witherington and Martin 2003). This lighting is only used for short durations, however, typically in the evening for sporting events and in the pre-dawn hours when some of the fields are used for physical training. Visors and louvers can be installed that direct light down onto the fields and reduce the amount of upward and lateral light. It may also be possible to replace the metal-halide lamps that produce the extremely disruptive white, broad-spectrum light with less disruptive lamps, reduce the wattage of the bulbs, and redirect and lower the lights that are most visible on the beach.

The perimeter lighting around the NSWDC compound is currently unshielded, with flood lighting aimed relatively upward (Figure 12) which increases the amount of light that reaches the beach and illuminates building walls that are visible from the beach (Appendix A, Map 2). In

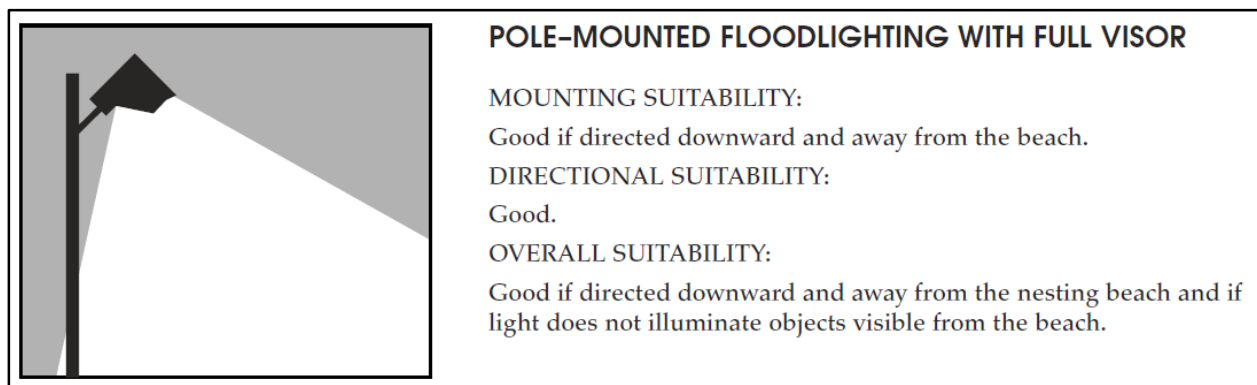
order to mitigate the impact from these lights, lamps could be directed downward with hoods installed to limit the amount of light visible from the beach and illuminating the upper portion of building walls (Figure 13). Similarly, these methods could also be undertaken with the pole-mounted flood lights identified in the Building 187 and 127 parking lots (see Appendix A, Maps 3 and 4). At Building 465A, changing the lamps to those with a lower wattage and less disruptive wavelength, redirecting or shielding the fixtures, or replacing with better focused luminaries to direct the light where it is most needed would decrease the impact to the beach. When lighting is required on the pad adjacent to Building 465A, the installation of hooded flood lamps or mobile lighting, placed on the eastern edge of the pad and directed downward and inland should be considered.



Figure 12. Perimeter flood lighting used at Naval Air Station Oceana – Dam Neck Annex, Naval Special Warfare Development Group Compound

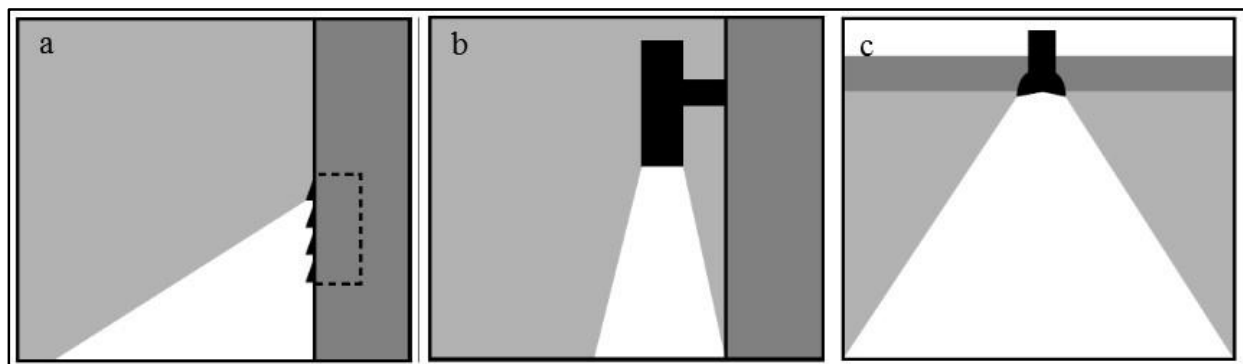
To mitigate the impact of the direct light sources on Building 187 (see Figure 9), the lights on the upper level deck area should be replaced with fixtures such as louvered step lighting, wall-mounted downlighting, or ceiling-recessed downlighting. Because these lights are on upper floors visible above the dunes, louvered step lighting (Figure 14a) mounted a maximum of 30 centimeters (12 inches) from the floor would be the most effective at reducing the amount of light generated from the upper deck area. While wall-mounted downlighting or recessed

downlighting (Figure 14b and 14c) would be an improvement over the wall-mounted area lighting currently installed and more easily installed than louvered step lighting, these fixture types are not optimal since they would still be directly visible from the beach. If installed, light from recessed or wall-mounted downlighting could be further mitigated with the use of low-watt lamps that produce light with wavelengths greater than 560 nm. See Figure 11 for an example of the results similar actions.



Source: Witherington and Martin 2003

Figure 13. Example and suitability of pole-mounted floodlighting with full visor



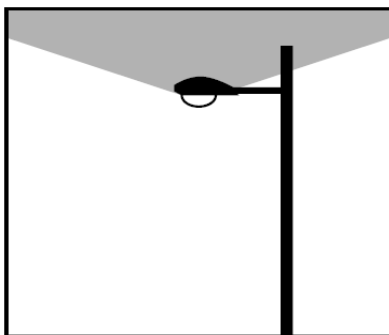
Source: Witherington and Martin 2003

Figure 14. a) Louvered step lighting, b) wall-mounted downlighting, and c) recessed downlighting

The impact of the arm-mounted cobrahead and cutoff shoebox fixtures that are widely used for street and parking lot lighting at several locations on NASO-DNA such as those lights located on

the beachside of roadways and the parking lots located around Buildings 127, 187, 225, and 241 (Appendix A, Maps 3 and 4). Impacts from these lights could be reduced using several of the methods described by Florida Power & Light Company (1998). The specific measures considered would be dependent on the purpose of the light, fixture type, lamp wattage, distance of the fixture from the beach, and the linear extent and height of natural (i.e., dunes and vegetation) or man-made structures between the light and the beach. Prior to performing any alternatives, they should be reviewed by civil engineers to ensure lights would continue to meet roadway safety standards.

The higher a fixture is mounted, the greater potential for its light to impact beaches. Reducing the mounting height of fixtures often resolves problems from fixtures that are relatively distant for the beach. Reducing the mounting height should also be given first consideration for those light close to the beach and then combined with other alternatives to reduce the amount of light impacting the beach to the lowest amount that is safely possible. In addition, cobrahead fixtures with drop globe fixtures (Figure 15) should be replaced with cutoff or hooded fixtures that compress the lighting footprint by concentrating the light on the targeted roadway or parking lot.



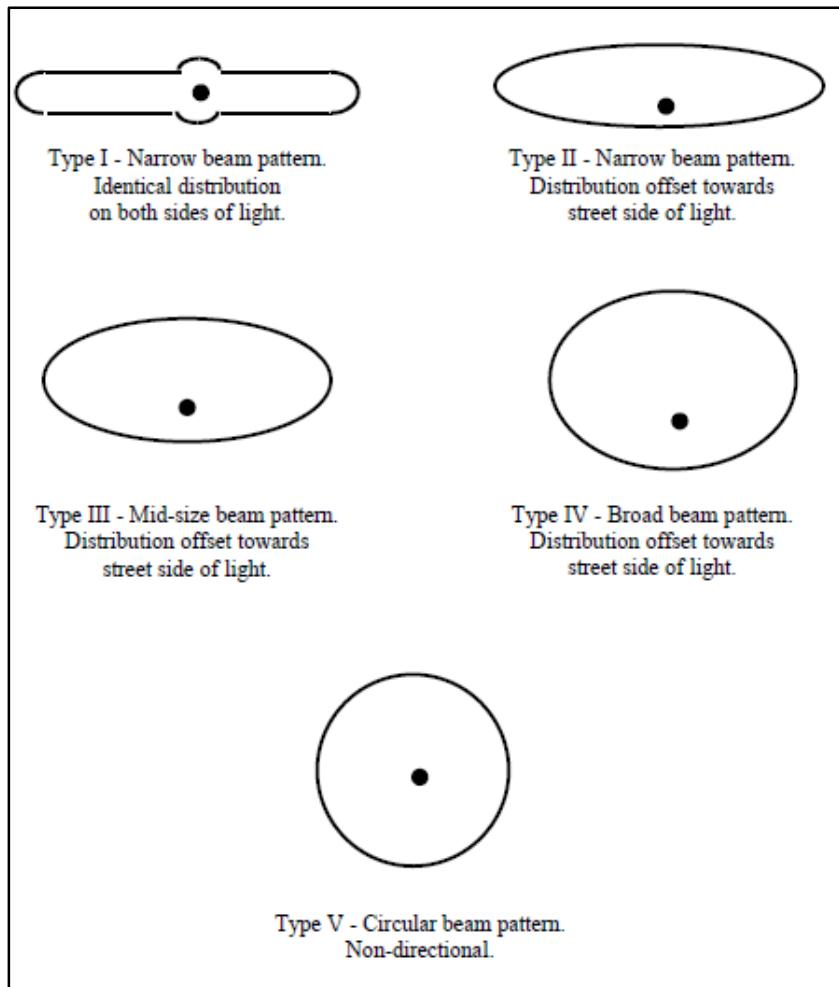
Source: Witherington and Martin 2003

Figure 15. Arm-mounted area lighting with cobrahead fixture and dropdown globe

Changing reflectors or the lamp socket position within the existing fixture would change the way light is distributed away from the source. If uniformity of light distribution of an area can be altered without compromising safety or security, adjusting fixtures to produce a long longitudinal pattern would require fewer lights to illuminate an area or street fixtures should be configured to have good backside cutoff properties, and changing reflectors should be considered. The distance light travels across the roadway parallel to the mounting arm of the fixture refers to its transverse distribution and is dependent on the type of reflector within the fixture (Figure 16). It is preferable to install Type I, II, and III reflectors in street lights facing the ocean due to their narrow transverse properties. Type II and III reflectors in fixtures facing away from the beach may be sufficient to prevent direct illumination of the beach depending on their height and distance from the beach. Other methods that should be considered include adding a dark non-reflective internal shield to reduce the lighting footprint and amount of light cast toward the beach and aligning the mounting angle of the fixture away from the beach. Additional consideration could be given to replacing the parking area lights that are immediately adjacent to the dunes with either fully hooded fixtures or low-mounted, louvered bollard fixtures to reduce the amount of light trespass onto nesting beaches (Figure 17).

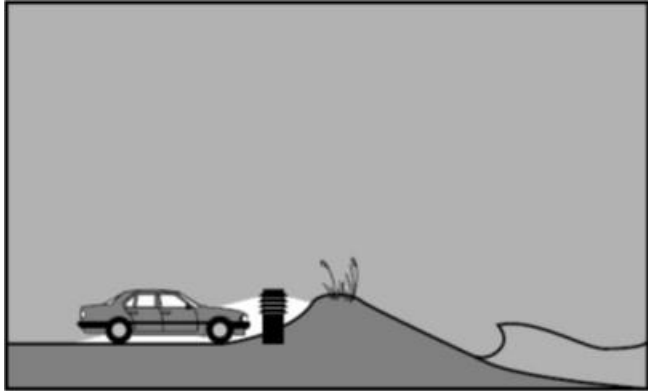
It was noted during the post-nesting/hatching survey that six fixtures within and adjacent to the Shifting Sands Club (Building 187) parking lot had been changed over to arm-mounted area “cobrahead” LED fixtures. These fixtures produce white, broad spectrum light. The type of LEDs installed in these fixtures should be determined. The type of LEDs that are currently most commonly used have high concentration of blue wavelength light and a correlated color temperature (CCT) of 5,500 Kelvins (K), termed as blue-rich white light (BRWL) LEDs (International Dark Sky Association 2010a, b). Manufacturers have started producing LEDs with

lower CCT values (2,600 – 4,100 K) that produce light with a lower fraction of light in the blue wavelength. If it is determined that new street and parking lot fixtures contain BRLW LEDs, consideration should be given to replace through attrition BRWL LEDs with high-efficiency, low CCT bright white LEDs that produce light with a lower fraction of their energy in the blue wavelength. (400 – 475 nm). It has also been found that LEDs under 3,700 K emit and broader range of frequencies that improves color rendition and produces less glare than higher CCT LEDs (International Dark Sky Association 2010a, b).



Source: Florida Power & Light Company 1998

Figure 16. Light distribution patterns (lighting footprints) for street lights with different types of reflectors.



Source: Witherington and Martin 2003

Figure 17. Louvered, low-mounted bollard fixtures for parking area lights immediately adjacent to dunes

Prior to any additional construction or improvements to facilities that are adjacent to the beach in which light sources are replaced or installed, planners should consult resources that identify sea turtle friendly lighting such as the following:

- Witherington and Martin (2003), Understanding, assessing, and resolving light-pollution problems on sea turtle nesting beaches
- International Dark Sky Association (2000), Outdoor lighting code handbook, Version 1.14. Available at www.darksksociety.org/handouts/idacodehandbook.pdf.
- Florida Fish and Wildlife Conservation Commission (2015), Marine turtles and lights, Available at <http://www.myfwc.com/wildlifehabitats/managed/sea-turtles/lighting/#Solutions%20to%20Decrease%20Light-Pollution>
- Florida Power & Light Company. 1998. Florida Fish and Wildlife Commission. Coastal roadway lighting manual; A handbook of practical guidelines for managing street lighting to minimize impacts to sea turtles. Available at http://myfwc.com/media/1421691/Coastal_Roadway_Lighting_Manual.pdf

VIRGINIA ARMY NATIONAL GUARD - CAMP PENDLETON SURVEY AREA

VAARNG-CP is located in the tidewater area of southeastern Virginia in the southeastern portion of the City of Virginia Beach (Figure 18). VAARNG-CP is just north of NASO-DNA, is situated along the Atlantic Ocean, and has approximately 0.23 mi (0.37 km) of intertidal beach and primary and secondary coastal dune habitat that is continuous with NASO-DNA beaches (VAARNG 2004). The beaches on VAARNG-CP contain favorable habitats for the federally listed sea turtle species and several state-listed rare plant species (VAARNG 2004). The shoreline of VAARNG-CP and adjacent facilities that could be potential sources of light are shown on Figure 19.

METHODS

Desktop Analysis

A desktop analysis was performed using Navy-provided GIS layers and aerial imagery of base boundaries, the coastline, and facilities (e.g., buildings, roads, parking lots) and utilities that have the potential to generate either direct or indirect light that may be visible from the beach. A quarter-mile buffer from the shoreline inland was overlaid on the aerial images in order to focus on sources that had the highest potential to be a source of direct or indirect light. Areas of interest for the field surveys were identified based on the results of the desktop analysis, but no light sources outside of these areas were excluded from consideration. Maps were used during the surveys to orient surveyors on the beach and assist in the identification of potential light sources observed from the beach.

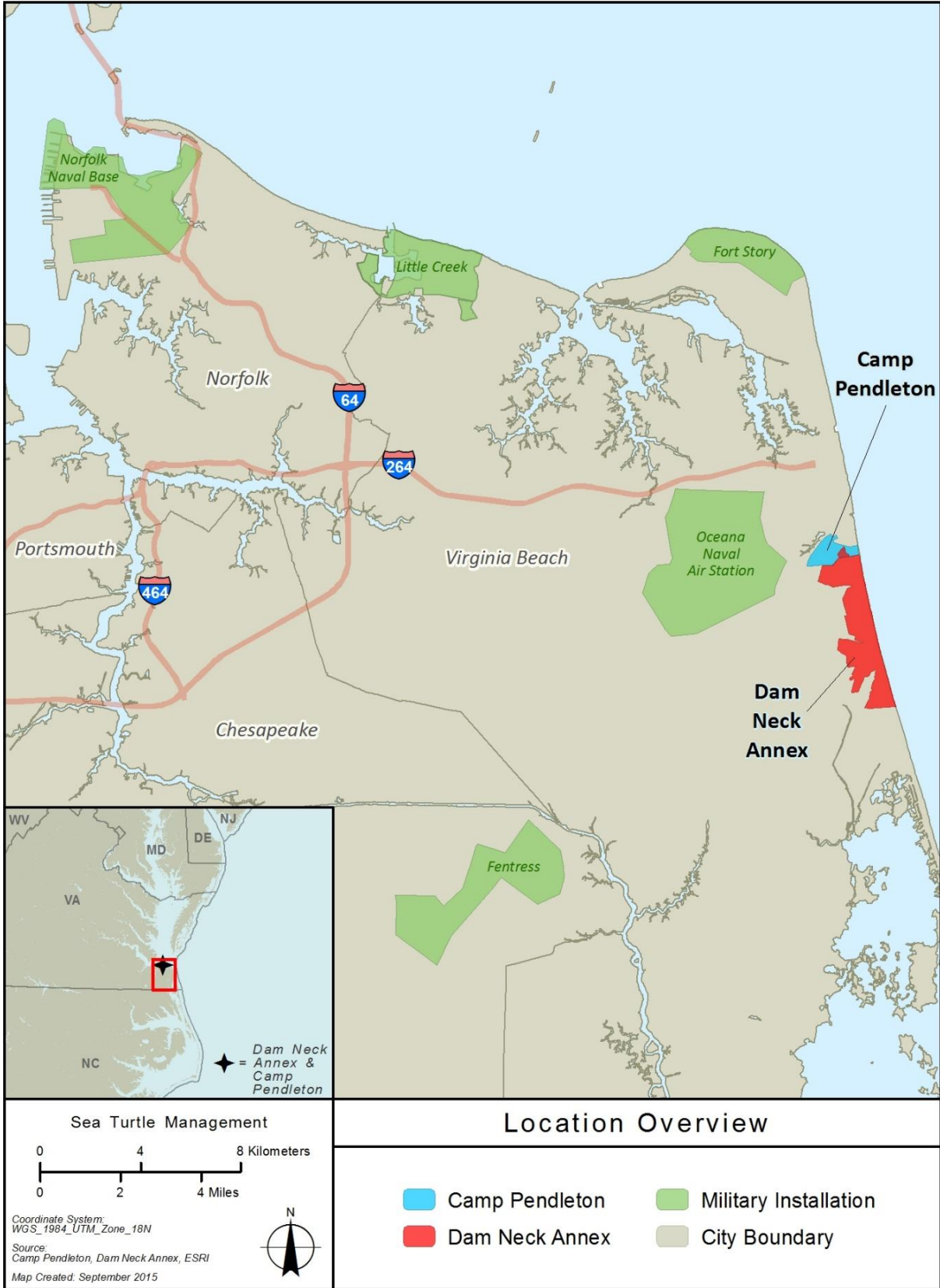


Figure 18. Virginia Army National Guard Camp Pendleton

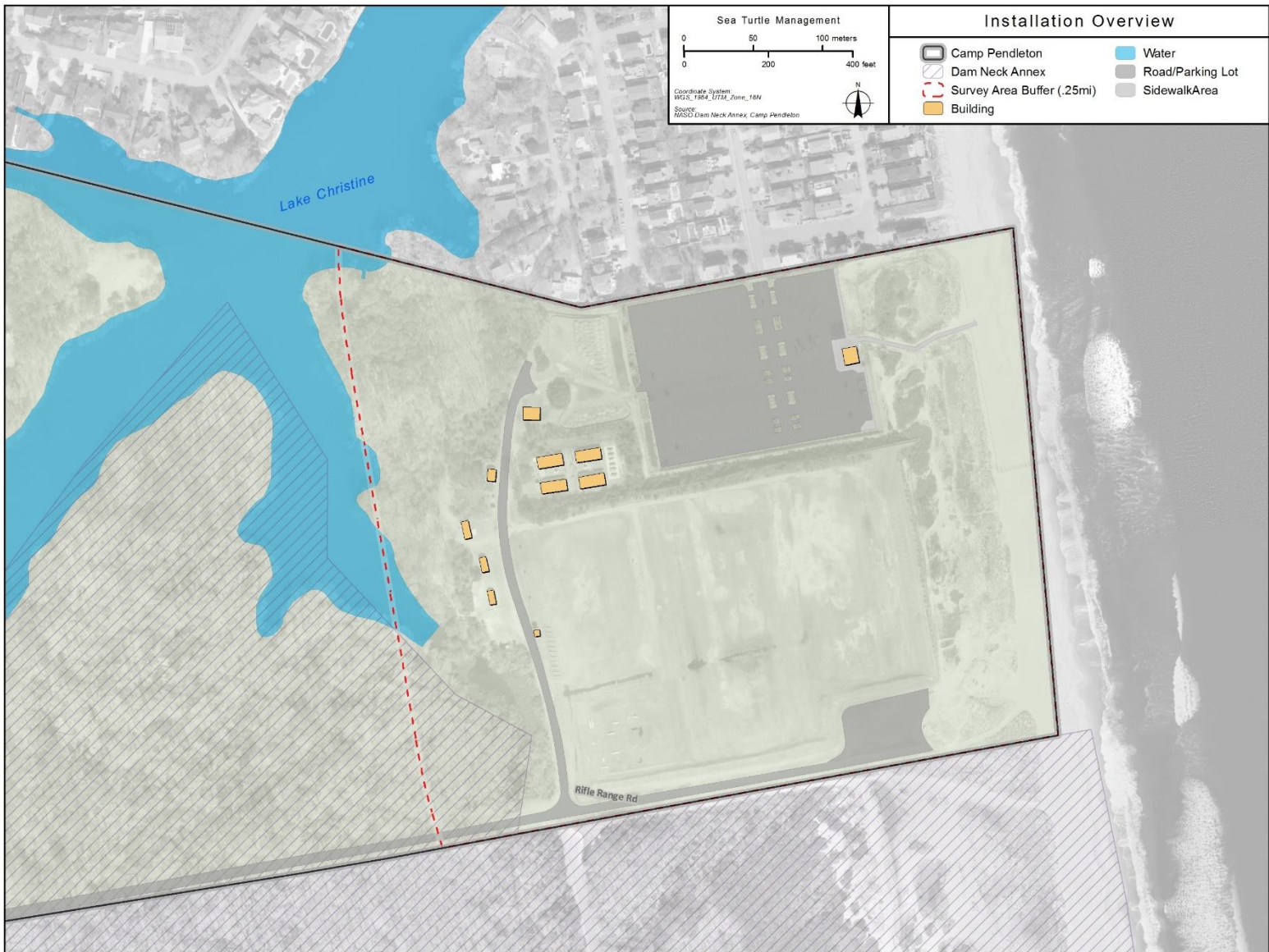


Figure 19. Virginia Army National Guard – Camp Pendleton survey area

Initial Daytime Surveys

Daytime surveys were conducted both along the beach face and behind the rear dunes and allowed the surveyors to familiarize themselves with the areas to be surveyed at night and identify likely sources of light to be investigated at night. During the beach surveys, surveyors walked just above the swash line looking inland to identify potential light sources (e.g., street lights, security lights, buildings) and noted their findings for follow up during the surveys behind the dunes. During these dune surveys, they evaluated the facilities and utilities identified during the beach surveys and the desktop analysis. The primary focus was on those facilities and utilities identified during the beach survey, those closest to the beach, as well as those thought to have the highest potential to produce direct or indirect light visible from the beach. All potential sources of light were documented by noting the building number and/or its GPS location and type of fixture. Location coordinates were collected using a Trimble GeoXT™ handheld (Datum WGS 1984; Latitude/longitude; sub-meter accuracy in real time; 50 centimeter accuracy post processed; PDOP – 8 resulting in a lowest acceptable distance error of 10 meters). Surveyors also reference photographs of light fixtures and recorded the photograph number to document potential light sources. A predicted impact (i.e., direct or indirect) was also noted if it seemed reasonably certain.

Surveyors conducted the daytime survey at VAARNG-CP on 3 April 2014 at approximately 1400 hours. They accessed the beach at the public beach access located at the end of Rifle Range Road and began the beach survey at the NASO-DNA and VAARNG-CP installation boundary and walked north until reaching the installation's northern boundary and then returned to the starting point. Inland surveys were conducted at the rifle range.

Nighttime Surveys

The intent of the nighttime surveys was to identify the light sources that are visible on VAARNG-CP beaches with the potential to impact sea turtles and classify them as either direct or indirect light sources. Four nighttime surveys were conducted: one during the pre-nesting season, two during nesting season, and one at the end of nesting season and the beginning of hatching. Surveys occurred within 2 to 14 days after a full moon and started after 2100 hours Eastern Standard Time (EST). The specific dates of each survey are provided below.

The same basic procedures described for daytime procedures were followed for nighttime surveys although specific routes changed due to access schedules for different facilities.

Surveyors walked just above the swash zone looking inland to identify sources and impact of lights visible from the beach. Afterwards, the surveys continued inland. During inland surveys, surveyors located the sources identified during the beach survey and characterized them by the observed impact, type of fixture, type of light, and specific location of the light source. Where possible, coordinates for all light sources were collected using a Trimble GeoXT™ handheld (Datum WGS 1894; Latitude/longitude; sub-meter accuracy in real time; 50 centimeter accuracy post processed; PDOP – 8 resulting in a lowest acceptable distance error of 10 meters). In cases where it was not possible to collect GPS coordinates (e.g., location not accessible, location blocked satellite acquisition), surveyors either used the map on the GPS to estimate the location of the light and document coordinates or marked the light source locations on survey maps and documented them in data collection sheets.

Pre-nesting Season Surveys

Pre-nesting nighttime surveys at VAARNG-CP were conducted on 15 April 2015 from 2200-2230 hours. The same basic procedures described for daytime procedures were followed.

Nighttime beach surveys focused on identifying the inland locations of direct and indirect light sources visible from the beach. The beach was accessed from the same location as the daytime survey, and surveyors followed the same route. During the inland surveys, they located the sources identified during the beach survey and characterized them by the observed impact, type of fixture, type of light, and specific location of the light source.

Nesting Season Surveys

Nesting season nighttime surveys were conducted on 6 June 2015 and again on 12 June 2015. These surveys were accomplished to document any changes or additions to light sources on VAARNG-CP from the pre-nesting surveys. Maps generated from the pre-nesting nighttime survey data were used to identify new and changed impacts. The survey on 6 June started at approximately 0100 hours and lasted an hour. The 12 June survey began at approximately 2330 hours and was completed at 0030 hours on 13 June. The survey route followed the same route as that of the pre-nesting survey.

Post-nesting/Hatching Season Surveys

The post-nesting/hatching season survey was accomplished on 10 October 2015 starting at 0030 hours and lasted approximately 1 hour. The beach survey began on the northern portion of VAARNG-CP beach leased to the City of Virginia Beach and was completed at the installation boundary with NASO-DNA. Surveyors used maps generated from previous surveys to identify any changes that may have occurred from previous surveys. Any lights that were identified from beach surveys were located and characterized by observed impact, type of fixture, type of light, and specific location of the light source.

RESULTS

Three light sources on VAARNG-CP are visible from the beach, one direct and two indirect (Table 4; Appendix A, Map 6). No light sources were noted at the firing range that is adjacent to the beach and this location does not have electricity. The restroom facility on the Croatan Beach parking (land leased to the City of Virginia Beach) has two wall-mounted area lights (Figure 20) that illuminate the northern upper wall and roof peak the building. This light is only visible through the dune cut through with the beach access boardwalk. In addition, the fence that marks the northern boundary of the leased Croatan property has a small, solar-powered LED flood lamp mounted on one of the fence post that illuminates a small United States flag mounted on an adjacent post (Figure 21). Of the data collected using the Trimble GeoXT™ handheld, 84 percent of all points were accurate to within less than 1 meter, 98 percent were accurate to within less than 5 meters, and 100 percent were accurate to within less than 9 meters.

The other light sources visible from VAARNG-CP beaches included the off-base residential areas on the northern edge of the base (Figure 22) and the top of the radar dome located in the MACS-24 compound on NASO-DNA.

Table 4. Location, fixture type and observed impacts of light sources identified on Virginia Army National Guard – Camp Pendleton

Location, fixture description, and lamp type	Observed impact		
	Direct	Indirect	Total
Croatan Beach restroom facility Wall-mounted area “Wall pak” High-pressure sodium White, broad-spectrum		1 1	1 1
VAARNG-CP north boundary Solar flood lamp White, board-spectrum LED	1		1
Total	1	2	3



Figure 20. Lights identified at the restroom facilities on the Croatan Beach area leased to the City of Virginia Beach



Figure 21. Solar-powered light-emitting diode lamp installed on the northern boundary fence of Virginia Army National Guard – Camp Pendleton



Figure 22. Residential area adjacent to the northern boundary of Virginia Army National Guard – Camp Pendleton

DISCUSSION

Light pollution on or near beaches can reduce the reproductive success of sea turtles by disrupting the behaviors of nesting females and hatchlings. Artificial lights on nesting beaches can deter adult females from emerging from the water, affect nest site selection, disrupt the seaward orientation of adult females after nesting, and disrupt the seaward orientation of hatchlings after emergence from the nest (Witherington and Bjorndal 1991, Witherington 1992, Witherington and Martin 2003, Tuxbury and Salmon 2005, Brei et al. 2014, Rivas et al. 2015).

During the surveys, surveyors identified three lighting sources that contribute to the direct and indirect artificial light visible from VAARNG-CP beaches. These sources were elevated fixtures on building walls and fence posts (see Table 4). Two sources contributed to indirect light, illuminating the upper portion of the restroom facilities on Croatan Beach. One light source was installed on a fence post used to mark the beach boundary.

The best method of solving light pollution is to manage the light rather than eliminating it (Witherington and Martin 2003). The principal sources of light that cause problems for sea turtles is that which “spills over” onto the beach from the areas that are intended to be illuminated. Managing this spillage can resolve many of the impacts identified during the surveys.

There is no set criteria for the acceptable level of light intensity to mitigate potential impacts to turtles; factors such as the level of natural light and the availability of other visual clues such as dunes and vegetation vary widely, and the amount of artificial lighting that may interfere with nesting or disorient hatchlings differs greatly from one location to the next (Witherington and Martin 2003). The most effective mitigation method is to minimize the amount of artificial light as much as possible using the best available technology.

General Recommendations

The general measures listed below should be considered individually or together based on the need, type, intensity, and orientation of the light source without compromising safety and security. How these types of changes to adjust the amount and type of light can reduce the impact to beaches are illustrated on Figure 23. These measures should also be considered for any future construction of facilities near the beach such as at the rifle range or the beach access.

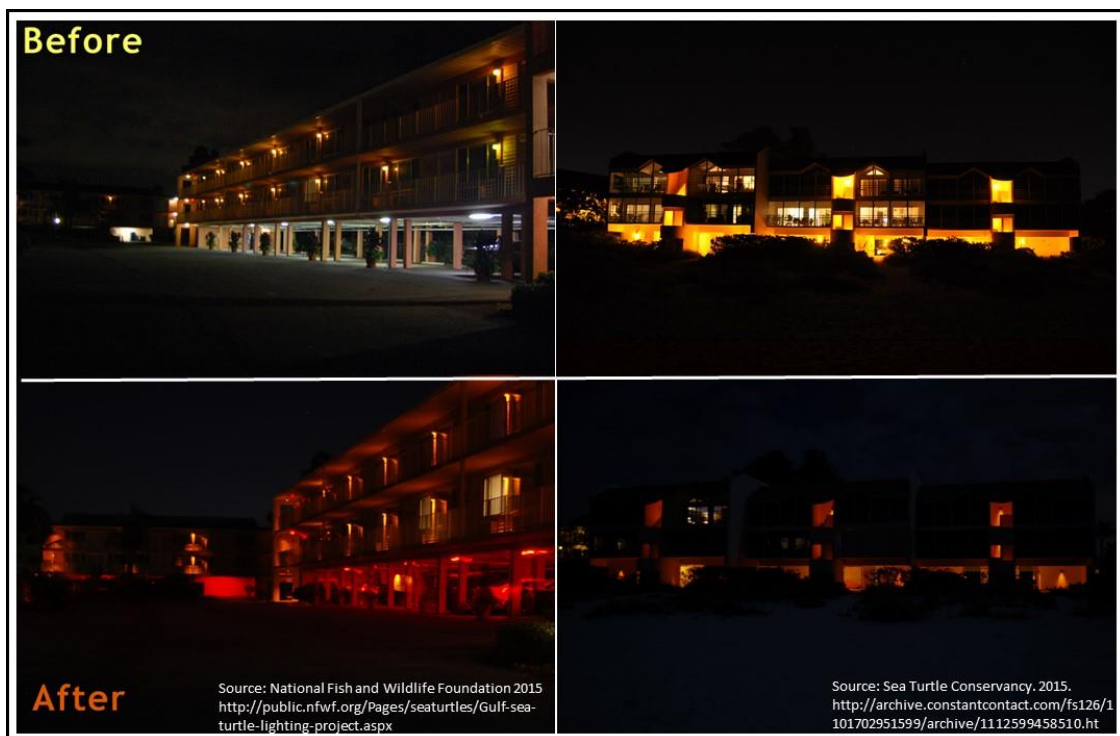


Figure 23. Examples illustrating the results of strategies to reduce and change light sources to minimize impacts to sea turtles.

Eliminating Unnecessary Lights

The direct and indirect light sources should be evaluated based on their effectiveness and the lighting needs of this installation. Reducing the use of lights is the easiest and least expensive method to reduce the amount of light visible from the beach, although safety and security requiring the use of artificial lighting must remain a priority. Where possible, unnecessary light

sources should be eliminated. Unnecessary light sources may include those that illuminate areas which do not require security and areas that are vacant and do not have foot traffic, as well as decorative light sources and those light sources that provide more than adequate lighting for a particular function (Witherington and Martin 2003).

Minimizing Lighting from Outdoor Sources

The simplest method to reduce the impact of artificial lighting on sea turtles is to prevent light from reaching the beach although this is not always a practical solution. Fixtures that are directly visible from the beach can be realigned, modified, repositioned, or shielded to keep light from reaching the beach (Florida Power & Light Company 1998). The following is a list of recommended solutions compiled from the Florida Fish and Wildlife Conservation Commission (2011), Witherington and Martin (2003), and Florida Power & Light (1998) to minimize the amount of light reaching the beach from existing light sources:

1. Turn off lights that are not essential for safety or security. This is the simplest and less expensive method to minimize light trespass onto beach areas. Lighting only needs to be turned off during the nesting and hatching season.
2. Reduce the wattage of the lamps used to the lowest level necessary to fulfill the purpose for the light and remain within the manufacture's guidelines. This will reduce the amount of light emitted and, subsequently, reaching the beach.
3. Reposition luminaires to better focus the light to where it is most needed.
4. Substitute high-watt, multidirectional luminaires with low-watt, directional luminaires that are directed away from the beach.
5. Install shields on light sources that are sufficiently opaque, large, and positioned to prevent light from reaching the beach.

6. Recess light sources and position them to direct the light downward and away from the beach.
7. Reduce the height of pole-mounted and arm-mounted luminaires. The lower a light source is mounted, the less area it will illuminate. In addition, lower-mounted luminaires may also be better shielded by dunes, vegetation, and buildings.
8. Take advantage of natural light screens, such as dunes and vegetation, to shield luminaires.
9. Install timers or motion detectors so that the light is illuminated only when it is most needed. These are relatively inexpensive solutions, yet they have some limitations in their use and efficacy. Timers are minimally effective since nesting and hatching can take place throughout the night and should be set to turn off early in the evening. Motion detectors can be a better solution than timers, but they should not be used in high traffic areas visible from the beach and can only be used with incandescent lighting. If used, motion detectors work well with yellow bug-light bulbs.

Minimizing Lighting from Indoor Sources

Indoor lighting that is visible from the beach also has the potential to disrupt sea turtle nesting and hatching. These sources are typically from buildings located close to the beach with windows that are visible above the dunes. Indoor lighting that trespasses onto the beach is easily eliminated and typically involves a few simple and inexpensive methods. Lights in rooms that are not in use should be turned off, and lamps can be repositioned away from windows that are visible from the beach. Windows that are visible from the beach can be tinted to reduce the amount of light passing through the glass using either manufactured tinted glass or with applied

film. Installing and closing opaque curtains or blinds and closing them after dark can block a majority of light that might otherwise trespass onto beaches.

Using Alternative Long-Wavelength Light Sources

As previously discussed, it is not always practical to eliminate all light sources that are visible from the beach. In these instances, steps should be considered to minimize the use of light sources that produce the most disruptive wavelengths of light. In areas where light is needed in areas close to the beach, the use of long-wave length light sources should be considered (Florida Power & Light Company 1998).

Based on studies on physiological spectral sensitivity, hatchling orientation with respect to laboratory and commercial light sources, and spectral profiles of commonly used lamps, white, broad-spectrum lights are known to be extremely disruptive and HPS light sources are thought to be highly disruptive to sea turtles (Witherington and Martin 2003).

The use of alternative light sources in place of these HPS and white, broad-spectrum light sources should be evaluated. Alternative light sources which are known to be minimally disruptive to sea turtles include LPS vapor lighting, yellow filters, yellow or amber incandescent light bulbs (bug lights), and red, orange, or amber LED lighting (Witherington and Martin 2003; FWC 2011). These types of light bulbs and sources are on the Florida Fish and Wildlife Conservation Commission's list of approved sea turtle lighting (FWC 2011). The Florida Wildlife Commission (2011) approves lamps that produce light that measures greater than 560 nanometers (nm) for sources visible from and adjacent to turtle nesting beaches. Acceptable lamps include:

- LPS 18w and 35w;
- red, orange, or amber LED (true red, orange, or amber diodes, NOT filters);

- true red neon; and
- other lighting sources that produce light of 560 nm or longer.

Enhancing Dune Profile and Using Light Screens

Natural dune systems are highly variable, dunes grow, shrink, and are shaped by wind and water (Brome 2002). Dune systems may have areas with large dunes and small, low dunes only a few hundred yards away. In addition, foredunes often contain natural gaps such as blowouts and overwash passes.

As reviewed in Witherington and Martin (2003), several researchers have found that improper orientation is exacerbated when the dune profile is low or sparsely vegetated. The dune silhouette may influence hatchling behavior by providing visual cues, shielding light, or both since hatchlings tend to move away from darkly silhouetted objects. In areas that may have a low dune profile, restoring dunes to be similar in appearance to the preexisting or adjacent natural dunes may be an option to provide more natural orientation cues for hatchlings. This method may be considered in locations such as old, unused beach access points or in areas where erosion has reduced the profile to an extent that it no longer provides sufficient visual cues for sea turtle hatchlings.

Small areas can be restored using methods such as planting native pioneer dune vegetation (e.g., American beachgrass, sea oats, and bitter panicum) and installing sand fencing (Broome 2002). If the restoration of larger areas is considered, methods such as bulldozing and dredging may be necessary. It must be noted, however, that any dune manipulation should be carefully considered and planned. Sand fencing should not be installed in areas where turtles may nest. Moreover, dune restoration typically requires several years of continuous actions. For example, dune building with sand fencing requires the installation of an additional row of fencing over several

years, placing new fencing at the seaward dune toe when the preceding fence is filled approximately two-thirds high (O'Connell 2008). The use of bulldozing and dredging are expensive and can be extremely damaging to the coastal environment (Broome 2002). In addition, large dune building projects may affect adjacent ecology by changing the micro-climate and negatively impacting plant communities (O'Connell 2008).

Light screens may be considered to prevent beachfront lighting from shining directly on the beach, created from vegetation buffers, natural features, or artificial screens such as shade cloth and privacy fencing. Light screens, also known as ground level barriers, are used extensively in Florida to block existing light sources and are required in accordance with coastal city and county ordinances. Ground level barriers should be placed so that they do not interfere with nesting sea turtles or hatchlings or cause short- or long-term damage to the beach-dune system. Artificial screens would only be necessary during nesting and hatching season or until vegetation has become tall and dense enough to block the light (Martin 2000).

Specific Recommendations

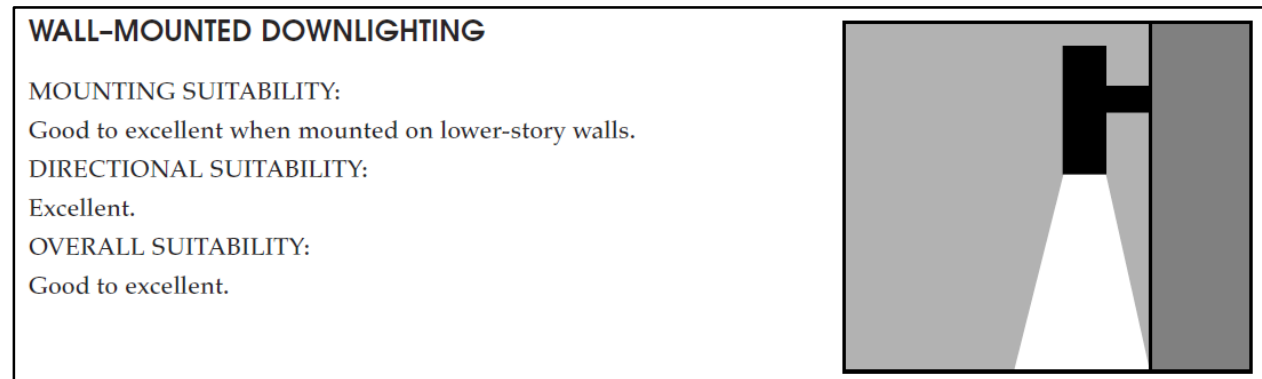
If the solar-powered LED lamp on the fence post cannot be removed, consideration should be given to move and reorient the fixture so that the light is directed at an upward angle and away from the water. A shield could also be used to focus the light only on the intended area. Even though this light does not shine on the beach, its location in the swash zone of the beach may disrupt hatchling dispersal and cause them to linger in the glow, thus increasing mortality from predation.

The indirect light from the restroom facility in the Croatan Beach parking lot is only visible on a very narrow portion of the beach. In order to reduce this impact, downlighting should be considered in place of the wall-mounted area lights (Figure 24). This would eliminate the light

that is illuminating the upper wall and roof peak. Any change made to these lights would likely need to be coordinated through the City of Virginia Beach.

Prior to any improvements to facilities at the firing range or beach access in which light sources are replaced or installed, planners should consult resources that identify sea turtle friendly lighting such as the following:

- Witherington and Martin (2003), Understanding, assessing, and resolving light-pollution problems on sea turtle nesting beaches
- International Dark Sky Association (2000), Outdoor lighting code handbook, Version 1.14. Available at www.darkskysociety.org/handouts/idacodehandbook.pdf.
- Florida Fish and Wildlife Conservation Commission (2015), Marine turtles and lights, Available at <http://www.myfwc.com/wildlifehabitats/managed/sea-turtles/lighting/#Solutions%20to%20Decrease%20Light-Pollution>
- Florida Power & Light Company. 1998. Florida Fish and Wildlife Commission. Coastal roadway lighting manual; A handbook of practical guidelines for managing street lighting to minimize impacts to sea turtles. Available at http://myfwc.com/media/1421691/Coastal_Roadway_Lighting_Manual.pdf



Source: Witherington and Martin 2003

Figure 24. Example and suitability of wall-mounted downlighting

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Appendix A

Naval Air Station Oceana – Dam Neck Annex and Virginia Army National Guard
– Camp Pendleton

Lighting Survey Observed and Expected Impact Maps

List of Maps

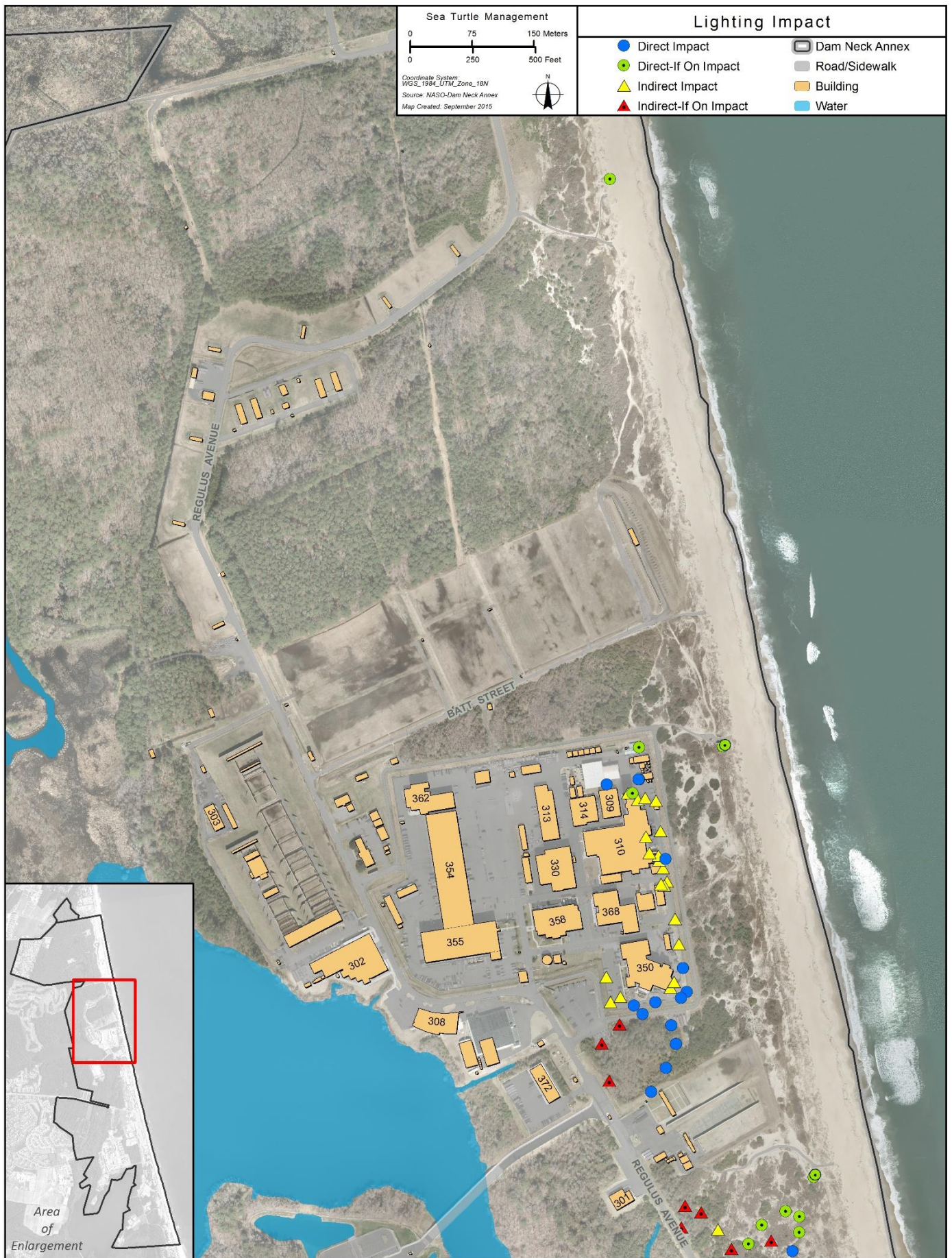
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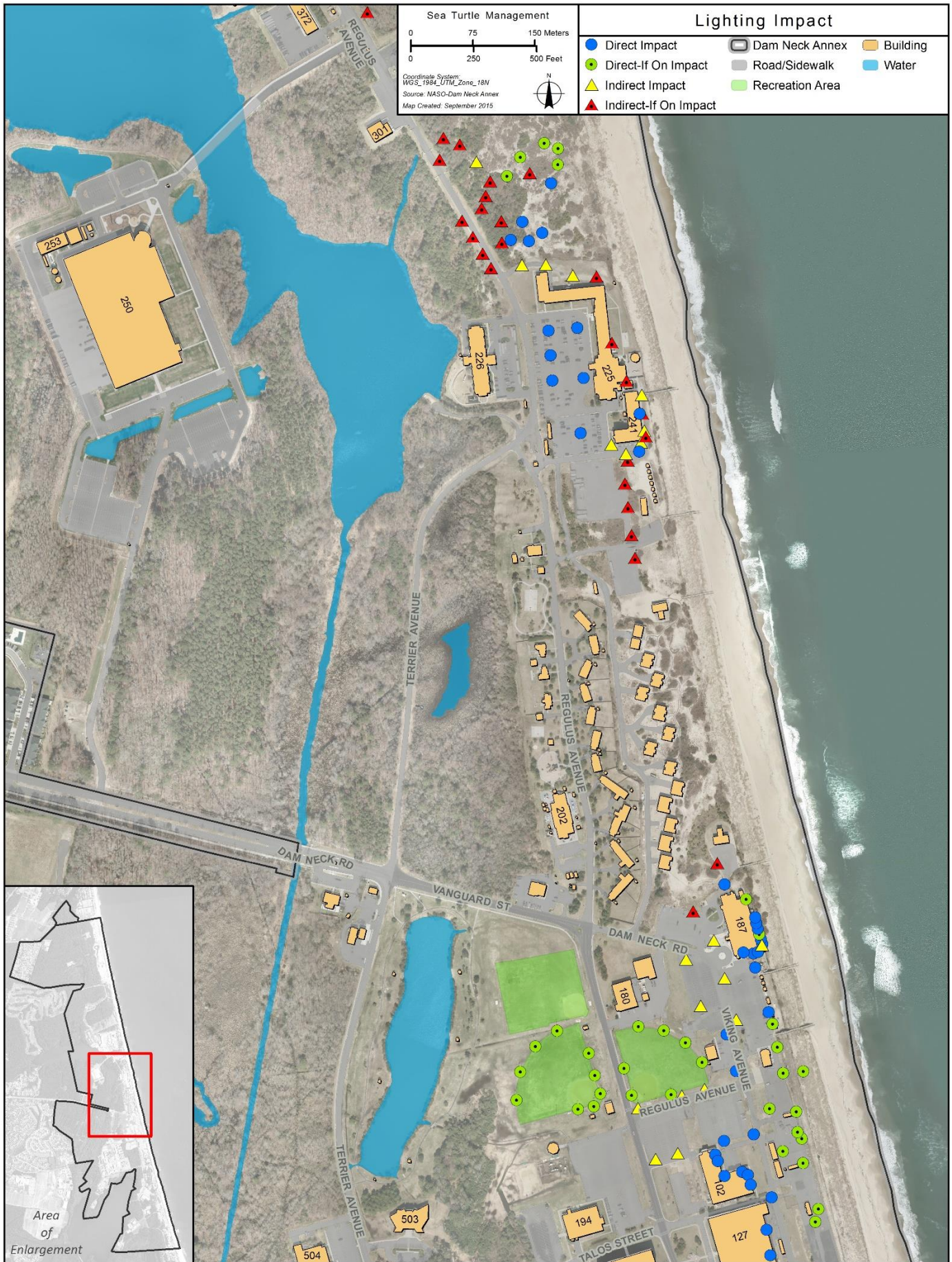
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Map 6. Virginia Army National Guard – Camp Pendleton



Appendix B

Naval Air Station Oceana – Dam Neck Annex and Virginia Army National Guard
– Camp Pendleton

Lighting Survey Data Sheets

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The data presented in the table below are a consolidation of all field data sheets from all surveys. The GPS coordinates presented here are the pre-processed GPS coordinates and may be slightly different than the coordinates contained in the post-processed GIS database.

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
Ball fields	DNA100	36°46'53.451"	75°57'35.915"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.
Ball fields	DNA101	36°46'54.324"	75°57'37.572"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.
Ball fields	DNA102	36°46'53.712"	75°57'38.605"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.
Ball fields	DNA103	36°46'52.703"	75°57'39.325"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.
Ball fields	DNA104	36°46'51.600"	75°57'39.502"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.
Ball fields	DNA89	36°46'53.932"	75°57'31.316"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.
Ball fields	DNA90	36°46'54.397"	75°57'32.289"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.
Ball fields	DNA91	36°46'54.536"	75°57'33.491"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.
Ball fields	DNA92	36°46'52.929"	75°57'34.198"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	White, broad-spectrum	Visible from beach. Lamp type obtained from Navy utility data
Ball fields	DNA93	36°46'51.857"	75°57'33.822"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	White, broad-spectrum	Visible from beach. Lamp type obtained from Navy utility data
Ball fields	DNA94	36°46'51.958"	75°57'31.937"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	White, broad-spectrum	Visible from beach. Lamp type obtained from Navy utility data
Ball fields	DNA95	36°46'53.157"	75°57'30.352"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
Ball fields	DNA96	36°46'51.366"	75°57'36.478"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.
Ball fields	DNA97	36°46'51.448"	75°57'35.693"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.
Ball fields	DNA98	36°46'51.888"	75°57'35.342"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.
Ball fields	DNA99	36°46'52.587"	75°57'35.614"	Pole-mounted stadium lighting arrays	1	6969	Direct- if on	Likely white, broad-spectrum	Fixture is visible from the beach. Navy data indicates the lamps in some of the stadium lighting are mercury vapor. Mercury vapor lamps produce white, broad-spectrum light. If any lights have been upgraded, they may contain high pressure sodium lamps.
Beach Access (North end of Regulus Avenue)	DNA1	36°48'17.271"	75°57'50.516"	Pole-mounted flood	1	1125	Direct- if on	Not on	Broken, fixture was lying on the ground. Would be direct if repaired.
Building 102	DNA218	36°46'49.550"	75°57'29.684"	Wall-mounted area "Wall pak"	1	7017	Direct	Gold-peach, indicative of HPS	Was not visible until completion of beach replenishment
Building 102	DNA219	36°46'49.297"	75°57'29.561"	Wall-mounted area "Wall pak"	1	7017	Direct	Gold-peach, indicative of HPS	Was not visible until completion of beach replenishment
Building 102	DNA220	36°46'48.721"	75°57'29.227"	Wall-mounted area "Wall pak"	1	7017	Direct	Gold-peach, indicative of HPS	Was not visible until completion of beach replenishment
Building 102	DNA221	36°46'48.890"	75°57'28.366"	Wall-mounted area "Wall pak"	1	7017	Direct	Gold-peach, indicative of HPS	Was not visible until completion of beach replenishment
Building 102	DNA222	36°46'48.770"	75°57'28.084"	Wall-mounted area "Wall pak"	1	7017	Direct	Gold-peach, indicative of HPS	Was not visible until completion of beach replenishment
Building 102	DNA223	36°46'48.385"	75°57'27.940"	Wall-mounted area "Wall pak"	1	7017	Direct	Gold-peach, indicative of HPS	Was not visible until completion of beach replenishment
Building 102 parking	DNA84	36°46'50.116"	75°57'29.305"	Arm-mounted area - cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	
Building 102 parking	DNA88a	36°46'49.376"	75°57'32.655"	Arm-mounted area - cobrahead (double)	1	7015	Indirect	Gold-peach, indicative of HPS	
Building 102 parking	DNA88b	36°46'49.658"	75°57'31.625"	Arm-mounted area - cobrahead (double)	1	7015	Indirect	Gold-peach, indicative of HPS	

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
Building 127	DNA229	36°46'39.928"	75°57'24.572"	Wall-mounted flood	1	7021	Direct	Gold-peach, indicative of HPS	East facing. Lights located along roof edge. This area of the building is behind a fence with no access, point estimated from GPS map.
Building 127	DNA230	36°46'40.507"	75°57'25.495"	Wall-mounted flood	1	7022	Direct	Gold-peach, indicative of HPS	East facing. Lights located along roof edge. This area of the building is behind a fence with no access, point estimated from GPS map.
Building 127	DNA231	36°46'41.035"	75°57'25.626"	Wall-mounted flood	1	7022	Direct	Gold-peach, indicative of HPS	East facing. Lights located along roof edge. This area of the building is behind a fence with no access, point estimated from GPS map.
Building 127	DNA232	36°46'45.622"	75°57'26.945"	Wall-mounted flood	1	7026 / 7100	Direct	Gold-peach, indicative of HPS	East facing. Lights located along roof edge. This area of the building is behind a fence with no access, point estimated from GPS map.
Building 127	DNA233	36°46'46.624"	75°57'27.142"	Wall-mounted flood	1	7026 / 7100	Direct	Gold-peach, indicative of HPS	East facing. Lights located along roof edge. This area of the building is behind a fence with no access, point estimated from GPS map.
Building 127	DNA234	36°46'39.400"	75°57'24.491"	Wall-mounted flood	1	7026 / 7100	Direct	gold-peach, indicative of HPS	South facing. Lights located along roof edge, point estimated from GPS map.
Building 127 parking	DNA72	36°46'39.841"	75°57'23.260"	Arm-mounted area - cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	
Building 127 parking	DNA73	36°46'38.559"	75°57'22.769"	Arm-mounted area - cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	
Building 127 parking	DNA74	36°46'39.074"	75°57'21.543"	Pole-mounted flood (double)	1	7028	Direct- if on	Not on	Fixtures visible from beach.
Building 127 parking	DNA75	36°46'40.111"	75°57'21.921"	Pole-mounted flood (double)	1	7028	Direct- if on	Not on	Fixtures visible from beach.
Building 127 parking	DNA76	36°46'41.128"	75°57'22.265"	Pole-mounted flood (double)	1	7028	Direct- if on	Not on	Fixtures visible from beach.
Building 127 parking	DNA77	36°46'38.617"	75°57'24.292"	Arm-mounted area - cobrahead (flat faced)	1	7099	Direct	White, broad-spectrum	
Building 127 parking	DNA78	36°46'38.274"	75°57'25.619"	Arm-mounted area - cobrahead (flat faced)	1	7099	Indirect	White, broad-spectrum	
Building 127 parking	DNA79	36°46'37.143"	75°57'25.187"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Building 127 parking	DNA80	36°46'36.536"	75°57'25.558"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Building 127 parking	DNA81	36°46'37.355"	75°57'26.453"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
Building 127 parking	DNA82	36°46'38.501"	75°57'26.923"	Arm-mounted area - cobrahead (flat faced)	1	7099	Indirect	White, broad-spectrum	
Building 127 parking	DNA83	36°46'37.462"	75°57'23.957"	Arm-mounted cutoff - shoebox (double)	1	7014 / 7101	Indirect	Gold-peach, indicative of HPS	
Building 127 tower	DNA194	36°46'42.943"	75°57'25.197"	Red marker	1	Example B	Direct	Red lens	Located near tower top, could not photograph due to height and angle
Building 132/114 parking	DNA209	36°46'50.217"	75°57'25.467"	Arm-mounted area - cobrahead	1	7454	Direct- if on	Not on	Fixture visible from beach.
Building 132/114 parking	DNA210	36°46'49.261"	75°57'25.396"	Arm-mounted area - cobrahead (flat faced)	1	7456	Direct- if on	Not on	Fixture visible from beach.
Building 132/114 parking	DNA211	36°46'50.493"	75°57'26.611"	Arm-mounted area - cobrahead	1	7454	Direct- if on	Not on	Fixture visible from beach.
Building 132/114 parking	DNA212	36°46'49.394"	75°57'26.486"	Arm-mounted area - cobrahead (flat faced)	1	7456	Direct- if on	Not on	Fixture visible from beach.
Building 132/114 parking	DNA213	36°46'48.543"	75°57'26.065"	Arm-mounted area - cobrahead (flat faced)	1	7456	Direct- if on	Not on	Fixture visible from beach.
Building 153 parking	DNA208	36°46'52.785"	75°57'26.438"	Arm-mounted area - cobrahead (flat faced) Solar	1	7013 / 7449	Direct- if on	Not on	Fixture visible from beach.
Building 153 parking	DNA64	36°46'53.874"	75°57'26.713"	Arm-mounted area - cobrahead (flat faced) Solar	1	7013	Direct- if on	Not on	Fixtures visible from beach.
Building 170	DNA214	36°46'47.461"	75°57'24.623"	Pole-mounted flood (double)	1	7028	Direct- if on	Not on	Fixture visible from beach.
Building 170	DNA215	36°46'46.781"	75°57'25.311"	Arm-mounted area - cobrahead (flat faced)	1	7456	Direct- if on	Not on	Fixture visible from beach.
Building 170	DNA216	36°46'43.088"	75°57'23.569"	Arm-mounted area - cobrahead	1	7454	Direct- if on	Not on	Fixture visible from beach.
Building 170	DNA235	36°46'41.527"	75°57'23.006"	Arm-mounted area - cobrahead	1	7454	Indirect- if on	Not on	
Building 183 Parking	DNA183	36°46'51.294"	75°57'25.774"	Arm-mounted area - cobrahead	1	7454	Direct- if on	Not on	Fixture visible from beach.

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
Building 183 Parking	DNA184	36°46'51.402"	75°57'27.082"	Arm-mounted area - cobrahead	1	7454	Direct- if on	Not on	Fixture visible from beach.
Building 187	DNA130	36°46'57.427"	75°57'27.915"	Wall-mounted area "Wall pak"	1	6949 / 7096	Direct	White, broad-spectrum	South facing
Building 187	DNA131	36°46'57.501"	75°57'27.712"	Wall-mounted area "Wall pak"	1	6949 / 7096	Direct	White, broad-spectrum	South facing
Building 187	DNA132	36°46'57.810"	75°57'27.512"	Wall-mounted area "Wall pak"	1	6948 / 7097	Direct	White, broad-spectrum	East facing
Building 187	DNA133	36°46'57.986"	75°57'27.549"	Wall-mounted area "Wall pak"	1	6948 / 7097	Direct	White, broad-spectrum	East facing
Building 187	DNA134	36°46'58.184"	75°57'27.625"	Wall-mounted area "Wall pak"	1	6948	Direct- if on	Not on	East facing, fixture visible from the beach
Building 187	DNA135	36°46'58.399"	75°57'27.698"	Wall-mounted area "Wall pak"	1	6948 / 7097	Direct	White, broad-spectrum	East facing
Building 187	DNA136	36°46'58.624"	75°57'27.777"	Wall-mounted area "Wall pak"	1	6948 / 7097	Direct	White, broad-spectrum	East facing
Building 187	DNA137	36°46'58.844"	75°57'27.835"	Wall-mounted area "Wall pak"	1	6948 / 7097	Direct	White, broad-spectrum	East facing
Building 187	DNA224	36°46'59.591"	75°57'28.300"	Wall-mounted area "Wall pak"	1	6950	Direct- if on	Not on	East facing and visible from beach. Fixture is located close to building upper deck.
Building 187	DNA225	36°46'57.504"	75°57'28.405"	Wall-mounted area "Wall pak"	1	6949 / 7096	Direct	Gold-peach, indicative of HPS	South facing. Fixture is located under building upper deck.
Building 187 parking	DNA182	36°46'55.250"	75°57'27.159"	Arm-mounted area - cobrahead (flat faced) LED	1	7458	Direct	White, broad-spectrum LED	
Building 187 parking	DNA207	36°46'56.524"	75°57'29.319"	Arm-mounted area - cobrahead (double)	1	7015	Indirect	White, broad-spectrum LED	
Building 187 parking	DNA57	36°46'59.180"	75°57'30.931"	Pole-mounted flood	1	6965	Indirect- if on	Not on	Likely indirect due to height of fixture and proximity to dune.
Building 187 parking	DNA58	36°46'58.064"	75°57'29.879"	Arm-mounted area - cobrahead (flat faced; double) LED	1	7447 / 7457	Indirect	White, broad-spectrum LED	

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
Building 187 parking	DNA59	36°46'57.276"	75°57'31.211"	Arm-mounted area - cobrahead (flat faced) LED	1	7458	Indirect	White, broad-spectrum LED	
Building 187 parking	DNA60	36°46'55.437"	75°57'30.488"	Arm-mounted area - cobrahead (flat faced; double) LED	1	7447 / 7457	Indirect	White, broad-spectrum LED	
Building 187 parking	DNA61	36°46'54.938"	75°57'28.780"	Arm-mounted area - cobrahead (flat faced) LED	1	7458	Indirect	White, broad-spectrum LED	
Building 187 parking	DNA62	36°46'56.978"	75°57'27.855"	Arm-mounted area - cobrahead (flat faced) LED	1	7458	Direct	White, broad-spectrum LED	Was not visible until completion of beach replenishment
Building 187 parking	DNA63	36°46'54.763"	75°57'26.985"	Arm-mounted area - cobrahead (flat faced) Solar	1	7013	Direct- if on	Not on	Fixtures visible from beach.
Building 187 patio	DNA236	36°46'57.810"	75°57'27.512"	Ceiling mounted fluorescent tubes	2	6968	Indirect	White, broad-spectrum, fluorescent tubes	Lights located under the upper deck and immediately adjacent to the rear dune and at enough height to illuminate upper edge of dune.
Building 187 pavilion	DNA55	36°47'01.086"	75°57'29.750"	Arm-mounted flood	1	6967	Indirect- if on	Not on	Broken. Likely indirect due to height of fixture and proximity to dune.
Building 187 pavilion	DNA56	36°47'00.241"	75°57'29.375"	Arm-mounted cutoff - shoebox	1	6961	Direct	Gold-peach, indicative of HPS	
Building 225	DNA4	36°47'20.051"	75°57'34.282"	Wall-mounted area "Wall pak"	1	6948	Indirect- if on	Not on	Likely indirect due to height of fixture and proximity to dune.
Building 225	DNA6	36°47'21.473"	75°57'35.080"	Wall-mounted flood	1	6957	Indirect- if on	Not on	Likely HPS. Likely indirect due to height of fixture and proximity to dune.
Building 225 parking	DNA116	36°47'19.929"	75°57'36.088"	Arm-mounted cutoff - shoebox (double)	1	7014	Direct	Gold-peach, indicative of HPS	Was not visible until completion of beach replenishment
Building 225 parking	DNA117	36°47'20.021"	75°57'36.606"	Arm-mounted cutoff - shoebox (double)	1	7014 / 7105	Direct	Gold-peach, indicative of HPS	Was not visible until completion of beach replenishment
Building 225 parking	DNA118	36°47'22.014"	75°57'36.886"	Arm-mounted cutoff - shoebox (double)	1	7014	Direct	Gold-peach, indicative of HPS	Was not visible until completion of beach replenishment
Building 225 parking	DNA119	36°47'21.900"	75°57'38.321"	Arm-mounted cutoff - shoebox (double)	1	7014	Direct	Gold-peach, indicative of HPS	Was not visible until completion of beach replenishment
Building 225 parking	DNA120	36°47'20.918"	75°57'38.159"	Arm-mounted cutoff - shoebox (double)	1	7014	Direct	Gold-peach, indicative of HPS	Not visible from beach

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
Building 225 parking	DNA121	36°47'23.991"	75°57'35.965"	Arm-mounted area - cobrahead (flat faced) Solar	1	7013	Indirect- if on	Not on	Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Building 225 Parking	DNA52	36°47'24.026"	75°57'37.073"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Building 225 Parking	DNA53	36°47'24.443"	75°57'38.393"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Building 225 Parking	DNA54	36°47'24.425"	75°57'39.571"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Building 241	DNA227	36°47'18.612"	75°57'33.740"	Beach facing windows	38	None	Direct	Interior lights	No photos of building windows were taken.
Building 241	DNA228	36°47'17.738"	75°57'33.439"	Pole-mounted cutoff, round	1	6951	Indirect- if on	Not on	
Building 241	DNA7	36°47'19.366"	75°57'33.654"	Pole-mounted cutoff, round	1	6951 / 7103	Indirect	Gold-peach, indicative of HPS	Behind dune
Building 241	DNA8	36°47'18.041"	75°57'33.314"	Wall-mounted area	2	6958	Indirect	White, broad-spectrum (likely incandescent)	Likely white, broad-spectrum incandescent
Building 241	DNA9	36°47'17.537"	75°57'33.606"	Wall-mounted area	2	6958	Indirect	White, broad-spectrum (likely incandescent)	Likely white, broad-spectrum incandescent
Building 241 parking	DNA105	36°47'12.892"	75°57'33.909"	Arm-mounted area - cobrahead (flat faced) Solar	1	6959	Indirect- if on	Not on	Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Building 241 parking	DNA106	36°47'13.853"	75°57'34.114"	Arm-mounted area - cobrahead (flat faced) Solar	1	6959	Indirect- if on	Not on	Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Building 241 parking	DNA107	36°47'14.994"	75°57'34.391"	Arm-mounted area - cobrahead (flat faced) Solar	1	6959	Indirect- if on	Not on	Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Building 241 parking	DNA108	36°47'15.781"	75°57'34.373"	Arm-mounted area - cobrahead (flat faced) Solar	1	6959	Indirect- if on	Not on	Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Building 241 parking	DNA109	36°47'16.728"	75°57'34.310"	Arm-mounted area - cobrahead (flat faced) Solar	1	6959	Indirect- if on	Not on	Due to height of fixture and proximity to dunes, indirect light from source may be visible.

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
Building 241 parking	DNA110	36°47'17.079"	75°57'34.459"	Pole-mounted cutoff, round	1	6951 / 7103	Indirect	Gold-peach, indicative of HPS	
Building 241 parking	DNA111	36°47'17.239"	75°57'33.831"	Pole-mounted cutoff, round	1	6951 / 7103	Direct	Gold-peach, indicative of HPS	Was not visible until completion of beach replenishment
Building 241 parking	DNA112	36°47'17.430"	75°57'35.117"	Pole-mounted cutoff, round	1	6951 / 7104	Indirect	White, broad-spectrum	
Building 241 parking	DNA115	36°47'17.892"	75°57'36.646"	Arm-mounted area - cobrahead (double)	1	7015	Direct	Gold-peach, indicative of HPS	Was not visible until completion of beach replenishment
Building 241 parking	DNA193	36°47'18.620"	75°57'33.619"	Pole-mounted cutoff, round	1	6951	Indirect- if on	Not on	
Building 310	DNA166	36°47'43.068"	75°57'44.905"	Wall-mounted flood	3	1148	Indirect	Gold-peach, indicative of HPS	East facing. Cluster of three flood lights.
Building 310	DNA167	36°47'43.262"	75°57'44.938"	Wall-mounted area "Wall pak"	1	1147	Indirect	Gold-peach, indicative of HPS	East facing
Building 310	DNA168	36°47'43.383"	75°57'45.364"	Wall-mounted area "Wall pak"	1	1146	Indirect	Gold-peach, indicative of HPS	
Building 310	DNA169	36°47'43.974"	75°57'45.550"	Wall-mounted area "Wall pak"	1	1148	Indirect	Gold-peach, indicative of HPS	East facing
Building 310	DNA171	36°47'45.347"	75°57'45.590"	Wall-mounted area "Wall pak"	1	1149	Indirect	White, broad-spectrum	
Building 310	DNA189	36°47'45.378"	75°57'45.978"	Wall-mounted area "Wall pak"	1	1149	Indirect	White, broad-spectrum	Light illuminates building wall visible from beach.
Building 310	DNA190	36°47'45.618"	75°57'46.471"	Wall-mounted area "Wall pak"	1	1149	Indirect	White, broad-spectrum	Light illuminates building wall visible from beach.
Building 310 (rock wall)	DNA241	36°47'45.616"	75°57'46.235"	Wall-mounted area "Wall pak"	1	None	Direct- if on	Not on	Fixture visible from the beach. Fixture located near the top of the rock wall, about four stories high. Too distant for a photograph.
Building 350	DNA163a	36°47'38.085"	75°57'44.279"	Wall-mounted area "Wall pak"	1	1139	Indirect	Gold-peach, indicative of HPS	East facing
Building 350	DNA163b	36°47'38.306"	75°57'44.117"	Wall-mounted area "Wall pak"	1	1139	Indirect	Gold-peach, indicative of HPS	East facing
Building 350 parking	DNA162	36°47'37.664"	75°57'46.726"	Arm-mounted cutoff - shoebox	1	1161	Indirect	Gold-peach, indicative of HPS	

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
Building 404 parking	DNA196	36°45'38.840"	75°57'05.230"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Building 404 Gate Guard Building.	DNA195	36°45'39.296"	75°57'06.156"	Wall-mounted flood lamp	4	Example A	Indirect- if on	White, broad-spectrum	Missed photo.
Building 465A	DNA185	36°46'11.249"	75°57'14.387"	Wall-mounted flood	1	7451	Direct	Gold-peach, indicative of HPS	
Building 465A	DNA186	36°46'11.478"	75°57'14.162"	Wall-mounted flood	1	7451	Direct	Gold-peach, indicative of HPS	
Building 465A	DNA187	36°46'11.425"	75°57'14.453"	Wall-mounted flood lamp	1	7452	Direct	Yellow, halogen lamp	
Building 465A	DNA188	36°46'11.538"	75°57'14.360"	Wall-mounted flood lamp	1	7452	Direct	Yellow, halogen lamp	
Building 293	DNA226a	36°48'44.005"	75°58'05.133"	Dome skylight	1	None	Direct	Interior lights	Faint, minimal. Skylights located on top, center of dome. No photos showing building were taken.
Building 293	DNA226b	36°48'44.005"	75°58'05.133"	Red marker	1	Example B	Direct- if on	Red lens	Top mounted lights, fixture visible from beach. Unable to obtain a photograph.
Buildings 384/385	DNA36	36°47'27.773"	75°57'41.120"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Buildings 384/385	DNA37	36°47'27.194"	75°57'41.333"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Buildings 384/385	DNA38	36°47'26.707"	75°57'41.353"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Buildings 384/385	DNA39	36°47'26.708"	75°57'41.354"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Buildings 384/385	DNA40	36°47'25.377"	75°57'40.533"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Buildings 384/385	DNA45	36°47'29.143"	75°57'42.676"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Buildings 384/385	DNA46	36°47'29.464"	75°57'43.444"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Buildings 384/385	DNA47	36°47'28.612"	75°57'43.616"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
Building 382	DNA178	36°47'47.475"	75°57'45.955"	Beach facing windows	1	None	Direct- if on	Not on	Interior lights were not on during surveys, however, upper floor windows are visible from beach. No photos of building windows were taken.
Building 382 perimeter	DNA15	36°47'45.915"	75°57'47.452"	Arm-mounted cutoff - shoebox	1	1154	Direct	Gold-peach, indicative of HPS	
Building 382 perimeter	DNA176	36°47'46.240"	75°57'47.465"	Arm-mounted cutoff - shoebox	1	1154	Direct	Gold-peach, indicative of HPS	
Building 382 perimeter	DNA21	36°47'46.110"	75°57'45.889"	Arm-mounted cutoff - shoebox	1	1154	Direct	Gold-peach, indicative of HPS	
Building 370 parking	DNA23	36°47'36.437"	75°57'46.690"	Arm-mounted cutoff - shoebox (double)	1	1164	Indirect- if on	Not on	Likely white, broad-spectrum as other new parking lights in this area. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Building 370 parking	DNA24	36°47'35.737"	75°57'47.474"	Arm-mounted cutoff - shoebox (double)	1	1164	Indirect- if on	Not on	Likely white, broad-spectrum as other new parking lights in this area. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Building 370 parking	DNA25	36°47'34.213"	75°57'47.148"	Arm-mounted cutoff - shoebox (double)	1	1164	Indirect- if on	Not on	Likely white, broad-spectrum as other new parking lights in this area. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Building 370 parking	DNA26	36°47'33.795"	75°57'45.115"	Arm-mounted cutoff - shoebox (double)	1	1164 / 10930	Direct	White, broad-spectrum	Visible due to beach replenishment
Building 370 parking	DNA27	36°47'34.732"	75°57'44.411"	Arm-mounted cutoff - shoebox (double)	1	1164 / 10930	Direct	White, broad-spectrum	Visible due to beach replenishment
Building 370 parking	DNA28	36°47'35.681"	75°57'43.923"	Arm-mounted cutoff - shoebox (double)	1	1164 / 10930	Direct	White, broad-spectrum	Visible due to beach replenishment
Building 370 parking	DNA29	36°47'36.432"	75°57'44.149"	Arm-mounted cutoff - shoebox (double)	1	1164 / 10930	Direct	White, broad-spectrum	Visible due to beach replenishment
Building 370 parking	DNA30	36°47'36.905"	75°57'45.497"	Arm-mounted cutoff - shoebox (double)	1	1164 / 10930	Direct	White, broad-spectrum	Visible due to beach replenishment
Building 383	DNA180	36°47'27.618"	75°57'38.164"	Beach facing windows	1	None	Direct	Interior lights	Interior lights were not on during surveys, however, upper floor windows are visible from beach. No photos of building windows were taken.
Building 383 parking	DNA138	36°47'25.377"	75°57'40.166"	Arm-mounted cutoff - shoebox	1	1166 / 10931	Direct	White, broad-spectrum	
Building 383 parking	DNA139	36°47'25.341"	75°57'39.275"	Arm-mounted cutoff - shoebox	1	1166 / 10931	Direct	White, broad-spectrum	New construction

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
Building 383 parking	DNA140	36°47'25.680"	75°57'38.595"	Arm-mounted cutoff - shoebox	1	1166 / 10931	Direct	White, broad-spectrum	New construction
Building 383 parking	DNA141	36°47'26.176"	75°57'39.601"	Arm-mounted cutoff - shoebox	1	1166 / 10931	Direct	White, broad-spectrum	New construction
Building 383 parking	DNA179	36°47'29.195"	75°57'38.552"	Arm-mounted cutoff - shoebox	1	1166	Direct- if on	Not on	Fixtures visible from beach.
Building 383 parking	DNA181	36°47'28.066"	75°57'39.277"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Building 383 parking	DNA32	36°47'28.960"	75°57'37.794"	Arm-mounted cutoff - shoebox	1	1166	Direct- if on	Not on	Fixtures visible from beach.
Building 383 parking	DNA33	36°47'28.356"	75°57'37.798"	Arm-mounted cutoff - shoebox	1	1166	Direct- if on	Not on	Fixtures visible from beach.
Building 383 parking	DNA34	36°47'27.863"	75°57'40.272"	Arm-mounted cutoff - shoebox	1	1166	Direct- if on	Not on	Fixtures visible from beach.
Building 383 parking	DNA35	36°47'28.614"	75°57'39.629"	Arm-mounted cutoff - shoebox	1	1166	Direct- if on	Not on	Fixtures visible from beach.
NSWDG perimeter	DNA149	36°47'42.247"	75°57'44.450"	Pole-mounted flood (double)	1	1130 / 1142	Indirect	Gold-peach, indicative of HPS	
NSWDG perimeter	DNA150	36°47'40.774"	75°57'44.078"	Pole-mounted flood (double)	1	1130 / 1142	Indirect	Gold-peach, indicative of HPS	
NSWDG perimeter	DNA151	36°47'39.794"	75°57'43.875"	Pole-mounted flood (double)	1	1130 / 1142	Indirect	Gold-peach, indicative of HPS	
NSWDG perimeter	DNA152	36°47'38.811"	75°57'43.673"	Pole-mounted flood (double)	1	1130 / 1142	Direct	Gold-peach, indicative of HPS	Visible due to beach replenishment
NSWDG perimeter	DNA153	36°47'37.878"	75°57'43.455"	Pole-mounted flood (double)	1	1130 / 1142	Direct	Gold-peach, indicative of HPS	Visible due to beach replenishment
NSWDG perimeter	DNA154	36°47'37.663"	75°57'43.732"	Pole-mounted flood (double)	1	1130 / 1142	Direct	Gold-peach, indicative of HPS	Visible due to beach replenishment
NSWDG perimeter	DNA155	36°47'37.478"	75°57'44.981"	Pole-mounted flood (double)	1	1130 / 1142	Direct	Gold-peach, indicative of HPS	Visible due to beach replenishment
NSWDG perimeter	DNA156	36°47'37.333"	75°57'46.048"	Pole-mounted flood (double)	1	1130 / 1142	Direct	Gold-peach, indicative of HPS	Visible due to beach replenishment

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
NSWDG perimeter	DNA157	36°47'37.476"	75°57'47.190"	Pole-mounted flood (double)	1	1130 / 1142	Indirect	Gold-peach, indicative of HPS	
NSWDG perimeter	DNA158	36°47'38.471"	75°57'47.408"	Pole-mounted flood (double)	1	1130 / 1142	Indirect	Gold-peach, indicative of HPS	
NSWDG perimeter	DNA172	36°47'45.456"	75°57'45.035"	Pole-mounted flood (double)	1	1130 / 1142	Indirect	Gold-peach, indicative of HPS	Lights illuminate the sides of Building 310
NSWDG perimeter	DNA173	36°47'44.206"	75°57'44.898"	Pole-mounted flood (double)	1	1130 / 1142	Indirect	Gold-peach, indicative of HPS	Lights illuminate the sides of Building 310
NSWDG perimeter	DNA174	36°47'43.110"	75°57'44.571"	Pole-mounted flood (double)	1	1130 / 1142	Direct	Gold-peach, indicative of HPS	This light also illuminate the sides of Building 310
NSWDG Range guard shack	DNA192a	36°47'30.573"	75°57'37.191"	Pole-mounted strobe - solar	1	1165	Direct- if on	Incandescent bulb	Likely white, broad-spectrum incandescent
NSWDG Range guard shack	DNA192b	36°47'30.573"	75°57'37.191"	Beach facing windows	1	None	Direct- if on	White, broad-spectrum, fluorescent tubes	Located on beachside of dune. No photos showing windows are available.
NSWDG Range guard shack	DNA2	36°48'09.816"	75°57'47.698"	Beach facing windows	1	None	Direct- if on	White, broad-spectrum, fluorescent tubes	Located on beachside of dune. No photos showing windows are available.
NSWDG Range guard shack	DNA31a	36°47'47.475"	75°57'41.782"	Beach facing windows	1	None	Direct- if on	White, broad-spectrum, fluorescent tubes	Located on beachside of dune. No photos showing windows are available.
NSWDG Range Guard shack	DNA31b	36°47'47.475"	75°57'41.782"	Pole-mounted strobe - solar	1	1165	Direct- if on	Incandescent bulb	Likely white, broad-spectrum incandescent
Regulus Ave (at Viking)	DNA85	36°46'52.628"	75°57'30.235"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Regulus Ave (at Viking)	DNA86	36°46'51.872"	75°57'31.333"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Regulus Ave (at Viking)	DNA87	36°46'51.409"	75°57'35.534"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Regulus Ave at new Entry Control	DNA48	36°47'26.159"	75°57'42.503"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Regulus Ave at new Entry Control	DNA49	36°47'25.579"	75°57'41.951"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.

Table B-5. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference Photo Number	Observed or Expected Impact	Lamp Type	Other Remarks
Regulus Ave at new Entry Control	DNA50	36°47'24.931"	75°57'41.479"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
Regulus Ave at new Entry Control	DNA51	36°47'24.325"	75°57'41.073"	Arm-mounted cutoff - shoebox	1	1166	Indirect- if on	Not on	New construction. Due to height of fixture and proximity to dunes, indirect light from source may be visible.
TPS10	DNA165	36°47'42.747"	75°57'44.729"	Wall-mounted area "Wall pak"	1	1147	Indirect	Gold-peach, indicative of HPS	
TPS9	DNA164a	36°47'42.113"	75°57'44.636"	Wall-mounted area "Wall pak"	1	1131	Indirect	Gold-peach, indicative of HPS	East facing
TPS9	DNA164b	36°47'42.173"	75°57'44.785"	Wall-mounted area "Wall pak"	1	1131	Indirect	Gold-peach, indicative of HPS	North facing
Viking Ave	DNA65	36°46'54.335"	75°57'29.234"	Arm-mounted area - cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	Visible due to beach replenishment
Viking Ave	DNA66	36°46'52.915"	75°57'28.712"	Arm-mounted area - cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	Visible due to beach replenishment
Viking Ave	DNA67	36°46'50.408"	75°57'27.861"	Arm-mounted area - cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	Visible due to beach replenishment
Viking Ave	DNA68	36°46'47.976"	75°57'26.950"	Arm-mounted area - cobrahead	1	6972	Direct	Gold-peach, indicative of HPS	Visible due to beach replenishment
Viking Ave	DNA69	36°46'45.404"	75°57'25.655"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Viking Ave	DNA70	36°46'43.759"	75°57'25.154"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	
Viking Ave	DNA71	36°46'41.124"	75°57'23.823"	Arm-mounted area - cobrahead	1	6972	Indirect	Gold-peach, indicative of HPS	

Table B-6. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Unknown Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference photo number	Observed or Expected Impact	Lamp Type	Other Remarks
Building 225	DNA3	36°47'20.035	75°57'34.110	Wall mounted area decorative carriage (large)	7	6952 / 6953	Unknown	Not on	Incandescent bulb. Unknown if enough light is produced for indirect lighting.
Building 474	DNA197	36°45'47.677"	75°57'07.561"	Wall mounted area "Wall pak"	1	7036	Unknown	Not on	East facing. Fixtures located several floors high. Potential impact unknown, fixture is not visible from the beach but may illuminate the wall visible from the beach when on.
Building 474	DNA199	36°45'47.906	75°57'07.671	Wall mounted area "Wall pak"	1	7037	Unknown	Not on	Northwest facing. Fixtures located several floors high. Potential impact unknown, fixture is not visible from the beach but may illuminate the wall visible from the beach when on.
MACS 24 perimeter	DNA200	36°48'46.718"	75°58'05.976"	Arm mounted cutoff - shoebox	1	7038	Unknown	Not on	Fixtures are not visible from the beach, but these lights are at a height and may be close enough to the dunes to provide indirect lighting.
MACS 24 perimeter	DNA201	36°48'46.456"	75°58'07.116"	Arm mounted cutoff - shoebox	1	7038	Unknown	Not on	Fixtures are not visible from the beach, but these lights are at a height and may be close enough to the dunes to provide indirect lighting.
MACS 24 perimeter	DNA202	36°48'43.598"	75°58'05.511"	Arm mounted cutoff - shoebox	1	7038	Unknown	Not on	Fixtures are not visible from the beach, but these lights are at a height and may be close enough to the dunes to provide indirect lighting.
MACS 24 perimeter	DNA203	36°48'43.395"	75°58'06.261"	Arm mounted cutoff - shoebox	1	7038	Unknown	Not on	Fixtures are not visible from the beach, but these lights are at a height and may be close enough to the dunes to provide indirect lighting.
MACS 24 perimeter	DNA204	36°48'43.367"	75°58'07.470"	Arm mounted cutoff - shoebox	1	7038	Unknown	Not on	Fixtures are not visible from the beach, but these lights are at a height and may be close enough to the dunes to provide indirect lighting.
MACS 24 perimeter	DNA205	36°48'45.978"	75°58'08.820"	Arm mounted cutoff - shoebox	1	7038	Unknown	Not on	Fixtures are not visible from the beach, but these lights are at a height and may be close enough to the dunes to provide indirect lighting.
MACS 24 perimeter	DNA206	36°48'44.460"	75°58'07.967"	Arm mounted cutoff - shoebox	1	7038	Unknown	Not on	Fixtures are not visible from the beach, but these lights are at a height and may be close enough to the dunes to provide indirect lighting.
NSWDG Firing Range (Batt Rd)	DNA142	36°47'50.287	75°57'50.982	Pole mounted cutoff shoebox	1	1154	Unknown	Not on	Fixtures are on elevated poles and located approximately 1,000 ft from shoreline. Impact unknown, but may be at a height and close enough to provide indirect lighting.
NSWDG Firing Range (Batt Rd)	DNA143	36°47'49.467	75°57'53.160	Pole mounted flood	1	1169	Unknown	Not on	Fixtures are on elevated poles and located approximately 1,000 ft from shoreline. Impact unknown, but may be at a height and close enough to provide indirect lighting.

Table B-6. Naval Air Station Oceana – Dam Neck Annex Lighting Survey Data Sheet Unknown Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference photo number	Observed or Expected Impact	Lamp Type	Other Remarks
NSWDG Firing Range (Batt Rd)	DNA144	36°47'50.289	75°57'50.984	Pole mounted flood (double)	1	1170	Unknown	Not on	Fixtures are on elevated poles and located approximately 1,000 ft from shoreline. Impact unknown, but may be at a height and close enough to provide indirect lighting.
Building 382 perimeter	DNA175	36°47'46.055	75°57'47.465	Arm mounted cutoff - shoebox	1	1154	Unknown	Not on	Fixtures are on elevated poles. Impact unknown, but may at a height and close enough to dunes to provide indirect lighting.
Building 382 perimeter	DNA16	36°47'46.721	75°57'48.936	Arm mounted cutoff - shoebox	1	1154	Unknown	Not on	Fixtures are on elevated poles. Impact unknown, but may at a height and close enough to dunes to provide indirect lighting.
Building 382 perimeter	DNA19	36°47'47.700	75°57'45.691	Arm mounted cutoff - shoebox	1	1154	Unknown	Not on	Fixtures are on elevated poles. Impact unknown, but may at a height and close enough to dunes to provide indirect lighting.
Buildings 384/385	DNA217	36°47'28.486"	75°57'41.857	Ceiling mounted area	14	P1020162	Unknown	Not on	These are ceiling mounted down lighting that is partially shielded by an overhang, however, they are elevated and are clustered relatively close together. Unable to determine potential impact, this will depend on lamp type and intensity.

Table B-7. Virginia Army National Guard – Camp Pendleton Lighting Survey Data Sheet Observed and Expected Impacts

Location of Light	GPS Pt Designation	Latitude (N)	Longitude (W)	Description of Light	Quantity	Reference photo number	Observed or Expected Impact	Lamp Type	Other Remarks
Camp Pendleton North Boundary	DNA239	36°49'07.158"	75°58'00.156"	Solar flood lamp	1	7460	Direct	White, broad-spectrum LED	Located on boundary fence piling directed out towards the ocean. Used to illuminate a U.S. flag mounted on an adjacent piling.
Croatan Beach parking restrooms	DNA240a	36°49'04.392"	75°58'04.601"	Wall-mounted area "Wall pak"	1	7463	Indirect	Gold-peach, indicative of HPS	Northern peak of roof and side is visible through the dune crossing boardwalk.
Croatan Beach parking restrooms	DNA240b	36°49'04.350"	75°58'04.826"	Wall mounted area "Wall pak"	1	7464	Indirect	White, broad-spectrum	Northern peak of roof and side is visible through the dune crossing boardwalk.

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Appendix C

Naval Air Station Oceana – Dam Neck Annex and Virginia Army National Guard
– Camp Pendleton

Reference Photographs of Light Sources Identified

List of Tables

Table C-1. Naval Air Station Oceana – Dam Neck Annex Reference Photographs C-3
Table C-2. Virginia Army National Guard – Camp Pendleton Reference Photographs C-6

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Table C-8. Naval Air Station Oceana – Dam Neck Annex Reference Photographs

Location	Fixture Type	Photograph Number ²
Ball fields	Pole-mounted stadium lighting arrays	6969
Beach Access	Pole-mounted flood	1125
Building 102	Wall-mounted area "Wall pak"	7017
Building 102 parking	Arm-mounted area - cobrahead	6972
	Arm-mounted area - cobrahead (double)	7015
Building 127	Wall-mounted flood	7021, 7022, 7026, 7100
Building 127 parking	Arm-mounted area - cobrahead	6972
	Arm-mounted area - cobrahead (flat faced)	7099
	Pole-mounted flood (double)	7028
	Arm-mounted cutoff – shoebox (double)	7014, 7101
Building 127 tower	Red marked light	Example B
Building 132/114 parking	Arm-mounted area - cobrahead	7454
	Arm-mounted area - cobrahead (flat faced)	7456
Building 153 parking	Arm-mounted area - cobrahead (flat faced) Solar	7013 / 7449
Building 170	Arm-mounted area - cobrahead	7454
	Arm-mounted area - cobrahead (flat faced)	7456
	Pole-mounted flood (double)	7028
Building 183 parking	Arm-mounted area - cobrahead	7454
Building 187	Wall-mounted area "Wall pak"	6948, 6949, 6950, 7096, 7097
Building 187 parking	Arm-mounted area - cobrahead (double)	7015
	Arm-mounted area - cobrahead (flat faced) light-emitting diode (LED)	7458
	Arm-mounted area - cobrahead (flat faced; double) LED	7447, 7457
	Pole-mounted flood	6965

² The reference photographs are in numerical order and are provided on pages C-7 through C-18.

Location	Fixture Type	Photograph Number ²
	Arm-mounted area - cobrahead (flat faced) Solar	7013
Building 187 patio	Ceiling mounted fluorescent tubes	6968
Building 187 pavilion	Arm-mounted cutoff - shoebox	6961
	Arm-mounted flood	6967
Building 225	Wall-mounted area "Wall pak"	6948
	Wall-mounted flood	6957
	Wall-mounted area decorative carriage (large)	6952, 6953
Building 225 Parking	Arm-mounted area - cobrahead	6972
	Arm-mounted area - cobrahead (flat faced) solar	7013
	Arm-mounted cutoff - shoebox (double)	7014, 7105
Building 241	Pole-mounted cutoff, round	6951, 7103
	Wall-mounted area	6958
Building 241 parking	Arm-mounted area - cobrahead (flat faced) solar	6959
	Pole-mounted cutoff, round	6951, 7103, 7104
	Arm-mounted area - cobrahead (double)	7015
Building 404	Arm-mounted area - cobrahead	6972
Building 404 Gate Building	Wall-mounted flood lamp	Example A
Building 465A	Wall-mounted flood	7451
	Wall-mounted flood lamp	7452
Building 474	Wall-mounted area "Wall pak"	7036, 7037
MACS-24 perimeter	Arm-mounted cutoff - shoebox	7038

Location	Fixture Type	Photograph Number ²
MACS-24 dome	Red marker light	Example B
NSWDG Building 310	Wall-mounted flood (group of three)	1148
	Wall-mounted area "Wall pak"	1146, 1147, 1149
NSWDG Building 350	Wall-mounted area "Wall pak"	1139
NSWDG Building 350 parking	Arm-mounted cutoff - shoebox	1161
NSWDG firing range (Batt road)	Pole-mounted cutoff - shoebox	1154
	Pole-mounted flood	1169
	Pole-mounted flood (double)	1170
NSWDG New Entry Control	Arm-mounted cutoff - shoebox	1166
	Ceiling mounted area	P1020162
NSWDG K9 facility perimeter	Arm-mounted cutoff - shoebox	1154
NSWDG New N10 facility parking	Arm-mounted cutoff - shoebox (double)	1164, 10930
NSWDG New shipping and receiving - parking	Arm-mounted cutoff - shoebox	1166, 10931
NSWDG perimeter	Pole-mounted flood - 2 per pole	1130, 1142
NSWDG Range guard shack	Pole-mounted strobe - solar	1165
NSWDG TPS9	Wall-mounted area "Wall pak"	1131
NSWDG TPS10	Wall-mounted area "Wall pak"	1147
Regulus Ave (at Viking)	Arm-mounted area - cobrahead	6972
Viking Ave	Arm-mounted area - cobrahead	6972
Regulus Ave at New Entry Control	Arm-mounted cutoff - shoebox	7012

Table C-9. Virginia Army National Guard – Camp Pendleton Reference Photographs

Location	Fixture Type	Photograph Number ³
Camp Pendleton North Boundary	Solar flood lamp	7460
Croatan Beach parking restrooms	Wall-mounted area "Wall pak"	7463, 7464

³ The reference photographs are in numerical order and are provided on pages C-7 through C-18.

Reference Photographs

1125



1130



1131



1139



1142



1146



1147



1148



1149



1154



1161



1164



1165



1166



1169



1170



6948



6949



6950



6951



6952



6953



6957



6958



6959



6961



6965



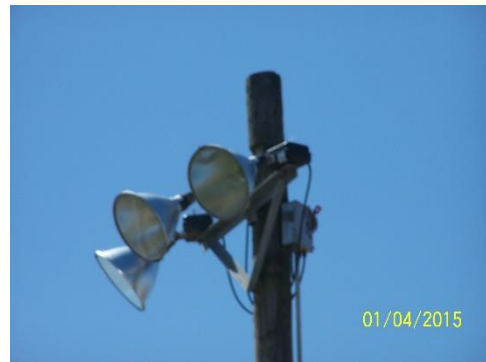
6967



6968



6969



6972



7012



7013



7014



7015



7017



7021



7022



7026



7028



7036



7037



7038



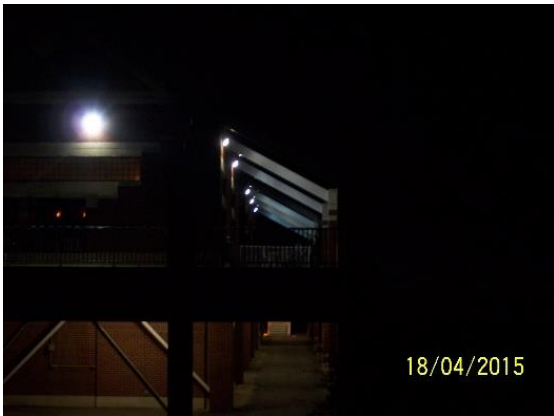
03/04/2015

7096



18/04/2015

7097



18/04/2015

7099



18/04/2015

7100



18/04/2015

7101



18/04/2015

7102



7103



7105



7447



7449



7451



7452



7454



7556



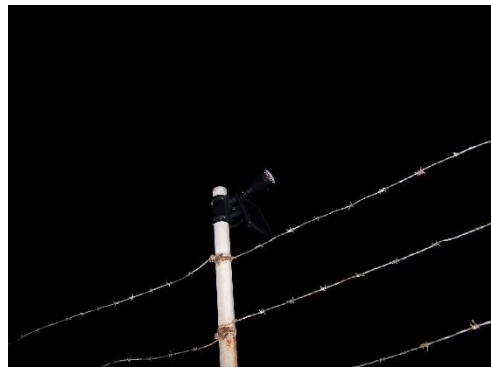
7457



7458



7460



7463



7464



10930



10931



P1020162



Example A



Example B



Appendix D

Naval Air Station Oceana – Dam Neck Annex and Virginia Army National Guard
– Camp Pendleton

Locations, Fixture Type, and Lamp Type of Light Sources Identified
Observed and Expected Impacts

List of Tables

Table D-1. Locations, Fixture Type, and Lamp Type of Light Sources Identified at Naval
Air Station Oceana – Dam Neck Annex – Observed and Expected Impacts D-3
Table D-2. Locations, Fixture Type, and Lamp Type of Light Sources Identified at
Virginia Army National Guard – Camp Pendleton - Observed Impacts D-9

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Table D-10. Locations, Fixture Type, and Lamp Type of Light Sources Identified at Naval Air Station Oceana – Dam Neck Annex – Observed and Expected Impacts

Location, Fixture, <i>Lamp type</i>	Quantity of Observed, Expected, and Unknown Impacts				
	Direct	Direct- if on	Indirect	Indirect- if on	Total
Ball fields		16			16
Pole mounted stadium lighting arrays		16			16
<i>Likely white, broad-spectrum</i>		13			13
<i>White, broad-spectrum</i>		3			3
Beach Access, north end of Regulus Avenue		1			1
Pole mounted flood		1			1
<i>Not on</i>		1			1
Building 102	6				6
Wall mounted area "Wall pak"	6				6
<i>Gold-peach, indicative of HPS</i>	6				6
Building 102 parking	1		2		3
Arm mounted area - cobrahead	1				1
<i>Gold-peach, indicative of HPS</i>	1				1
Arm mounted area - cobrahead (double)			2		2
<i>Gold-peach, indicative of HPS</i>			2		2
Building 127	6				6
Wall mounted flood	6				6
<i>Gold-peach, indicative of HPS</i>	6				6
Building 127 parking	3	3	6		12
Arm mounted area - cobrahead	2		3		5
<i>Gold-peach, indicative of HPS</i>	2		3		5
Arm mounted area - cobrahead (flat faced)	1		2		3
<i>White, broad-spectrum</i>	1		2		3
Arm mounted cutoff - shoebox (double)			1		1
<i>Gold-peach, indicative of HPS</i>			1		1
Pole mounted flood (double)		3			3
<i>Not on</i>		3			3

Location, Fixture, <i>Lamp type</i>	Quantity of Observed, Expected, and Unknown Impacts				
	Direct	Direct- if on	Indirect	Indirect- if on	Total
Building 127 tower	1				1
Red marker	1				1
<i>Red lens</i>	1				1
Building 132/114 parking		5			5
Arm mounted area - cobrahead		2			2
<i>Not on</i>		2			2
Arm mounted area - cobrahead (flat faced)		3			3
<i>Not on</i>		3			3
Building 153 parking		2			2
Arm mounted area - cobrahead (flat faced) Solar		2			2
<i>Not on</i>		2			2
Building 170		3		1	4
Arm mounted area - cobrahead		1		1	2
<i>Not on</i>		1		1	2
Arm mounted area - cobrahead (flat faced)		1			1
<i>Not on</i>		1			1
Pole mounted flood (double)		1			1
<i>Not on</i>		1			1
Building 183 Parking		2			2
Arm mounted area - cobrahead		2			2
<i>Not on</i>		2			2
Building 187	8	2			10
Wall mounted area "Wall pak"	8	2			10
<i>Gold-peach, indicative of HPS</i>	1				1
<i>Not on</i>		2			2
<i>White, broad-spectrum</i>	7				7

Location, Fixture, <i>Lamp type</i>	Quantity of Observed, Expected, and Unknown Impacts				
	Direct	Direct- if on	Indirect	Indirect- if on	Total
Building 187 parking	2	1	5	1	9
Arm mounted area - cobrahead (double)			1		1
<i>White, broad-spectrum</i>			1		1
Arm mounted area - cobrahead (flat faced) LED	2		2		4
<i>White, broad-spectrum</i>	2		2		4
Arm mounted area - cobrahead (flat faced) Solar		1			1
<i>Not on</i>		1			1
Arm mounted area - cobrahead (flat faced; double) LED			2		2
<i>White, broad-spectrum</i>			2		2
Pole mounted flood				1	1
<i>Not on</i>				1	1
Building 187 patio			2		2
Ceiling mounted fluorescent tubes			2		2
<i>White, broad-spectrum</i>			2		2
Building 187 pavilion	1			1	2
Arm mounted cutoff - shoebox	1				1
<i>Gold-peach, indicative of HPS</i>	1				1
Arm mounted flood				1	1
<i>Not on</i>				1	1
Building 225				2	2
Wall mounted area "Wall pak"				1	1
<i>Not on</i>				1	1
Wall mounted flood				1	1
<i>Not on</i>				1	1

Location, Fixture, Lamp type	Quantity of Observed, Expected, and Unknown Impacts				
	Direct	Direct- if on	Indirect	Indirect- if on	Total
Building 225 parking	5		3	1	9
Arm mounted area - cobrahead			3		3
<i>Gold-peach, indicative of HPS</i>			3		3
Arm mounted area - cobrahead (flat faced) Solar				1	1
<i>Not on</i>				1	1
Arm mounted cutoff - shoebox (double)	5				5
<i>Gold-peach, indicative of HPS</i>	5				5
Building 241	38		5	1	44
Beach facing windows	38				38
<i>Interior lights</i>	38				38
Pole mounted cutoff, round			1	1	2
<i>Gold-peach, indicative of HPS</i>			1		1
<i>Not on</i>				1	1
Wall mounted area			4		4
<i>White, broad-spectrum</i>			4		4
Building 241 parking	2		2	6	10
Arm mounted area - cobrahead (double)	1				1
<i>Gold-peach, indicative of HPS</i>	1				1
Arm mounted area - cobrahead (flat faced) Solar				5	5
<i>Not on</i>				5	5
Pole mounted cutoff, round	1		2	1	4
<i>Gold-peach, indicative of HPS</i>	1		1		2
<i>Not on</i>				1	1
<i>White, broad-spectrum</i>			1		1
Building 293	1	1			2
Dome skylight	1				1
<i>Interior lights</i>	1				1
Red marker		1			1
<i>Red lens</i>		1			1

Location, Fixture, Lamp type	Quantity of Observed, Expected, and Unknown Impacts				
	Direct	Direct- if on	Indirect	Indirect- if on	Total
Building 310			9		9
Wall mounted area "Wall pak"			6		6
<i>Gold-peach, indicative of HPS</i>			3		3
<i>White, broad-spectrum</i>			3		3
Wall mounted flood			3		3
<i>Gold-peach, indicative of HPS</i>			3		3
Building 310 (rock wall)		1			1
Wall mounted area "Wall pak"		1			1
<i>Not on</i>		1			1
Building 350			2		2
Wall mounted area "Wall pak"			2		2
<i>Gold-peach, indicative of HPS</i>			2		2
Building 350 parking			1		1
Arm mounted cutoff - shoebox			1		1
<i>Gold-peach, indicative of HPS</i>			1		1
Building 370 parking	5			3	8
Arm mounted cutoff - shoebox (double)	5			3	8
<i>Not on</i>				3	3
<i>White, broad-spectrum</i>	5				5
Building 382		1			1
Beach facing windows		1			1
<i>Interior lights</i>		1			1
Building 382 perimeter	3				3
Arm mounted cutoff - shoebox	3				3
<i>Gold-peach, indicative of HPS</i>	3				3
Building 383	1				1
Beach facing windows	1				1
<i>Interior lights</i>	1				1

Location, Fixture, <i>Lamp type</i>	Quantity of Observed, Expected, and Unknown Impacts				
	Direct	Direct- if on	Indirect	Indirect- if on	Total
Building 383 parking	4	5		1	10
Arm mounted cutoff - shoebox	4	5		1	10
<i>Not on</i>		5		1	6
<i>White, broad-spectrum</i>	4				4
Building 404			1		1
Arm mounted area - cobrahead			1		1
<i>Gold-peach, indicative of HPS</i>			1		1
Building 404 Gate Guard Building.				4	4
Wall mounted flood lamp				4	4
<i>White, broad-spectrum</i>				4	4
Building 465A	4				4
Wall mounted flood	2				2
<i>Gold-peach, indicative of HPS</i>	2				2
Wall mounted flood lamp	2				2
<i>Yellow, halogen lamp</i>	2				2
Buildings 384/385				8	8
Arm mounted cutoff - shoebox				8	8
<i>Not on</i>				8	8
NSWDG perimeter	6		7		13
Pole mounted flood (double)	6		7		13
<i>Gold-peach, indicative of HPS</i>	6		7		13
NSWDG Range guard shack		5			5
Beach facing windows		3			3
<i>White, broad-spectrum</i>		3			3
Pole mounted strobe - solar		2			2
<i>White, broad-spectrum</i>		2			2
Regulus Ave at Building 385				4	4
Arm mounted cutoff - shoebox				4	4
<i>Not on</i>				4	4

Location, Fixture, <i>Lamp type</i>	Quantity of Observed, Expected, and Unknown Impacts				
	Direct	Direct- if on	Indirect	Indirect- if on	Total
Regulus Ave at Viking			3		3
Arm mounted area - cobrahead			3		3
<i>Gold-peach, indicative of HPS</i>			3		3
TPS10			1		1
Wall mounted area "Wall pak"			1		1
<i>Gold-peach, indicative of HPS</i>			1		1
TPS9			2		2
Wall mounted area "Wall pak"			2		2
<i>Gold-peach, indicative of HPS</i>			2		2
Viking Ave	4		3		7
Arm mounted area - cobrahead	4		3		7
<i>Gold-peach, indicative of HPS</i>	4		3		7
Total	101	48	54	33	236

Table D-11. Locations, Fixture Type, and Lamp Type of Light Sources Identified at Virginia Army National Guard – Camp Pendleton - Observed Impacts

Location, Fixture, <i>Lamp type</i>	Quantity of Observed Impacts		
	Direct	Indirect	Total
Camp Pendleton North Boundary	1		1
Solar flood lamp	1		1
<i>White, broad-spectrum LED</i>	1		1
Croatan Beach Parking Restrooms		2	2
Wall-mounted area "Wall pak"		2	2
<i>Gold-peach, indicative of HPS and</i>		1	1
<i>White, broad-spectrum</i>		1	1
Total	1	2	3

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Appendix C

Sea Turtle Data Sources

Numerous federal, state, non-profit, and academic research efforts have been conducted to obtain records of sea turtles in Virginia. We compiled a variety of records, including sightings, strandings, bycatch, nests, and false crawls, to describe the occurrence of sea turtles on and near military installations in the Virginia Beach area. The sources of these data are summarized in **Table C-1**. Summaries of the occurrence records for each turtle species near the Action Area are provided in **Tables C-2 through C-6**. These records are shown in **Figures 5-12** in Section 3.0.

**Table C-1
Data Sources for Sea Turtle Occurrence Records included in this Biological Assessment**

Dataset	Year(s)
Shipboard Sighting Surveys	
US Navy Marine Species Monitoring Program	
Norfolk/VA Beach Photo-ID Surveys	2012-2013
Norfolk/VA Beach MINEX Vessel Surveys	2012-2013
Norfolk/VA Beach Inshore Vessel Surveys	2012-2013
North Atlantic Right Whale Consortium (NARWC) Database	1762-2001
CETAP Shipboard Survey	1978-1982
Aerial Sighting Surveys	
VA and MD Sea Turtle Research and Conservation Initiative Aerial Survey ¹	2011-2013
VA CZM Wind Energy Area Aerial Surveys ¹	2012-2014
NMFS-SEFSC Mid-Atlantic <i>Tursiops</i> Surveys (MATS)	1995; 2002
North Atlantic Right Whale Consortium (NARWC) Database	1762-2001
CETAP Aerial Survey	1978-1982
NMFS-NEFSC Twin Otter Aerial Survey	2004
Strandings	
NMFS-NEFSC Sea Turtle Mapping and Information System	1980-1997
Sea Turtle Stranding and Salvage Network (STSSN) ²	1998-2015
Nests/False Crawls	
Virginia Department of Game and Inland Fisheries (VDGIF) Nesting/False Crawl Database	1970-2015
US Navy VA Installation Nesting/False Crawl Database	2002-2014
Published Literature	
Keinath et al.	1991
Musick et al.	1988
Swingle et al.	2007

¹ Data provided by the Virginia Aquarium and Marine Science Foundation

² Note that stranding data from 2006 and 2007 were not included in the STSSN database provided because data from these years have not been reviewed yet.

**Table C-2
Summary of Occurrence Records of the Leatherback Turtle near the Action Area**

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2014	spring				2	
2013	spring				4	
2012	summer			2		
2011	summer				4	
	fall			1		
2010	spring				1	
2009	summer				1	
	spring				1	
2006	spring				3	
	summer				6	
2005	summer				3	
2004	spring				1	
	summer				2	
	fall				2	
2003	spring				2	
	summer				6	
	fall				1	
2002	spring				1	
	summer				3	
	fall				1	
2001	summer				2	
	fall				1	
2000	summer				1	
	fall				1	
1999	spring				1	
	summer				1	
1997	spring				3	
	summer				3	
	fall				1	
1996	fall				1	
1993	summer				1	
	fall				1	

Table C-2
Summary of Occurrence Records of the Leatherback Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
1992	spring				2	
	summer				1	
	fall				1	
1991	spring				4	
1990	spring				1	
1989	summer				1	
1988	spring				1	
	summer				2	
1987	fall				1	
1984	summer				1	
1983	summer				1	
	fall				1	
1982	summer				2	
1980	spring				1	
1977	summer			1		

Table C-3
Summary of Occurrence Records of the Loggerhead Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2015	winter				1	
	summer		5			
2014	spring				29	
	summer	15	1	5	22	
	fall			1	9	
2013	winter				3	
	spring		1	3	11	
	summer		4	4	33	
	fall				24	
2012	spring		2	14	27	
	summer	3	7	33	22	
	fall				14	

Table C-3
Summary of Occurrence Records of the Loggerhead Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2011	spring	1		50	12	
	summer		4	31	33	
	fall			8	14	
2010	winter				1	
	spring				26	
	summer				14	
	fall				9	
2009	spring		1		24	
	summer	1	1		35	
	fall				24	
2008	winter				2	
	spring				23	
	summer	4	4		48	
	fall				11	
2007	summer		1			
2006	spring				15	
	summer	1			40	
2005	spring		2		9	
	summer	6	16		59	
	fall				9	
2004	spring			1	33	
	summer				43	
	fall				35	
2003	winter				2	
	spring	3	4		43	
	summer		2		85	
	fall				31	
2002	winter				2	
	spring				26	
	summer	2	14	11	46	
	fall				24	

Table C-3
Summary of Occurrence Records of the Loggerhead Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2001	spring				23	
	summer				50	
	fall				13	
2000	spring				55	
	summer				35	
	fall				27	
1999	spring				31	
	summer		2		74	
	fall				11	
1998	winter				1	
	spring				68	
	summer		2		58	
	fall				21	
1997	spring				58	
	summer				30	
	fall				6	
1996	winter				1	
	spring				25	
	summer				5	
	fall				2	
1995	spring				12	
	summer			14	8	
	fall				2	
1994	spring				20	
	summer				18	
	fall				9	
1993	spring				20	
	summer			2	7	
	fall				19	

Table C-3
Summary of Occurrence Records of the Loggerhead Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
1992	winter				1	
	spring		4		14	
	summer		15		23	
	fall				14	
1991	winter				1	
	spring				20	
	summer		1		9	
	fall				6	
1990	spring		4		24	
	summer		8		8	
	fall				1	
1989	spring				11	
	summer				12	
	fall				8	
1988	spring				23	
	summer				11	
	fall				7	
1987	winter				1	
	spring				14	
	summer				12	
	fall				7	
1986	winter				1	
	spring				6	
	summer				10	
	fall				4	
1984	spring		16		4	
	summer		47		4	
1983	spring				5	
	summer			1	6	
	fall				3	

Table C-3
Summary of Occurrence Records of the Loggerhead Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
1982	winter				1	
	spring				10	
	summer				1	
	fall				1	
1981	spring				9	
	summer				2	
	fall				3	
1980	spring				7	
	summer			1	6	
	fall			2	2	
1979	summer			2		

Table C-4
Summary of Occurrence Records of the Green Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2014	summer				2	
	fall				2	
2013	summer				2	
	fall				4	
2012	winter				1	
	summer			1		
	fall				4	
2011	spring			3		
	summer			1		
	fall				2	
2010	winter				2	
	fall				4	
2009	summer				5	
2008	summer				3	
	fall				1	
2006	summer				2	
2005	summer		2		1	

Table C-4
Summary of Occurrence Records of the Green Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2004	fall				2	
2003	fall				2	
2002	fall				5	
	winter				2	
2000	fall				4	
1998	summer				1	
	fall				5	
1994	spring				1	
	summer				1	
	fall				1	
1993	fall				2	
1989	fall				2	
1988	fall				2	
1987	summer				1	
1986	fall				1	

Table C-5
Summary of Occurrence Records of the Hawksbill Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2004	fall				1	
2000	fall				1	
1990	fall					1

Table C-6
Summary of Occurrence Records of the Kemp's Ridley Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2014	winter				1	
	spring				17	
	summer		1		10	
	fall				15	

**Table C-6
Summary of Occurrence Records of the Kemp's Ridley Turtle near the Action Area**

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2013	winter				1	
	spring				3	
	summer				4	
	fall				25	
2012	winter				1	
	spring		1		10	
	summer				3	
	fall				8	
2011	spring			1	6	
	summer				1	
	fall				9	
2010	winter				1	
	spring				6	
	summer				1	
	fall				9	
2009	winter				2	
	spring				9	
	summer				9	
	fall				10	
2008	spring				9	
	summer				2	
	fall				1	
2006	spring				6	
	summer				2	
2005	spring				2	
	summer				1	
	fall				4	
2004	winter				1	
	spring				1	
	summer				1	
	fall				3	

**Table C-6
Summary of Occurrence Records of the Kemp's Ridley Turtle near the Action Area**

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
2003	spring				8	
	summer				5	
	fall				8	
2002	spring				12	
	summer				2	
	fall				4	
2001	summer				5	
	fall				5	
2000	spring				3	
	summer				4	
	fall				20	
1999	winter				1	
	spring				2	
	summer				3	
	fall				4	
1998	spring				1	
	fall				13	
1997	spring				5	
	summer				2	
	fall				1	
1996	spring				2	
	fall				1	
1995	fall				1	
1994	spring				6	
	summer				2	
	fall				2	
1993	spring				4	
	fall				7	
1992	spring				2	
	summer				1	
	fall				7	

Table C-6
Summary of Occurrence Records of the Kemp's Ridley Turtle near the Action Area

Year	Season	False Crawl	Nest	Sighting	Stranding	Bycatch
1991	fall				2	
1990	spring				2	
1989	summer				1	
	fall				1	
1988	summer				1	
	fall				3	
1987	spring				1	
	fall				3	
1986	spring				1	
	fall				4	
1983	spring				1	
1981	spring				1	
	summer				1	
1980	spring				2	
	summer				1	

References

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Appendix D

Construction and Placement of Predator-Proof Nest Cages

When a nest is at high risk of predation and flat a piece of screening is not enough of a deterrent to keep predators such as foxes, pigs and coyotes from digging into the nest, the eggs and pre-emergent hatchlings may be protected by placing a self-releasing cage over the nest (Figure 1). The cages should provide enough room for all hatchlings to completely emerge from the sand and be made of 2 in. x 4 in. mesh fencing (welded wire or some other strong bendable material). The 4" width of the mesh must be parallel to the surface of the sand.

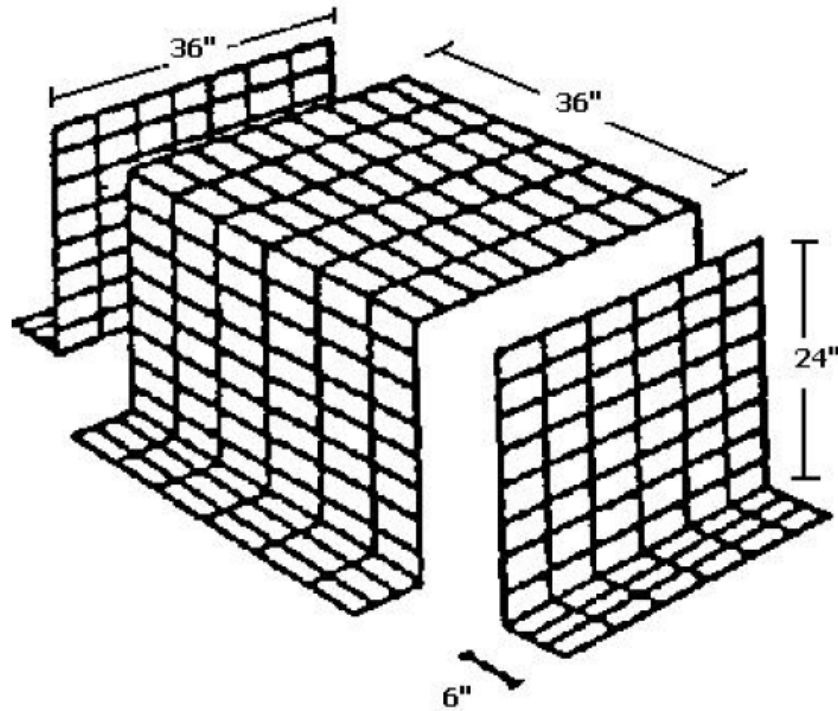
Methods and Placement

Cut one piece of 36 in. x 96 in. and two pieces of 30 in. x 36 in. welded wire fencing. Shape the fencing pieces to create the cage and flanges as shown in Figure 1. Use plastic zip ties to attach the two short side pieces to the long piece that forms the top and two sides.

Cages are to be centered exactly over the egg chamber to make it less likely that mammalian predators will burrow to the eggs from the side of the cage, and to make sure that any anchoring stakes placed along the edges of the cage will not enter the egg chamber. Most cages are anchored by burying the outward pointing flanges (Figure 1) about one foot under the sand's surface. Center the cage over the egg chamber and trace the edges of the cage in the sand. The cage should be oriented so that the opposing sides of the cage are either parallel or perpendicular to the shoreline. Remove the cage and the temporary egg chamber marker, and carefully dig a one foot deep trench along the tracing of the edges of the cage. Place the cage into the trench and fill the trench with sand. When completed, the sand around the cage and over the egg chamber should be at the original level. Because cages may become partially or completely dislodged, they must be checked regularly.

Source: Virginia Bureau of Wildlife Resources. 2015. Virginia sea turtle nesting handbook. Virginia Department of Game and Inland Fisheries, Henrico, Virginia, USA.

Figure 1. Example of a self-releasing cage. The cage is constructed of 2" x 4" welded wire fencing. Hatchlings are able to escape through the mesh of the wire. Cage design courtesy of The Conservancy of Southwest Florida.



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Appendix G



Encroachment and Adjacent Land Use

- Enclosure 1 Joint Land Use/Air Installation Compatible Use Zone Planning Map**
- Enclosure 2 Property Information in the Interfacility Traffic Area and in the Rural Acquisition Area**

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Enclosure 1. Joint Land Use/Air Installation Compatible Use Zone Planning Map

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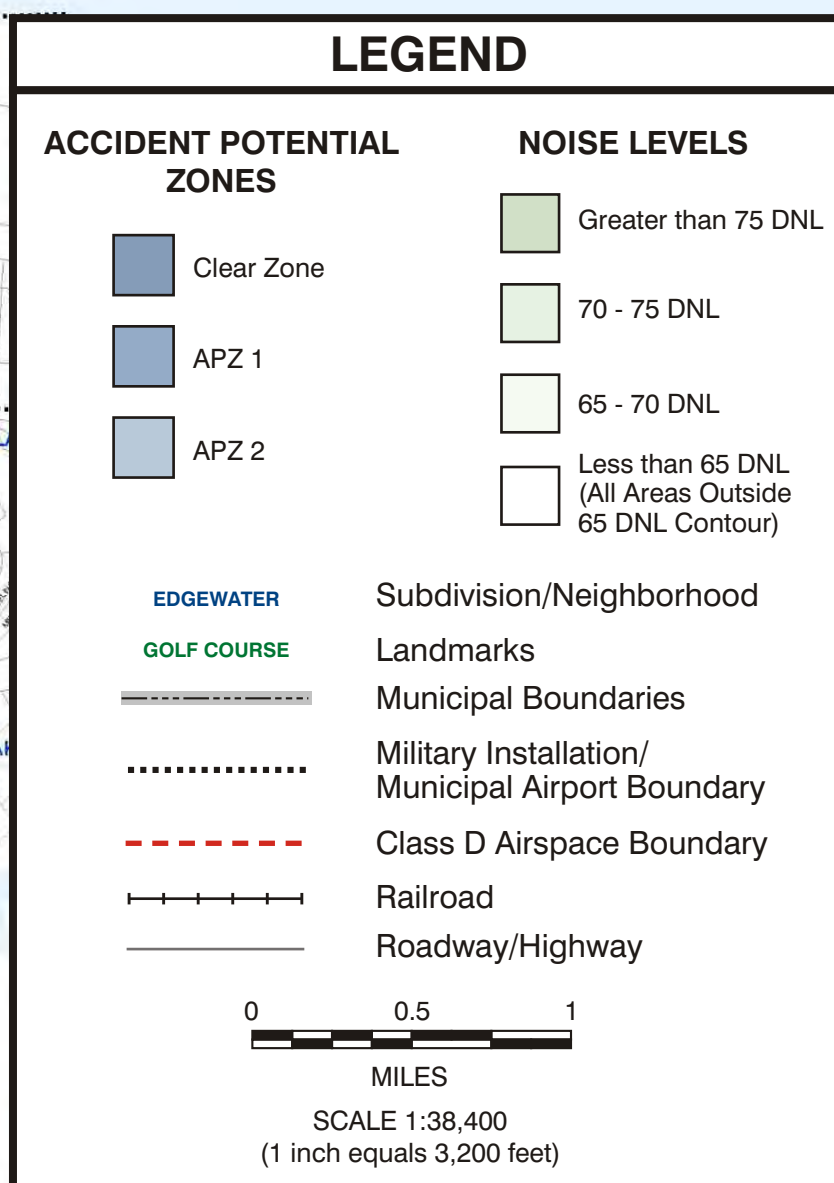
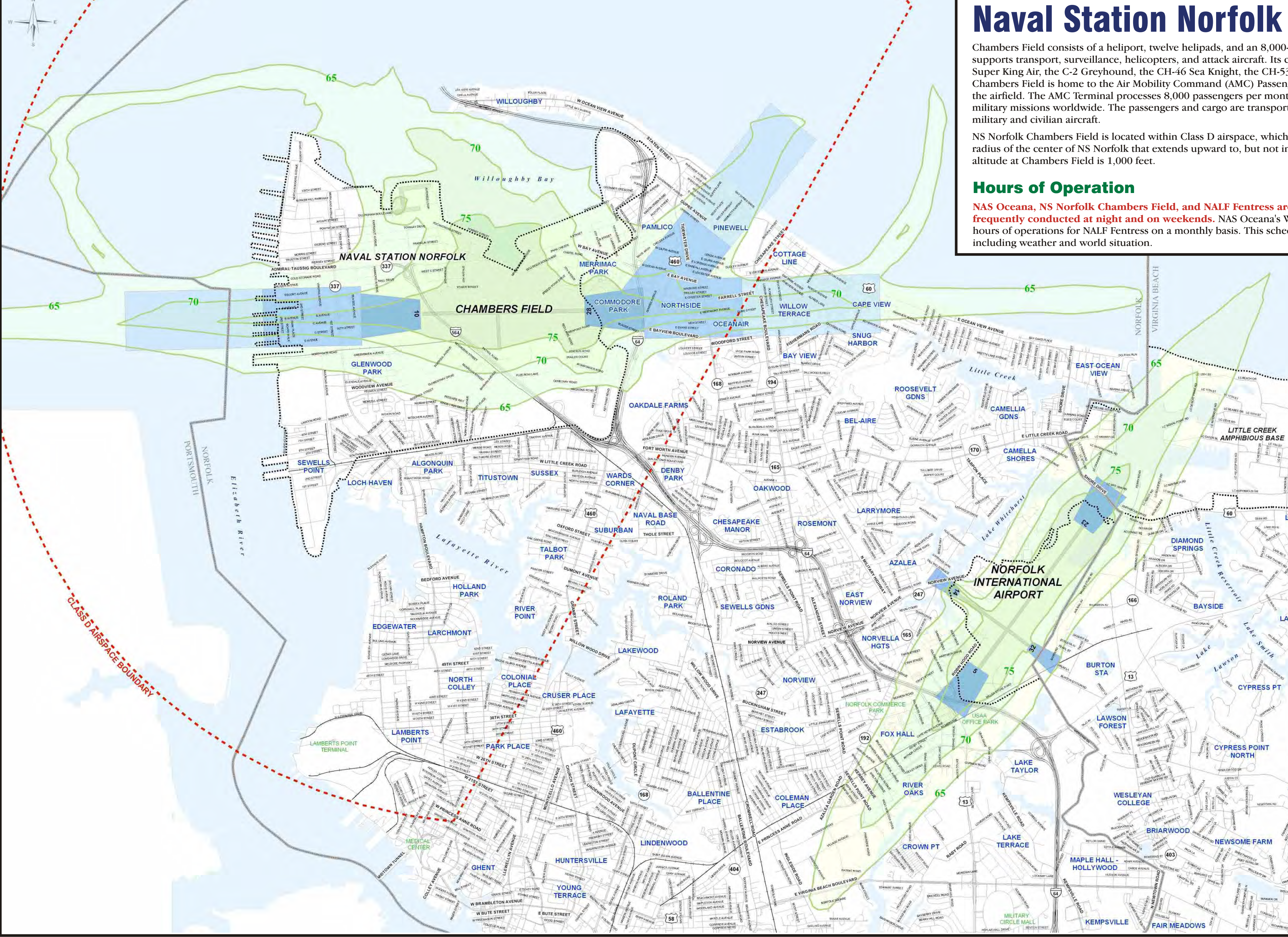
Naval Station Norfolk Chambers Field

Chambers Field consists of a heliport, twelve helpads, and an 8,000-foot runway. Commissioned in 1918, Chambers Field supports transport, surveillance, helicopters, and attack aircraft. Its current inventory includes: the E-2 Hawkeye, the C-12 Super King Air, the C-2 Greyhound, the CH-46 Sea Knight, the CH-53 Sea Dragon, and the H-60 Seahawk. In addition, Chambers Field is home to the Air Mobility Command (AMC) Passenger and Air Cargo Terminal located on the south side of the airfield. The AMC Terminal processes 8,000 passengers per month and more than 2,000 tons of cargo each month for military missions worldwide. The passengers and cargo are transported on L-1011, 747, C-5, C-17, 767, 757, C-40, and other military and civilian aircraft.

NS Norfolk Chambers Field is located within Class D airspace, which encompasses an area within a 4.3-nautical-mile (nm) radius of the center of NS Norfolk that extends upward to, but not including, 2,000 feet above ground level (AGL). The pattern altitude at Chambers Field is 1,000 feet.

Hours of Operation

NAS Oceana, NS Norfolk Chambers Field, and NALF Fentress are open 24 hours a day, and aircraft operations are frequently conducted at night and on weekends. NAS Oceana's Web site, <https://cnic.navy.mil/Oceana/>, publishes expected hours of operations for NALF Fentress on a monthly basis. This schedule is subject to change due to a variety of factors, including weather and world situation.



Note: The boundaries of the Noise Zones and Accident Potential Zones (APZs) represented on this brochure have not changed from those represented on the AICUZ Pamphlet published by the U.S. Navy in 1999.

Disclaimer: The Norfolk International Airport noise contours were provided by airport authority and have been added to the map for informational uses only. They are not part of the Naval Station (NS) Norfolk Chambers Field Air Installations Compatible Use Zones (AICUZ Study) or part of the Hampton Roads Joint Land Use Study (JLUS). For further information on the Norfolk International noise contours, please contact the Norfolk Airport Authority at (757) 857-3351.

JLUS/AICUZ Planning Map

Joint Land Use Study (JLUS)

The JLUS for the Hampton Roads region was initiated in 2004 as part of the Department of Defense (DoD) nationwide JLUS program. It addresses land use compatibility issues among three jurisdictions – the cities of Virginia Beach, Chesapeake, and Norfolk – surrounding the three Navy airfields in the region. The objective of the Hampton Roads JLUS is to provide recommendations regarding compatible land development policy and implementation responding to the Navy's air mission in the region. For more information on JLUS, refer to the study, 2005 Hampton Roads JLUS Report, located at <http://www.hrpdc.org/JLUS/JLUS.asp> or at local libraries or the city planning department.

AICUZ Program

Overview
All airports attract development. People who work at the airport want to live nearby, and businesses are established to cater to the airport and its employees. As development encroaches upon the airfield, more people experience the noise and other impacts associated with aircraft operations.

The Noise Control Act of 1972 declared that it is the policy of the United States to promote an environment for all Americans free from noise that jeopardizes their health or welfare. This act also excluded military weapons or equipment that are designed for combat use. In response to the Noise Control Act of 1972, the Department of Defense (DoD) established the Air Installations Compatible Use Zones (AICUZ) Program to balance the need for aircraft operations and community concerns. Individual services, in turn, adopted the program. The Navy's guidance on AICUZ may be found in Chief of Naval Operations Instruction (OPNAVINST) 11010.36C and is available for viewing on the Navy's web site of directives, <http://doni.daps.dla.mil/Directives/11000%20Facilities%20and%20Land%20Management%20Ashore/11-00%20Facilities%20and%20Activities%20Ashore%20Support/11010.36C.pdf>. The goal of the AICUZ Program is to protect the health, safety, and welfare of those living near a military airport while preserving operational assurance for the flying mission. AICUZ guidelines define zones of high noise and accident potential and recommend uses compatible within these zones. Local governments are encouraged to apply these guidelines in their land-use decision-making processes.

Noise Zones
Under the AICUZ Program, DoD provides noise zones as a planning tool for local planning agencies. Noise exposure is measured using the day-night average sound level (DNL). For a detailed discussion of DNL, refer to the Noise Metrics section. The DNL contours on the AICUZ maps reflect the noise exposure in the surrounding communities and the fact that noise impacts diminish with distance from the airfield. DNL contours do not reflect the noise of individual aircraft events. DNL contours are used to assess average long-term noise exposure rather than the impact of a single event.

Accident Potential Zones
The DoD provides Accident Potential Zones (APZs) as a planning tool to local land use agencies. APZs are areas where an aircraft accident is likely to occur if one occurs. They do not reflect the probability of an accident. APZs follow arrival, departure, and pattern flight tracks and are based upon analysis of historical data. The AICUZ map defines three APZs – the Clear Zone, APZ 1, and APZ 2. The Clear Zone extends 3,000 feet beyond the runway and has the highest potential for accidents. APZ 1 extends 5,000 feet beyond the Clear Zone, and APZ 2 extends 7,000 feet beyond APZ 1. If an accident occurs, it is more likely to occur in APZ 1 than APZ 2 and more likely to occur in the Clear Zone than in either APZ 1 or APZ 2.

As stated above, APZs follow arrival, departure, and pattern flight tracks. APZs are not roadways in the sky. Weather conditions, wind, pilot technique, and other air traffic will cause some lateral deviation within the landing pattern around an airport.

Compatible Development

Certain land uses are not compatible with military flight operations. Modifications to proposed land developments near the airfield can help resolve concerns between the community and the military. In general, DoD recommends that noise-sensitive uses (e.g., houses, churches, amphitheaters, etc.) be placed outside the high noise zones, that people-intensive uses (e.g., regional shopping malls, theaters, etc.) not be placed in APZs, and that sound-attenuating methods be incorporated into building design and construction. For further information on local land use guidelines, please consult the appropriate city planning department. The DoD recommendations are intended to serve only as guidelines. Local governments alone are responsible for regulating land use.

Land use development should be compatible with noise zones and APZs around a military airfield. Although the military can serve in an advisory capacity, local governments control development beyond the boundaries of the military airfields. Table 1 shows the Navy's recommendations for land use development in noise zones and APZs. Further information on land use guidelines is available in the 2005 Hampton Roads JLUS Report and the OPNAVINST 11010.36C.

Development should also be compatible with flight safety. The Federal Aviation Administration (FAA) and the DoD encourage local communities to restrict development or land uses that could endanger aircraft in the vicinity of the airfield, including:

- Lighting (direct or reflected) that would impair pilot vision;
- Towers, tall structures, and vegetation that penetrate navigable airspace or are to be constructed near the airfield;
- Uses that would generate smoke, steam, or dust;
- Uses that would attract birds, especially waterfowl; and
- Uses that would produce electromagnetic interference with aircraft communication, navigation, or other electrical systems.

The FAA and the DoD established height standards within aircraft approach and departure zones for military and commercial airfields. These standards are presented in the U.S. Code of Federal Regulations, Title 14, Part 77, "Objects Affecting Navigable Airspace." The cities of Virginia Beach, Chesapeake, and Norfolk review building permits in the approach and departure zones to ensure compliance with these height standards. **The FAA must be notified of any development that is not consistent with the height standards.**

KEY:
 Compatible
 Conditionally Compatible
 Incompatible

Land Use	Noise Zones				APZs		
	Less than 65 DNL	65-70 DNL	70-75 DNL	Greater than 75 DNL	Clear Zone	APZ 1	APZ 2
Outdoor Amphitheaters							
Residential							
Transient Lodging							
Churches, Schools							
Commercial, Retail, Services							
Wholesale, Manufacturing							
Agriculture, Public Rights-of-way							

Real Estate Disclosure
Most areas of Hampton Roads, to a greater or lesser extent, experience aircraft noise and overflight. Property owners, renters, and lessees need to be aware of whether their property is located within a noise zone or APZ. Virginia law requires that any person marketing property for sale, rental, or lease within a noise zone or APZ provide written disclosure to all prospective purchasers, renters, or lessees that such property is located within a noise zone or APZ. The Hampton Roads REALTORS® Association also encourages its members to provide written disclosure in all real estate transactions and advise their clients to verify whether property is located within a noise zone or APZ, especially in property transactions with non-members.

Restrictive Easements
The Navy owns restrictive easements on 3,680 acres of land near NAS Oceana and 8,780 acres near NALF Fentress. These easements restrict new incompatible development and certain uses of existing property, as outlined in the specific easement, near the airfields. All of the easements are recorded to deed in Virginia Beach or Chesapeake.

Noise Zones
The appropriate noise zone from the list below should be included in all real estate disclosure documents:

- Greater than 75 DNL
- 70 to 75 DNL
- 65 to 70 DNL
- Less than 65 DNL

Accident Potential Zones
The appropriate APZ from the list below should be included in all real estate disclosure documents:

- Clear Zone
- APZ 1
- APZ 2
- None (outside APZs)

Noise contours and APZs are subject to change. The noise contours and APZs will be periodically updated in association with mission changes at the airfield and/or master plan updates. Questions concerning details relating to AICUZ easements or the location of a particular property within a noise zone or APZ should be directed to the NAS Oceana AICUZ office. Questions pertaining to AICUZ-related provisions of local government policies and ordinances should be directed to the planning office of the appropriate locality.

Federal Housing Administration (FHA) and Department of Veterans Affairs (VA) mortgage guarantee eligibility may be affected for homes in certain noise zones and APZs. Contact the FHA or VA for more information.

The City of Virginia Beach's eMapping web site allows users to locate properties on a map by entering an address, street name, or geographic parcel identification number (GPIN). This tool provides property-specific information, including:

- AICUZ Noise/APZ Maps
- Floodplains and Flood Zones
- Real Estate Assessments
- Virginia Beach Land Records
- School Locations

To find more information about AICUZ and access the eMapping site, go to <http://www.vbgov.com/aicuz>.

The City of Chesapeake also has a web site that provides a substantial amount of background information on various related topics. This information can be found at: <http://cityofchesapeake.net/services/dep/par/planning/index.shtml>. This useful web site provides such information as:

- NALF Fentress AICUZ Noise Zone Map
- NALF Fentress Navy Purchased Easement Map
- 2026 City Land Use Plan
- 2050 City Master Transportation Plan
- Chesapeake Open Space and Agriculture Preservation Program
- Citywide Floodplain Maps

Noise Metrics

Noise is unwanted sound. Sound is all around us; sound becomes noise when it interferes with normal activities such as sleep or conversation. The main sources of noise at airfields are flight operations, which include take-offs, landings, touch-and-go operations, and engine maintenance activities. A discussion of how the effect of noise on the environment is quantitatively measured is provided below.

Decibels (dB)
A dB is a logarithmic unit that measures the intensity, or loudness, of sound. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels of about 130 dB are felt in the human ear as discomfort and pain.

In measuring community noise, sound frequency is taken into account by adjusting the very high and very low frequencies to approximate the human ear's lower sensitivity to those frequencies. This is called "A-weighting" and is commonly used in measuring community noise levels. An A-weighted decibel (abbreviated dBA) is a unit of sound pressure with a greater intensity than the ambient, or background, sound pressures that best reflect the range of human hearing. Table 2 shows the typical A-weighted sound levels of common sounds and noise environments. The minimum change in sound level of individual events that the average human ear can detect is about 3 dB. On average, a person perceives a change in sound level of about 10 dB as a doubling of the sound's loudness.

Day-Night Average Sound Level (DNL)
The DNL noise metric is based on the number of aircraft operations that occur on an average annual day or average busy day over a 24-hour period. The DNL includes a 10 dB adjustment, or penalty, for aircraft noise occurring between 10:00 pm and 7:00 am because people are more sensitive to noise during normal sleeping hours, when background noise levels are lower. DNL has become the standard metric used by many government agencies and organizations, including the U.S. Environmental Protection Agency (EPA) and FAA, for assessing aircraft noise. The DNL for the community is depicted as a series of contours that connect points of equal value, usually in 5 dB increments. DNL noise contours for NAS Oceana, NALF Fentress, and Chambers Field are shown on the maps included in this pamphlet. Noise contours are not exact measurements. Noise levels inside a contour may be similar to those outside a contour line because the change in noise levels occurs gradually.

Sound Exposure Level (SEL)
SEL is a composite metric that represents both the intensity of a sound and its duration. Individual time-varying noise events (e.g., aircraft overflights) have two main characteristics—a sound level that changes throughout the event and a period of time during which the event is heard. The SEL provides a measure of the net impact of the entire acoustic event, but it does not directly represent the sound level heard at any given time. During an aircraft flyover, it would include both the maximum noise levels and the lower decibel levels produced during onset and recess periods of the overflight. SEL values may exceed the peak noise for an event. Table 3 presents representative SEL values for aircraft on approach, departure, and in the Field Carrier Landing Practice (FCLP) or touch-and-go pattern.

Table 2 TYPICAL A-WEIGHTED SOUND LEVELS OF COMMON SOUNDS AND NOISE ENVIRONMENTS

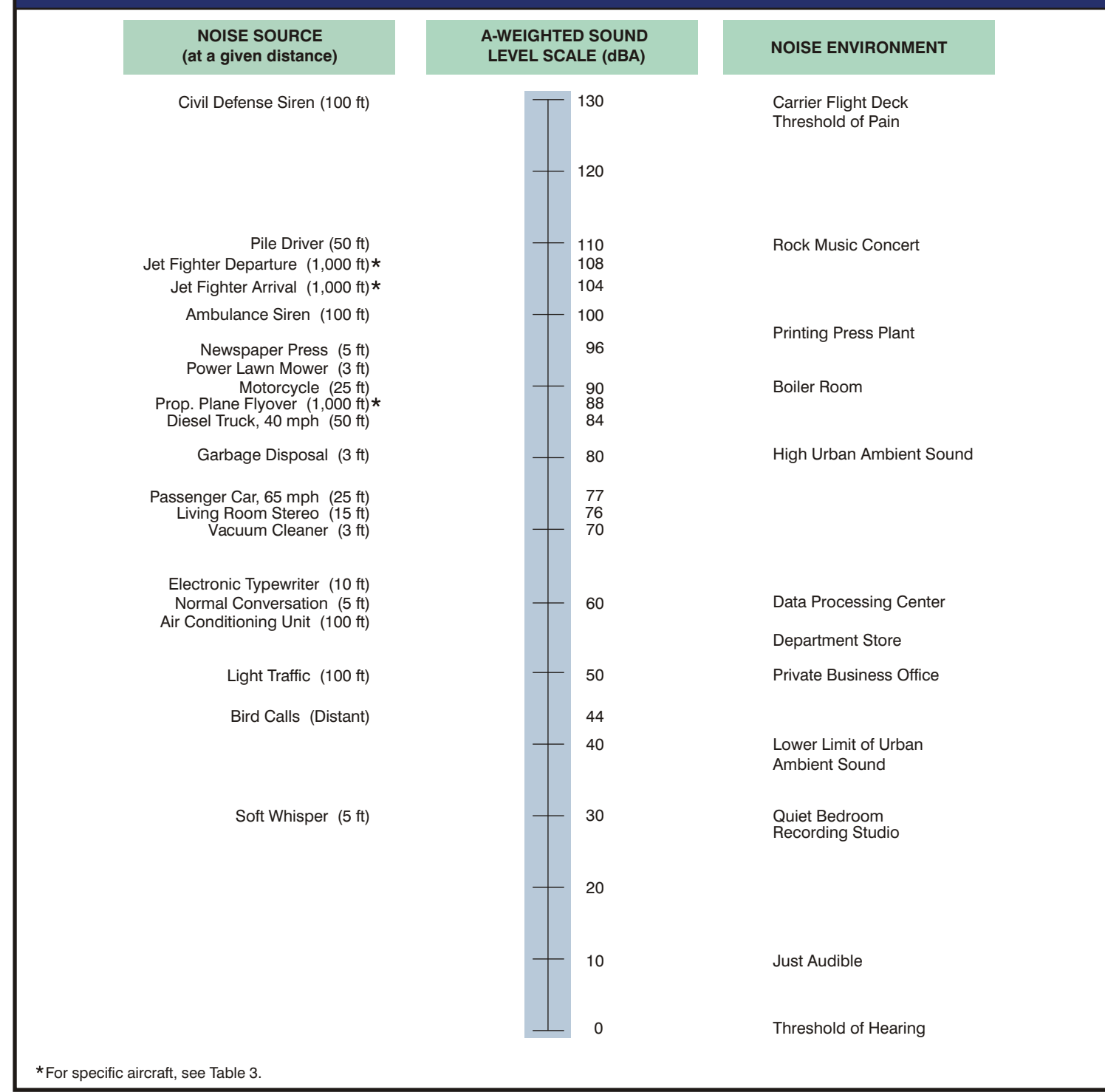


Table 3 Comparison of Representative SEL Values (dB) for Aircraft on Approach, Departure, and in the FCLP or Touch-and-Go Pattern

Operation	Altitude (ft AGL)	F-14 B/D	F/A-18 C/D	F/A-18 E/F	E-2/C-2	C-5A	H-60	H-53
Approach	1,000	87	109	114	82	110	85	97
Departure	1,000	108	117	117	94	114	79	96
FCLP*								
	1,000	95	108	113	87	109	83	92
	800	97	109	115	89	109	86	93

* FCLP or touch-and-go pattern altitude reflects the highest altitude of the downwind leg of the pattern.
SEL values for helicopters is given for level flight.

Key:
AGL—Above Ground Level
FCLP—Field Carrier Landing Practice

- For Further Information:**
- AICUZ:**
NAS Oceana AICUZ Office
(757) 433-3158
- Noise Concerns:**
NAS Oceana/NALF Fentress
Noise Concern Hotline
(757) 433-2162
- NS Norfolk Chambers Field Operations Office**
(757) 322-3429
- Norfolk International Airport**
(757) 857-3351
- Federal Loan Guarantees:**
U.S. Department of Housing and Urban Development
(800) 842-2610
- U.S. Department of Veterans Affairs
(800) 933-5499
- Real Estate Disclosures:**
Hampton Roads REALTORS® Association
(757) 473-9700
- Planning Departments:**
City of Virginia Beach (757) 385-4621
City of Chesapeake (757) 382-6176
City of Norfolk (757) 664-4752
- Web Sites:**
NAS Oceana
<http://cnic.navy.mil/Oceana/>
Naval Station Norfolk Chambers Field
<http://cnic.navy.mil/NorfolkSTA/>
City of Virginia Beach
<http://www.vbgov.com/aicuz>
City of Chesapeake
<http://cityofchesapeake.net/services/dep/par/planning/index.shtml>
City of Norfolk
<http://www.norfolk.gov>
Hampton Roads Planning District Commission
<http://www.hrpdcva.gov/JLUS/JLUS.asp>
Hampton Roads REALTORS® Association
<http://www.centerforrealestate.com>

Hampton Roads Joint Land Use Study (JLUS)/ Air Installations Compatible Use Zones (AICUZ) Planning Map

For Naval Air Station Oceana
Apollo Soucek Field
Virginia Beach, Virginia

Including Naval Auxiliary Landing Field Fentress
Chesapeake, Virginia

Naval Station Norfolk
Chambers Field
Norfolk, Virginia

This brochure is the product of the Joint Land Use Study prepared under sponsorship of the Hampton Roads Planning District Commission and the cities of Virginia Beach, Chesapeake, and Norfolk. Technical information was provided by the U.S. Navy for the JLUS effort.

This planning map was prepared under contract with the Hampton Roads Planning District Commission with financial support from the Office of Economic Adjustment, Department of Defense. The content reflects the views of the Hampton Roads Planning District Commission and the jurisdictions involved and does not necessarily reflect the views of the Office of Economic Adjustment.

2005; Revised 2010

NAS Oceana Apollo Soucek Field

In 1940, the Navy acquired the land that would eventually become Naval Air Station (NAS) Oceana. At that time, the surrounding area was mainly farmland. NAS Oceana has grown to become one of the largest and most advanced air stations in the world, with an area of 5,331 acres and an additional 3,680 acres in restrictive easements. Its runways, measuring 8,000 feet and 12,000 feet, are designed for high-performance aircraft. NAS Oceana's primary mission is to train and deploy the Navy's East Coast Strike/Fighter squadrons—the F-14 Tomcats (until their retirement in 2006) and the F/A-18 Hornets and Super Hornets.

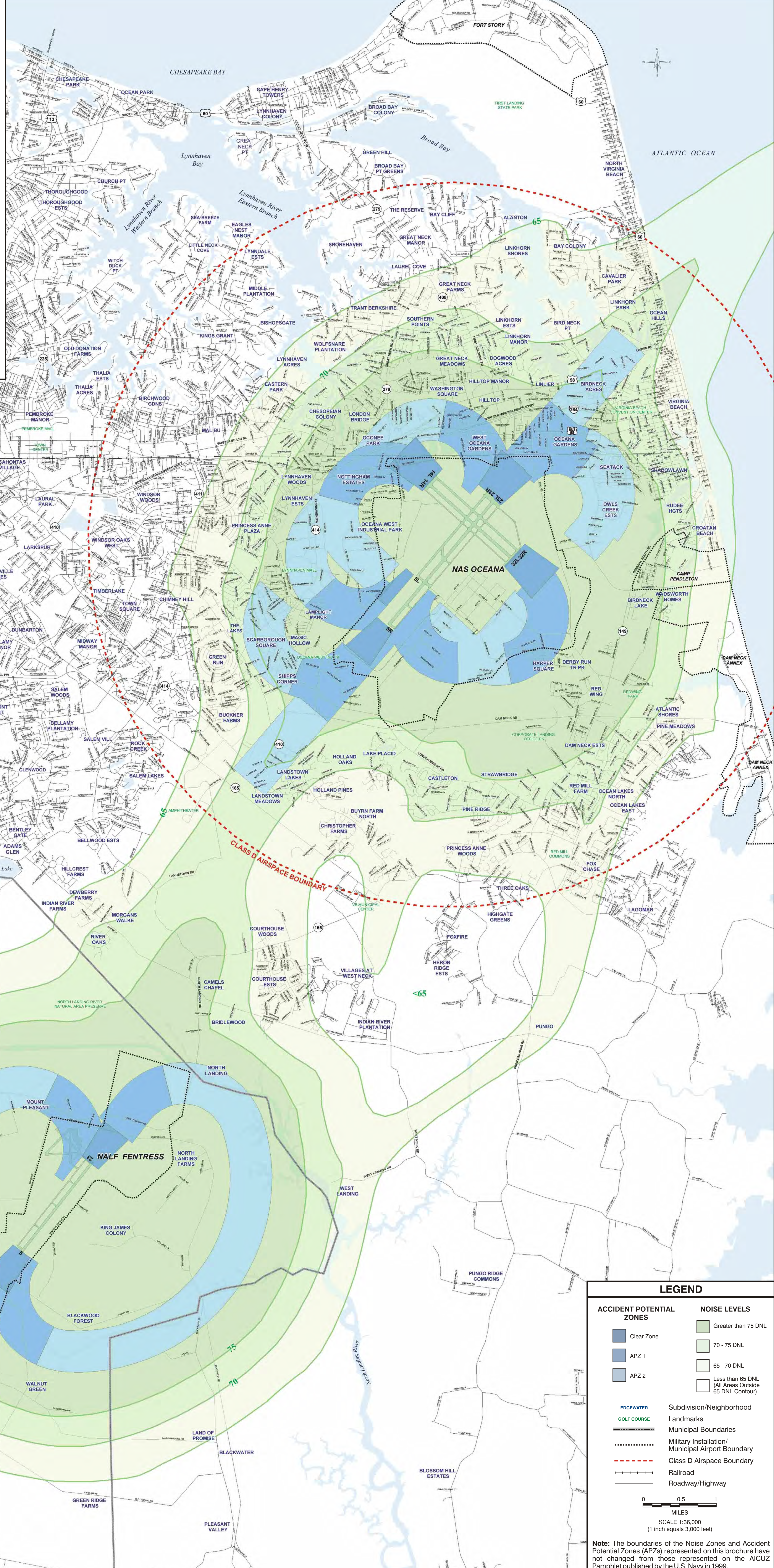
The airspace under control tower jurisdiction and immediately adjacent to the runways is defined by the FAA as "Class D" airspace. At NAS Oceana, Class D is that airspace from the surface to 2,500 feet above ground level within a 5-mile radius from the center of the airport. The pattern altitude at NAS Oceana is 1,000 feet. Flight operations that are conducted into and out of NAS Oceana as part of the typical training syllabus for flight crews include departures, arrivals, touch-and-go landings, practice radar approaches, flights to and from NALF Fentress, and flights to and from offshore training areas. **Flights operating within NAS Oceana's Class D airspace may be routed anywhere within the 5-mile radius at an altitude above 1,000 feet, or lower when necessary for takeoff or landing.**

NALF Fentress

The Naval Auxiliary Landing Field (NALF) Fentress is located approximately 7 miles southwest of NAS Oceana. It was established in 1940 and comprises 2,560 acres, with an additional 8,780 acres in restrictive easements. NALF Fentress has one 8,000-foot runway equipped to simulate an aircraft carrier flight deck. Squadrons stationed at NAS Oceana and NS Norfolk Chambers Field utilize NALF Fentress for Field Carrier Landing Practice (FCLP) operations. These operations are intended to familiarize pilots with carrier landings and must be conducted under both daytime and nighttime operational conditions. Prior to deployments, the local community may experience increased operations as pilots complete training exercises. The pattern altitude at NALF Fentress is 800 feet.

Hours of Operation

NAS Oceana, NS Norfolk Chambers Field, and NALF Fentress are open 24 hours a day, and aircraft operations are frequently conducted at night and on weekends. NAS Oceana's Web site, www.nasoceana.navy.mil, publishes expected hours of operations for NALF Fentress on a monthly basis. This schedule is subject to change due to a variety of factors, including weather and world situation.



LEGEND

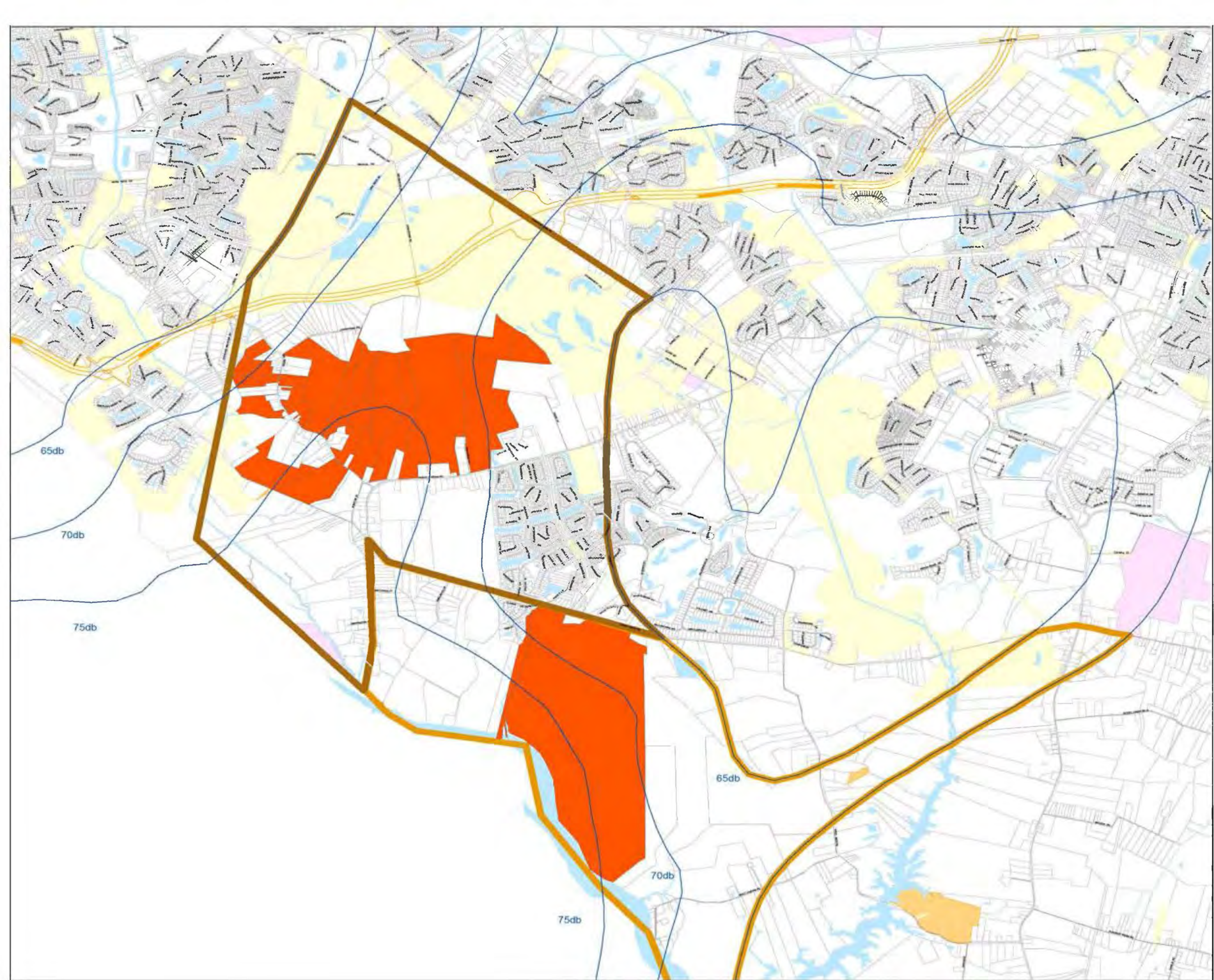
ACCIDENT POTENTIAL ZONES	NOISE LEVELS
Clear Zone	Greater than 75 DNL
APZ 1	70 - 75 DNL
APZ 2	65 - 70 DNL
EDGEWATER	Less than 65 DNL (All Areas Outside 65 DNL Contour)
GOLF COURSE	Subdivision/Neighborhood
LANDMARKS	Landmarks
MUNICIPAL BOUNDARIES	Municipal Boundaries
MILITARY INSTALLATION/ MUNICIPAL AIRPORT BOUNDARY	Military Installation/ Municipal Airport Boundary
CLASS D AIRSPACE BOUNDARY	Class D Airspace Boundary
RAILROAD	Railroad
ROADWAY/HIGHWAY	Roadway/Highway

0 0.5 1
MILES
SCALE 1:36,000
(1 inch equals 3,000 feet)

Note: The boundaries of the Noise Zones and Accident Potential Zones (APZs) represented on this brochure have not changed from those represented on the AICUZ Pamphlet published by the U.S. Navy in 1999.

**Enclosure 2. Property Information in the Interfacility Traffic Area and in the Rural
Acquisition Area**

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Legend

- Acquired
- City Property
- State Property
- Federal Property
- Parcel
- ITA Boundary
- RAA Boundary
- Noise Contour
- Southern Parkway Alignment



**Property Information in the Interfacility Traffic Area
and in the Rural Acquisition Area**

May 2012



DISCLAIMER:
The data is provided "as is" and the City of Virginia Beach expressly disclaims all warranties, LLC, and otherwise, express or implied including particular purpose, and further expressly disclaims responsibility for all incidental, consequential or special damages arising out of or in connection with the use or performance of the data. The user acknowledges the disclaimer of warranty and waives all remedies, whether or implied and waives any right of claim for damages, incidental, consequential or special, arising out of or in connection with the use or performance of the data.
CAUTION: This map represents various data sources and values. It is subject to mapping projection and compilation error(s). Property information is compiled from recorded data and best fit to base mapping products using Virginia State Plane NAD 1983 coordinate system, with a minimum target accuracy of +/- 2.0 feet. This mapping product is not a legal survey and therefore can not be used to determine precise property locations. For information purposes only. The map is for informational purposes only.

Appendix H
Surveys and Plans

- Enclosure 1 Climate Change**
- Enclosure 2 Nearshore Environment Studies**
- Enclosure 3 Vegetative Community Characterization Mapping**
- Enclosure 4 Primary and Secondary Dune Delineation**
- Enclosure 5 Invasive Species Inventory Survey for NASO DNA, Virginia Beach, Virginia**
- Enclosure 6 DoD Coordinated Migratory Bird Survey**
- Enclosure 7 Nest Box Data Sheet**
- Enclosure 8 Nuisance Wildlife Survey**
- Enclosure 9 Rare, Threatened, and Endangered Species**
- Enclosure 10 Sustainability Report, Dune Surveys & Plantings**
- Enclosure 11 Cooperative Ecosystems Studies Unit Dune Restoration at NASO DNA**
- Enclosure 12 Erosion Control Plan**
- Enclosure 13 Forest Inventory**
- Enclosure 14 Stream and Pond Assessments**
- Enclosure 15 Hazardous Materials Reutilization, Hazardous Waste Minimization and Disposal Guide**
- Enclosure 16 Integrated Pest Management Plan**
- Enclosure 17 Conservation Law Enforcement Program Needs Assessment**

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Enclosure 1. Climate Change (Pending)



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Enclosure 2. Nearshore Environment Studies (Pending)





**NAS Oceana VA,
Dam Neck**



N60191-DN



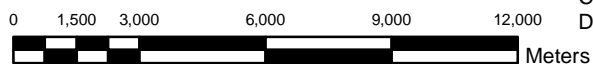
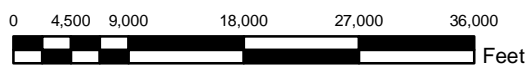
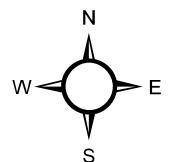
Environmental Business Line, Mid-Atlantic Region

Nearshore Environment

Legend

-  Installation Boundary
-  Nearshore Environment

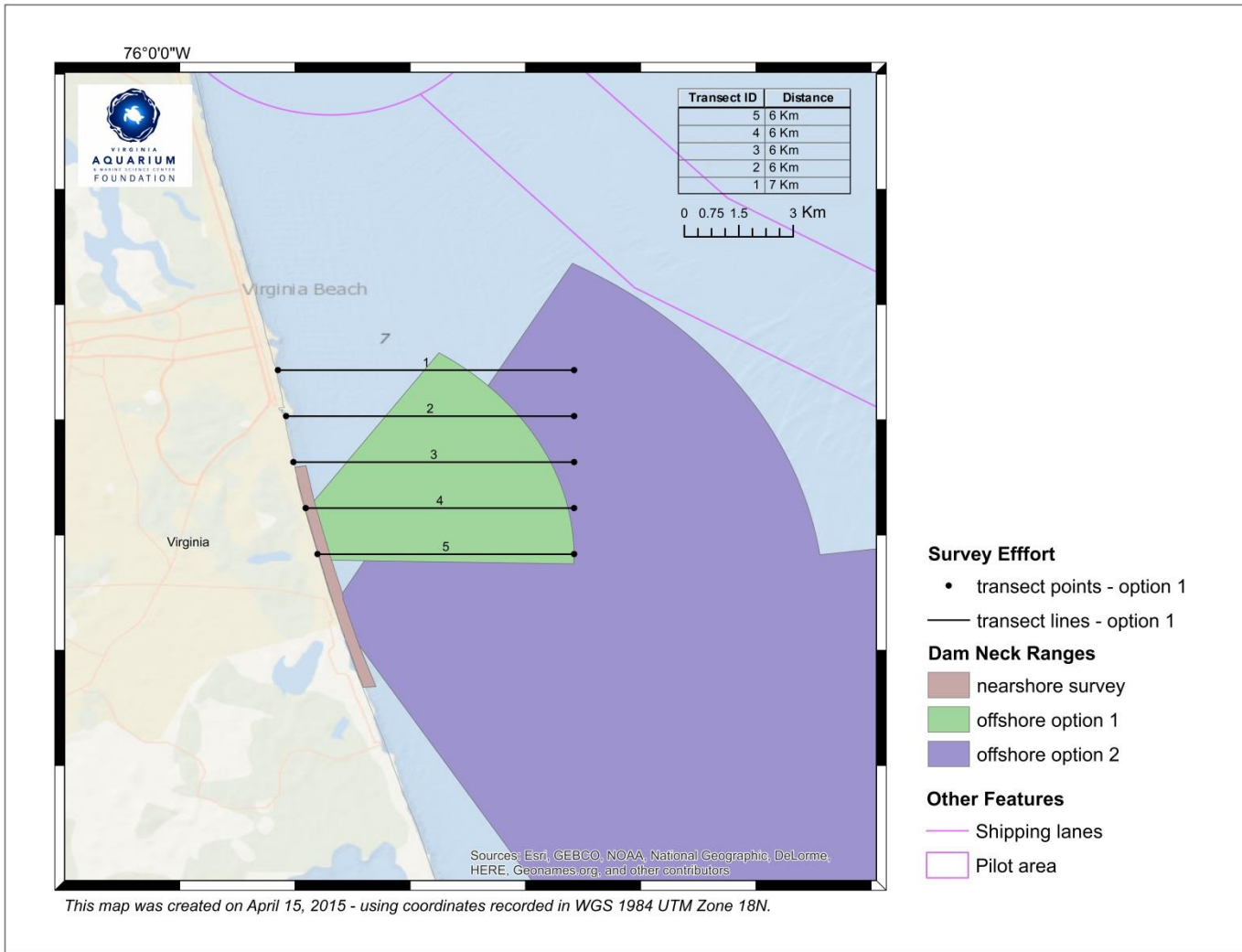
Map created on 8/18/2015
by K. Dean Wright
NAVFAC MIDLANT
EV GIS Coordinator



Projection: Transverse Mercator
Coordinate System: UTM Zone 18N
Datum: WGS1984

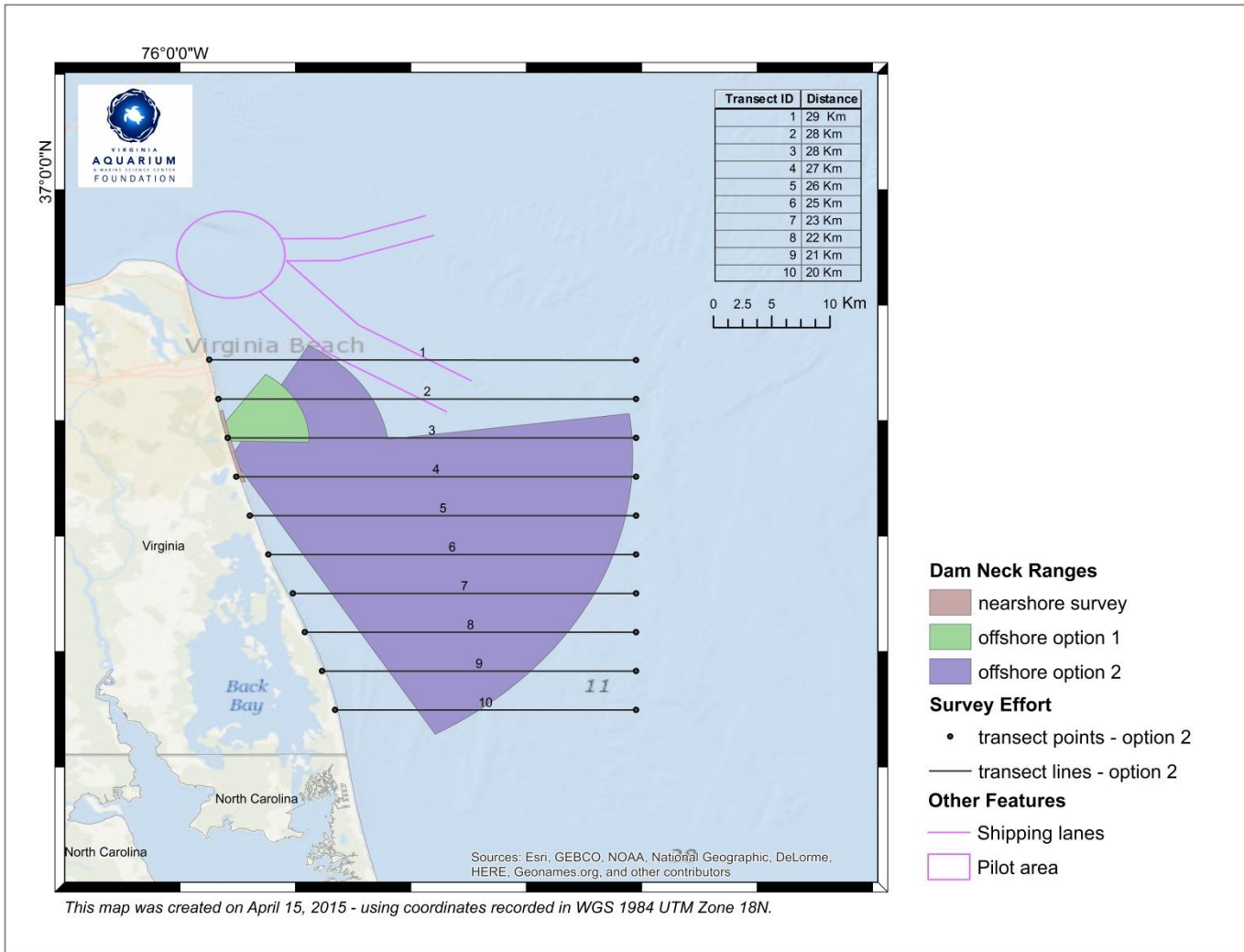


Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Transects for offshore survey option 1

This option involves five survey transects, running perpendicular to the beach, that are approximately six to seven kilometers long and one kilometer apart.



Transects for offshore survey option 2

This option involves ten survey transects, running perpendicular to the beach, that are approximately 20 to 30 kilometers long and five kilometers apart.

TECHNICAL/COST PROPOSAL

Prime Contract No.: N62470-13-D-8017

Task Order XZ13

**NEARSHORE SURVEYS FOR DAM NECK, OWL'S
CREEK, NWS YORKTOWN, CHEATHAM ANNEX
AND YORKTOWN FUEL TERMINAL**

JOINT VENTURE
GMI AECOM

6850 Versar Center #201
Springfield, Virginia 22151

Revised 6 May 2015



1.0 WHY GMI-AECOM JV?

- Geo-Marine, Inc.-AECOM Joint Venture (GMI-AECOM JV) provides unique capacity to conduct shipboard and nearshore surveys. We own and operate the equipment required for the various types of surveys. GMI-AECOM JV maintains and operates an assortment of small crafts for environmental sampling and monitoring projects. Principal among these are the 21-foot (ft) research vessel R/V Polgar and the 25-ft R/V Integrity. Both vessels are equipped with a cuddy cabin for equipment storage, a wheel house for all-weather sampling, a mast and boom assembly with a 12-volt electric winch capable of fish-trawling, clam-dredging, and deployment and retrieval of benthic grab-samplers, and meters.
- The GMI-AECOM JV benthic laboratory has gained a national reputation in monitoring and assessing water and habitat quality through collecting, processing, and analyzing thousands of sediment samples and the communities of benthic organisms they support. This reputation is built on 30 years of benthic sampling and analysis support to the federal, state, and local agencies and private entities.
- Specifically for this technical proposal, GMI-AECOM JV has brought together a team of experts possessing all the skills, equipment, and experience needed to complete the survey and a timely and cost-efficient manner.
- GMI-AECOM JV has worked with the Navy in project areas subject to military operations requiring strict access and safety protocols. We have integrated this coordination into our culture of safety and require all field personnel to be trained in First Aid and CPR.

2.0 TECHNICAL PROPOSAL

2.1 Background

The purpose of this task order is to add additional installations to the ongoing study to survey the nearshore and marine environments of the installations specified. These surveys will provide a comprehensive report listing all flora and fauna, habitat types including shoreline type and anthropogenic features, and water quality information. The installations to be surveyed include Naval Air Station Oceana (NASO) and NASO Dam Neck Annex (NASO-DNA), located in Virginia Beach, VA, and Naval Weapons Station Yorktown (NWSY), Cheatham Annex (CAX), and Yorktown Fuel Terminal (YFT) located in Yorktown, VA. The resulting report and data will aid in ensuring compliance with applicable federal, state, and local statutes and regulations, and with Department of Defense policies, instructions, and guidance. The period of performance for this order shall be from project award to 30 December 2016. Additional areas and installations may be added to the Contract through a modification should funds become available in future fiscal years. These include ranges in the adjacent marine environment at NASO-DNA, as well as the nearshore environments at Naval Station Newport (NAVSTA NPT), and Naval Weapons Station Earle (NWSE).

2.2 Technical Approach

The Scope of Work (SOW) identifies Tasks 1 through 3 and Optional Tasks 1 through 4 which correspond to several installations as follows:

Task 1. NASO (Owl's Creek) Nearshore Survey and Report

Task 2. NASO-DNA Nearshore Survey and Report

Task 3. NWSY, CAX, and YFT Nearshore Survey and Report

Option 1: NASO-DNA Range One Marine Survey and Report

Option 2: NASO-DNA Range Two Marine Survey and Report

Option 3: NAVSTA NPT Nearshore Survey and Report

Option 4: NWSE Nearshore Survey and Report

Because the subtasks are nearly identical for each installation, we will discuss our approach for each subtask below which will be adjusted and applied to each installation as appropriate.

Subtask 1 - Prior to conducting any field collections, the GMI-AECOM JV team will conduct a desktop analysis by obtaining historical surveys and data developed by natural resource agencies, applicable Biological Assessments/Biological Opinions and by reviewing each naval installation's Integrated Natural Resource Management Plan. Potential sampling stations will be selected based on reviews of National Oceanic and Atmospheric Administration (NOAA) bathymetry data in coordination with the Naval Technical Representative (NTR) and Installation Representatives (IR).

Subtask 2 - GMI-AECOM JV team's survey plan, generally outlined in this proposal, will be further developed in coordination with the NTR, IRs, and the applicable natural resources agencies to ensure the study plan includes all important habitats, describes all data collection methods, and provides a survey plan that can be repeated in subsequent surveys to quantitatively evaluate changes in environmental conditions.

Subtask 3 – Prior to all field collections, a base-specific health and safety plan will be developed. Our plan will be submitted to the Navy for review and approval, and in needed adjustments will be made prior to fieldwork. In addition, our team will coordinate with the IR to assess the need for a security or Rapid Gate pass, so that when field surveys do commence, we will have no delays.

The GMI-AECOM JV team will conduct surveys of the nearshore environment in accordance with the survey plan and utilizing staff experienced in surveying for all taxonomical groups and all habitats pertinent to the site. GMI-AECOM JV will secure all necessary permits and licenses to complete the work. GMI-AECOM JV routinely acquires scientific collection permits from state Natural Resource Agencies, including Virginia. The process entails filling out state specific collect permit forms and paying a nominal fee to process the application. Our staff maintains a list of state agency staff contacts who process these forms which we renew annually. In addition, we have coordinated with the Virginia Institute of Marine Science (VIMS), and will work with Dr. Mary Fabrizio and her lab who holds all federal T&E permits that would be needed for this study, including Atlantic sturgeon. We will have at least one representative of her lab that is covered by her

permits present with us during all surveys to ensure proper handling and care of T&E species collected, as well as ensure we meet all required protocols. For marine mammal surveys, a take permit will be required. Fortunately, the GMI-AECOM JV currently holds an active permit with NOAA that encompasses this survey area. Through the IR, we will contact NOAA and alert them to the survey efforts and provide all needed data for NOAA to allow the surveys to take place. This permit also covers all five sea turtle species that occur in the region.

Fish – The GMI-AECOM JV team will survey fish populations inhabiting nearshore habitats using a combination of plankton tows, mid-water trawls, bottom trawls and beach seines. At each installation, the GMI-AECOM JV team predetermine survey sites based on research and aerial photographs. Plankton tows will be conducted first before the water is disturbed by boat use and other sampling gear. The plankton tows are used primarily for the collection of larval fish, however, this method is also effective for collection of small fish residing in the water column. Upon arrival at the predetermined survey locations (marked with GPS coordinates to allow for repetition), the tow will be deployed and pulled for one minute parallel. At the end of the tow, the samples will be preserved and transported to our in-house processing lab for enumeration and identification. Three plankton tows will be performed at each site during all survey events. Although larval fish are most prevalent in the fall and spring, annual collection provides a more complete summary of the resident and transient fishes inhabiting the area and their various life stages.

For mid-water and bottom trawls, upon arrival at the survey site, a 25' experimental research trawl with 3/4" stretch mesh wings, lined with a 1/4" stretch bag, will be deployed off the R/V Integrity to collect benthic fish and larger macro-invertebrates. The trawl will be pulled parallel to shore for 3 minutes at a speed that will allow for optimal collection. Start and end points of each survey will be marked with GPS coordinates to allow for repetition and calculation of total distance towed. At the end of each pull, the trawl will be retrieved, and all fauna will be identified to the lowest possible taxon, enumerated, and released. A representative sub-sample of organisms collected will be measured to the closest millimeter. This survey method will be repeated at each location until all 6 samples for both surveys are collected. In restricted areas, or those potentially littered with UXO, we will increase the number of plankton tows and beach seines to assess the fisheries populations in the area. It is possible that gill nets could be used to collect data as well, however, feasibility of deployment and sea conditions may make this method difficult. Video cameras may also be used for fish census, however, if water quality is poor, the video will provide little data. Another option may be to conduct mid-water trawls, to collect samples in the water column, but depending on depth, this method may not be practical. Each method will be assessed and used as site conditions dictate.

Both plankton tow and trawl surveys will be conducted from GMI-AECOM JV's 25' flagship research vessel, the R/V Integrity, which is equipped with a small boat J-frame, Furuno GPS, Radar, and mechanical winch capable of lifting up to 500 lbs.

Following the plankton tow and trawl surveys, we will conduct six beach seines. As with the other gear, we will arrive at predetermined survey locations, we will deploy a 150', ¼" mesh net with a fishing height of 6 ft and a central bag. Using our 18 ft john boat, crews will anchor one end of the net onshore and deploy the net off the back of the boat. Crews will set the net against the flow of the tide to ensure the net does not collapse as it is being pulled in. Once the net is retrieved, we will quickly identify and enumerate all species collected to the lowest taxon possible.

Marine Mammals – Marine Mammal surveys in the nearshore environment are difficult to conduct using standard protocols. Most surveys protocols have been established for offshore areas, using large vessels, and covering large areas. However, the GMI-AECOM JV has experience conducting nearshore marine mammal surveys on the east using a small platform boat and similar methods to offshore protocols. In addition, we have teamed with Virginia Aquarium and Marine Science Center Foundation for these surveys. They have their own vessels and experienced observers to help the GMI-AECOM JV perform this task.

To meet the needs of the Navy, we will develop a systematic survey plan for running transects perpendicular to shore at a set distance to ensure we survey the entire project area (Example: See Appendix 1). Although the maps in the Appendix show 5 and 10 transects per range, we will follow the statement of work and perform 4 in Option 1 and 8 in Option 2. The boat will have a boat captain and three NOAA approved marine mammal/sea turtle observers. One will be the data recorder and the other two will be observing the survey area using binoculars. Each sighting will be recorded, and data will include species, number, behavior, and location. Because these surveys and subsequent sightings are difficult, especially from a small vessel, species level identification may not always be possible, however, we will identify each animal to the lowest taxon possible. These surveys will not allow us to develop density or abundance estimates for the various species encountered, but it will provide a good foundation for the species using the area and behaviors noted, such as feeding, breeding, etc.

We will conduct nearshore surveys during each season, however, because these visual surveys require certain sea conditions, as well as good visibility (no rain, fog, etc), we may have survey events where weather precludes us from completing surveys as designed. We will make every effort to collect as much data and carefully choose survey times based on sound weather and sea forecasts to allow for maximum data collection.

The above mentioned approach for marine mammal surveys can be used for all locations except for the NASP-DNA Range 2. The size of this site, as well as the distance from shore, requires a different approach for safe, proper surveys. The Aquarium has a 45' vessel that can be used for these surveys, allowing the team to survey this offshore area properly. Assuming good weather and sea conditions, we estimate roughly 3 days to complete transects for this range. If for any reason ship-based surveys are not acceptable in this area due to training or other issues, we can also perform aerial surveys. We can use standard fixed wing aircraft to systematically cover the survey area by flying transects both perpendicular and

parallel to shore to ensure 100% survey area coverage. We will use a pilot with aerial survey experience, as well as trained aerial observers to expedite the data collection. We will follow standard NOAA protocols for these types of surveys. These surveys will only require one day, with less costs than ship-based surveys. Depending on what method will be approved, we can adjust costs, however, we are building costs for this proposal using the ship-based method. As will all marine mammal surveys that require a NOAA permit, all methods and approaches must be approved by NOAA, therefore, the approach mentioned above may be modified after consultation with NOAA.

State and Federally Listed Threatened and Endangered Species - All field collections of biota and marine mammal observations will note any state or federally listed threatened and endangered species or proposed species. Our state issued scientific collection permit will be sufficient authorization to conduct fisheries surveys and our NOAA permit allows us to survey the marine mammal and sea turtle species. If listed or proposed fisheries species are collected, it will be noted and immediately released unharmed. ESA specific collection permits are limited to only a few specialized researchers. While Dr. Mary Fabrizio and her lab will assist us with some species, we assume additional subcontracts and schedules would need to be completed with an appropriate ESA permit holder to accompany the collection team is not included in our budget.

Benthic Habitat, Species and Sediment Characteristics – Benthic samples will be collected by field crews aboard the R/V Integrity using a Young Modified Van Veen sampler. Crews will navigate to a predetermined waypoint and record GPS coordinates as the Young sampler is dropped twice to the bottom. The first grab will be sieved through a 500 micron screen and then transferred to a 10% buffered formalin solution. A second sediment sample will be collected and the top layers will be collected, placed on ice for TOC/Grainsize analysis. Samples will then be transported to GMI-AECOM JV Laboratories for sorting and identification of all macro-invertebrate and other analyses. Four benthic collections will be taken in the intertidal habits and four samples in the deeper sub-tidal habitats each season to describe community composition. Location of the benthic grab samples will be carefully coordinated with the IR to ensure surveys are not conducted in areas of UXO or other concerns.

Submerged Aquatic Vegetation (SAV) - Surveys for the presence and distribution of SAV and upland vegetation will be done once in the fall season during peak SAV biomass. Surveys will be conducted using a combination of boat reconnaissance, recent aerial photographs (if available), groundtruthing, and shoreline-based visual surveys. We selected the fall season for SAV surveys to ensure the work will be conducted at the highest standing stock and highest water clarity (i.e., lower algal blooms).

Using our 18ft John Boat, we will determine the boundaries of SAV within each project site and mark them with GPS coordinates. For extremely shallow areas where boat use is impractical, we will mark boundaries on foot. The SAV areas located will be described in terms of species and diversity. If water quality is

sufficient, we can make these determinations visually from the boat, however, it may be necessary to put to collect this data using video cameras, however, this will be subject to approvals based on photography permits and may be limited or not allowed at some installations. Videos and still photographs will be analyzed to assess species present and make estimations of diversity and composition. .

Intertidal Flora and Fauna – The in-water portion of this community will be characterized in the shallow water benthic grabs, the SAV surveys, and beach seine sampling. However, for upland flora and fauna surveys, experienced coastal biologists will run transects from the inland most portion of the beach habit to shore and document vegetation and animal species encountered. The number of transects per site will be based upon the diversity of terrain and habitats in the area. For sites that are more homogenous, six transects will be run. For the sites that are more diverse, additional transects will be needed to accurately assess the area. The surveys will be conducted in late summer for vegetation communities, however, we will also conduct these during the spring season adequately assess fauna populations.

Water Quality - In-situ water quality conditions during all activities will be collected using a calibrated Yellow Springs Instruments (YSI) 6600 series sonde equipped to log dissolve oxygen, pH, conductivity, and turbidity. Water quality will be measured at all benthic grab stations (eight per season and installation) using a calibrated water quality meter to measure salinity, dissolved oxygen, pH, conductivity, turbidity, and temperature. Whole water samples will also be collected using an alpha water sampler to test for nitrogen, nitrate/nitrite, and phosphorus concentrations, and total suspended solids (TSS) using a National Environmental Laboratory Accreditation Program (NELAP)-certified analytical laboratory. A decontaminated sampler will be rinsed with local ambient water and then dropped to a predetermined depth, a messenger weight will be used to activate the sampler. After collection, samples will be decanted from the bottle and preserved on ice before laboratory analysis.

GMI-AECOM JV's field crew will conduct fish, benthic organisms, and water quality sampling for one week at each facility. Each facility will be surveyed in the spring, summer, fall and early winter months. SAV and Intertidal Flora and Fauna will be conducted as a stand-alone survey entailing 4 field days and a crew of 2 for each facility. Additionally, the marine mammal surveys may be stand-alone surveys as well. We will combine where we can, but due to weather restrictions, separate surveys may be required.

Task 3 Reporting:

1) Monthly progress reports will be prepared for each installation including tables that denotes the funds spent per month, per fiscal year, with a total for each fiscal year and an overall total for all fiscal years. These reports shall be provided to both the NTR and the IR. Progress reports shall be submitted electronically on a monthly basis. The progress reports will be submitted electronically as a Word attachment. The progress reports will be dated and sent to the NTR and IRs on the 10th day of each month. Each report will include a detailed account of work accomplished at each installation, estimated percentage of work completed, and costs to date. Each subsequent report will include work from

previous months and any past or future potential issues. Activities planned for the following month will be incorporated into the report. Progress report structure and information required will be amended as requested by the Government.

2) Draft survey plans for each installation will be submitted within 45 days of the Kickoff meeting. GMI-AECOM JV will prepare a plan for each installation summarizing all field survey methodologies and schedules. The plans will be concise reports that describe in detail the protocols that will be used to conduct the surveys in each location, the research vessels and survey equipment that will be utilized during the surveys, the procedures to ensure that the survey equipment is calibrated and functioning correctly, detailed descriptions and schedule of survey activities, and an outline of the data analysis methods. GMI-AECOM JV will provide one (1) electronic copy of each installation's draft plan to the NTR and will provide each IR with one (1) electronic copy of our installation specific plan.

3) Final survey plans for each installation will be sub each installation shall have its own plan.

4) Draft nearshore survey reports will be prepared or each installation that will include GIS data and maps for review.

Draft and final reports will have the following format: all reports will be submitted on 8 1/2 by 11 inch paper with folded maps or tables, as appropriate. All originals will be reproducible by black and white xerography and copies bound, and in digital format. Pages will be printed double-sided to conserve paper. Hard copy documents will be labeled on the front and spine of the documents. Labels will include project title, installation(s) included, and date finalized. The report will include the following sections:

i. Title Page

- Title, date, Contract and task order number and location

ii. Sub-title Page

- Title
- Prepared by listing with affiliations
- Prepared for listing Agreement number and date
- Recommended citation

iii. Executive Summary (background, purpose, findings, conclusion, recommendations)

iv. Table of Contents

- Table of contents
- List of tables
- List of figures (photos are considered figures)
- List of appendices
- List of acronyms

v. Introduction

- This section will include an overview of the project and relevant background information and will clearly state the project's purpose and objectives.

vi. Survey Area

- This section will provide a description in sufficient detail of each survey area/region. Maps of sufficient scale will be included to delineate the location of each species/study area.

vii. Methods

- This section will include detailed information describing how and when the work was accomplished. This section will be drafted so installation/contract personnel will be able to replicate the survey by reading what is in this section. The methods used will be structured and repeatable for future efforts. Survey routes/transects will be documented through GPS and provided to the NTR and IR as a separate GIS layer.

viii. Results

- Results will include, but not be limited to, all data requirements and any extensive data sets will be presented in appendices as appropriate. Results will be presented in text, tables, and figures and will include text describing survey results.

ix. Discussion

- The discussion will be relevant to the purpose of the project and discuss the significance of the results presented. The discussion will summarize sampling results and comment on the analyses.

x. Literature Cited

xi. Appendices (as appropriate)

5) After receiving collective comments from Navy reviewer a final nearshore survey report will be prepared for each installation including survey locations established w/ accompanying GIS route coverage. Final Reports and other text documents will be provided in Microsoft Word format AND Adobe Portable Document Format (PDF). Spreadsheet files will be provided in Microsoft Excel format. Databases will be provided in Microsoft Access format, unless specified otherwise, as approved by the NTR. Prior to database development, we will provide the Government with a Technical Approach Document for approval, which will describe our technical approach to designing and developing the database. All text, spreadsheet, and database files, and any videos will be delivered on external DVDs. In addition, all digital photographs taken during the project fieldwork will be submitted DVDs. All images will be labeled with the title of the image, the location of photograph, date, and photographers' name.

Two digitized copies of all raw field data resulting from the analysis of biological sampling will be submitted, one to the NTR and one to the IR. The format for the raw field data will be external CD/DVD.

All digital files, databases, source data acquired for this project, final hard-copy products, and related materials, including that furnished by the Government, will become the property of the Navy. All materials purchased under this task order will be considered Navy property. All materials will be inventoried and provided to Navy either upon request or at the completion of the project.

Task 3 Geographic Information System Data:

Geographic Information System (GIS) data deliverables will conform to current Navy adaptation of the Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) version 3.01 format. GIS data will be natively collected using the WGS84 (D_WGS_84) datum, in the WGS 1984 geographic coordinate system (GCS_WGS_84),

using meters as the standard unit of measurement. All data will be submitted in both a raw and post-processed form. ArcGIS metadata shall be completed and included in an XML format, in accordance with the FGDC Content Standard for Digital Geospatial Metadata.

3.0 PROJECT SCHEDULE AND DELIVERABLES

GMI-AECOM JV will utilize the following milestone schedule as a guide with the final schedule to be determined upon contract award. All dates are approximate until the "notice to proceed" is given to GMI-AECOM JV.

Deliverable	No. Copies	Due Date
Kickoff Meeting (to be held via teleconference)	N/A	Within 2 weeks of award of task order
Draft Survey Plans for all six Installations	Electronic	Within 45 days of kickoff meeting
Final Survey Plans for all six Installations	Electronic	Within 2 weeks of receipt of Navy comments
Progress Reports	Electronic	Monthly
Draft Nearshore Reports with Draft Geographic Information Systems (GIS) Deliverables for all six Installations	Electronic	31 Oct 2016
Final Nearshore Reports with GIS Deliverables for all installations	3 Hard Copies and 3 CDs/DVDs of Report and GIS Deliverables. 2 sets of DVDs with all photos and/or videos taken throughout the life of the project.	15 DEC 2016

4.0 PROJECT TEAM RESUMES AND EXPERIENCE

The GMI-AECOM JV team is uniquely qualified to complete the nearshore surveys at the various installations based upon our experience staff and past performance. Experience summaries for key team personnel and several past projects are presented below.

4.1 Key Personnel

Mr. William Burton

Mr. Burton has supervised multiple fisheries surveys throughout the Mid-Atlantic region including surveys conducted off the coasts of New Jersey, Delaware and North Carolina. For the United States Army Corps of Engineers (USACE) Philadelphia District, he conducted fish trawling and video sled surveys of bottom biological features at sand borrow sites slated for beach nourishment projects. All sampling was geo-referenced and the video images were reviewed in the laboratory to provide counts of fish, benthic organisms, and physical features of the borrow area. GIS data layers were created to map important biological features of the sand borrow site. These surveys were further enhanced by benthic infaunal grab sampling used to describe the community composition and abundance. For the Minerals Management Service (MMS; now Bureau of Ocean Energy Management), Mr. Burton conducted a 3-year study of fish use on offshore sand shoals and nearby flat reference bottom areas. Mr. Burton has also used remotely operated vehicles (VideoRay[®]) to survey and assess the fish community use of shipwrecks off the coast of New Jersey for the Philadelphia District of the USACE. The District tasked Mr. Burton to quantify the biological productivity of the shipwrecks as artificial reefs in the event they were buried with sand during a planned beach nourishment project.

Mr. John Ouellette

Mr. Ouellette has over 18 years of experience managing and coordinating research and conservation activities in the United States and worldwide. In his capacity as the GMI-AECOM JV Program Manager for the Naval Facilities Engineering Command Atlantic Biological Indefinite Delivery, Indefinite Contract #N62470-13-D-8017, Mr. Ouellette routinely works to assist project managers to monitor schedules, maintain financial performance, publish reports, ensure accurate and reliable results (quality assurance/quality control [QA/QC]), and administer staff/resource needs. Over his career Mr. Ouellette has worked closely with over 35 relevant government agencies, non-governmental organizations, academic institutions, and corporations in six countries to address a myriad of issues pertaining to the conservation and management of threatened and endangered species, species of interest, human-wildlife interactions, and epidemiology of enzootic diseases.

Ms. Lisa Scott

Ms. Scott specializes in the use of benthic macroinvertebrate communities as tools for impact assessment and biological monitoring. She has more than 30 years' experience in the processing and identification of benthic organisms collected from estuaries, freshwater systems, and coastal regions from eastern states including from Maine to Florida and from regions of the Gulf of Mexico. On average, she supervises the processing of more than 1500 biological samples and 1000 sediment samples in the laboratory each year. Ms. Scott has considerable expertise in laboratory QA/QC protocols and was principally responsible for the development and use of a QA/QC plan that served as the blueprint for the laboratory QA/QC requirements for the Environmental Protection Agency's Estuary Monitoring and Assessment Program, the Mid-Atlantic Integrative Assessment Program, and is currently part of NOAA's National Coastal Assessment Program. She is the curator of the Versar reference collection that includes over 1000 benthic taxa. She was instrumental in developing a comprehensive list of over 1700 benthic taxa representing all species identified from samples collected along the east and gulf coasts and

includes life history characteristics such as feeding type, whether the species is epifauna or infauna, and whether the species is considered an opportunistic or equilibrium species.

Mr. David Wong

Mr. Wong is a Senior Taxonomist with extensive experience in fish identification from both freshwater and marine habitats in the Mid-Atlantic region. Mr. Wong also has research and field experience in oceanic trawling, gillnetting, and fish identification; constructing water quality monitoring stations, conducting chemical and biological sampling, monitoring storm and non-storm events for watershed assessment, laboratory analysis, data analysis, staining procedures, and benthic processing. Mr. Wong has a wealth of project experience. He conducted biological surveys in the lower Christina River (Wilmington, Delaware) to examine the effect of dredging operations on the migration and spawning of anadromous fish in the river; he assisted in radiotelemetry tagging and monitoring of Alosids in the river and was responsible for collecting adult fish with gillnets; and, as a fisheries biologist for the USACE, Wilmington District, he was responsible for a fish community assessment of the beaches in Dare County, North Carolina.

Ms. Jodi Dew-Baxter

Ms. Dew-Baxter has more than 12 years of experience in data analysis and database development as well as data compilation, statistical analysis, modeling, computer programming in SAS, Visual Basic, and R, and webpage maintenance and design. She is the primary analyst for various nearshore survey projects for National Oceanic and Atmospheric Administration, Chesapeake Bay Office, Maryland Department of Natural Resources, USACE Philadelphia District and Wilmington District, and National Park Service (NPS). Some examples of work performed by Ms. Dew-Baxter include a long-term benthic survey project, bottom habitat characterization surveys, and assessment of the ecological impact of beach renourishment. Ms. Dew-Baxter will be responsible for developing an Access geodatabase to house all data collected, conducting QA/QC on data entry, and performing data and statistical analysis on the data.

Mr. Ryan Corbin

Mr. Corbin has research and field experience in the following areas: oceanic and estuarine trawling, seining, sampling with Fyke nets, electrofishing, plankton and ichthyoplankton sampling, benthic macroinvertebrate and sediment sampling and sediment classification, finfish tagging, finfish and crustacean identification, water quality assessment, and laboratory and data analysis. Mr. Corbin has a proficient background in taxonomic field identification of marine, estuarine, and freshwater fishes and crustaceans of the Mid-Atlantic Bight. Mr. Corbin has knowledge of geographic information systems (GIS) and how it can be applied to fisheries and ecosystem management, including the incorporation of a differential global positioning system into trawling operations for the purpose of generating trawl logs. Mr. Corbin also possesses the skills needed to maintain and analyze ecological data sets with both general and advanced statistical methods. Mr. Corbin can trailer and operate vessels up to 25 ft in length. Mr. Corbin has conducted benthic surveys within the nearshore (0.5 miles) ocean habitat off of Assateague Island and Ocean City, Maryland, to characterize the habitats and benthic communities. The type of biological sampling that Mr. Corbin conducted for these projects included the use of benthic grabs to collect sediment and invertebrate species, and trawling using a 25-ft semi-balloon otter trawl. Benthic samples were sieved in the field and organisms were preserved in a solution of formalin and brought back for laboratory species identifications and enumeration. Sediment

samples were also collected at all sites for grain size and total organic carbon analyses. All specimens collected in trawling operations were identified and enumerated in the field and returned back to the ocean as quickly as possible. Water quality data was also gathered at all stations for these projects.

4.2 Previous Experience

Essential Fish Habitat Study (2001-2010) \$500,000.

Versar conducted a study for the Department of Interior's MMS in support of efforts to identify environmentally-acceptable offshore sand resources for coastal beach restoration programs in the Mid-Atlantic Bight (MAB). The purpose of this study was to assess the ecological value of potential sand resources off the coasts of Delaware and Maryland. As ongoing and proposed beach restoration projects along the east coast of the United States deplete nearshore sand resources, efforts to identify new potential sand resources have moved farther offshore onto the continental shelf region of the Exclusive Economic Zone (EEZ) (3 to 200 miles from shore). The management of all mineral resources within the EEZ, including sand, gravel, and shell, falls under the jurisdiction of the MMS, and, as stewards of these resources, the MMS must comply with relevant federal laws to ensure any use of sand resources does not adversely affect marine biological resources.

In collaboration with Maryland and Delaware Geological Survey, the MMS identified four specific sand shoals off the coast of Maryland and Delaware as potential resources for long-term sand mining. The specific shoals were Shoal B, Shoal D, Fenwick Island Shoal, and Weaver Shoal. Recognizing that shoals may provide important habitat to specific marine communities and that sand mining activities could have negative impacts to those communities, the MMS contracted Versar to design and implement a study that would define the marine communities residing at the shoals, and assess the ecological value of the shoals. The results from this study will be used as a guide for future beach nourishment activities.



Underwater Video Sled

Using several analysis techniques, the results of this study documented significant seasonal variations in species composition and species abundances at the shoals and flat-bottom reference sites in this region of the MAB. Yearly variations in species abundance occur, but overall the seasonal patterns of species assemblages are constant. The results also determined day/night differences in fish species using the shoals and flat bottom areas based on the net and bioacoustic survey data. Differences are apparent in the species composition using the shoals and flat-bottom areas during the day, with generally higher species numbers at the flat-bottom sites. Because the net and hydroacoustic data indicated somewhat different patterns of fish use at the shoals, the recommendations to MMS were to adhere to the precautionary approach until further data, such as nighttime net survey

Client Contact and Phone Number: Roger Amato, Bureau of Ocean Energy Management, 703-787-1296

Assateague Island National Seashore Atlantic Subtidal and Beach Benthic Resource Inventory (NPS). \$113,685 and Maryland Coastal Zone Management Benthic Habitat Assessment (MD CZM). \$81,818.

This project combined the data collected from a comprehensive sonar mapping survey conducted by the Maryland Geological Survey (MGS) with biological data collected by Versar to and develop spatially explicit characterizations of coastal habitats and associated living resources. The inventory of biological resources associated with MGS mapped bottom types were conducted using a combination of benthic grab samples and trawls. Biological sampling was conducted over a period of 3 years during two separate sampling events between 2011 and 2013. Each sampling event consisted of conducting 36 benthic grabs (72 total) and 12 trawls (24 total) allocated among four strata (bottom types) delineated by the MGS from the interpretation of sonar survey data.



Sampling for macrobenthos at each site consisted of two grab samples, one for macrobenthos and one for sediment characterization. A Young-modified van Veen grab sampler with a surface sampling area of 0.04 square meters was used at all sites. The Young grab penetrates the sediment to a maximum depth of 10 centimeters (cm); penetration was recorded for each sample. Samples penetrating less than 7 cm were discarded and retaken. Samples were processed on the vessel and preserved for future analyses. In the laboratory, samples were washed in tap water through

nested 0.5- and 1.0-millimeter (mm) mesh screen sieves and processed by placing small amounts of sample material and water in sorting Petri dishes and examined through a binocular stereoscope at 10X magnification. All organisms except the meiofauna (e.g., nematodes and copepods) were sorted into major taxonomic groups, stored in 70 percent ethanol, and subsequently counted and identified to species level whenever possible. Ash-free dry weight biomass was determined for each species by drying (60°C), weighing, and then ashing (500°C) the organisms for 4 hours in a muffle furnace. Grain size was analyzed by wet sieving over nested 0.0625-, 0.125-, 0.25-, 0.50-, 1.00-, 2.00-, and 4.00-mm mesh metal wire screens. Various amounts of sediment (50-200 grams [g]) were used according to the coarseness of the material. Organic carbon was calculated as a percentage of weight loss upon ignition after drying (60°C), weighing, and then ashing (500°C) a small amount of sediment for hours in a muffle furnace.

Trawls were conducted in each of the four strata using a 7.6-meter (m) semi-balloon otter trawl with a 4-cm stretch mesh body fitted with a 3-mm stretch mesh liner in the cod-end. Trawling was conducted during the day from Versar's 7.6-m research vessel, the "R/V Integrity". Trawls were deployed over the stern of the vessel and towed on the seafloor for 6 to 10 minutes at a speed between 1.5 and 2.0 knots. Trawls were conducted parallel to the depth contour so that intra-trawl depths remained consistent. The vessel position and heading was logged on a shipboard computer at 2-second intervals to determine the approximate distance each trawl was towed. Organisms collected in trawls were placed into a large tub of seawater for sorting and documentation when a trawl was retrieved. Fish and invertebrate species were identified to the lowest practical taxon, counted, and a subset of 25 specimens of each species were measured to the nearest millimeter standard length. When jellies or SAV were present, the volume of each

was approximated. Shells and other natural debris were also documented when present in trawls. All living organisms and natural debris were released once the trawl content had been thoroughly sorted.

Benthic macroinvertebrate data were analyzed to identify patterns in species composition and abundance and biomass distribution using cluster analysis and non-metric multidimensional scaling ordination procedures in PRIMER and Nodal Analysis. Species collected in trawls were summarized and presented by bottom type. Community characteristics discovered from grab and trawl data were combined on fact sheets that described both physical and biological community attributes associated with each of the primary bottom types delineated by the MGS.

Client Contact and Phone Number: Bill Hulslander, Chief, Division of Resource Management, Assateague Island National Seashore, 410-629-6061

Client Contact Information: Laura Younger, Chesapeake and Coastal Service, 410-260-8742

A Determination of Habitat Preferences of Fish Communities Residing in Mesohaline Habitats of Chesapeake Bay (NOAA Chesapeake Bay Office). \$485,167.

Fish community sampling was conducted using two primary gear types. Shoreline habitats were sampled using 61-m seines, and deeper benthic fish communities were sampled using 7.5-m trawl nets. Sampling was conducted seasonally in spring (April-June), summer (July-September), and autumn (October-November). To determine differences in habitat use within the diel cycle, sampling with both gears occurred during the day and at night. Daytime samples were collected 1.5 hours after sunrise to 1.5 hours before sunset and night samples were collected 1.5 hours after sunset to 1.5 hours before sunrise.

Trawl Specific Methods

Once the trawl was deployed, starting global positioning system (GPS) coordinates, depth, and time were recorded on the datasheet. The duration of a trawl sample was 6 minutes from the time the trawl was set to the beginning of retrieval. Trawl transects were kept within the habitat being sampled, and sample areas could be moved to allow for the trawl to occur in the desired habitat, or if depth or underwater obstructions posed a problem. If a station was moved, a note was made on the datasheet. Trawls were also conducted into the current whenever possible, and the direction of the trawl, and current and wind relation, were noted on the datasheet. Finally, any pieces of habitat collected in the trawl were noted on the datasheet. At the end of the trawl, the ending GPS coordinates, depth, and time were recorded on the datasheet. Once the trawl was retrieved, the contents were emptied from the cod end into a large plastic tub half-full of saltwater for sorting. Any information regarding by-catch was also recorded on the datasheet.



Seine Specific Methods

The seine was set by boat in a semi-circle around the habitat being sampled. Once the seine was retrieved such that all organisms were within the bag, the net was consolidated until all organisms were restricted to a confined portion of the bag, making sorting easier later. The seine was then draped over the back of the skiff, making sure that all organisms remained in the water; this step ensured that all organisms incurred the least amount of stress as possible. The sample was then sorted as described above, and all data was recorded on the datasheet. Once all organisms had been sorted and recorded, site-specific habitat data was recorded, as well as the width of the seine (feet) on shore, the distance from shore to the bag buoy (feet), depth of the water at the bag (feet), and the GPS coordinates at the bag.

Client Contact Information: Howard Townsend, NOAA/NMFS/HC/Chesapeake Bay Office 410-226-5193

5.0 ASSUMPTIONS

To complete the tasks as outlined in this document and within the given project schedule, the following assumptions must be met:

- Reasonable access to the project areas will be provided by the Government to allow for a sufficient quantity of surveys and the work to proceed according to the schedule.
- Scientific permits will be secured in a timely manner without impacting schedule.
- Fish will be adequately surveyed using trawls and seines. Alternative methods of equivalent cost may be considered, where necessary.
- Acoustic surveys are not required for marine mammal surveys.
- All marine mammal surveys will be conducted from small vessels or shore using standard visual aids such as scopes or binoculars.
- Sea turtles will be recorded, including species, location, and time of day if observed.
- SAV will be surveyed through visual observation and aerial photography. In water mapping, using divers is not required.
- Winter sampling will be conducted early to avoid icing and seasonal sampling at all bases will be conducted in consecutive weeks with each survey season.
- Water quality parameters will include salinity, dissolved oxygen, pH, conductivity, turbidity, temperature, nitrogen, nitrate/nitrite, and phosphorus concentrations, and TSS. Any additional parameters will require additional funding.
- If the government requires substantial changes to the survey methodologies described in this proposal, then additional costs may be required; however, alternative methods of equivalent cost may be considered, where necessary.

6.0 COST PROPOSAL

Based on comments received on GMI-AECOM JV's original 9 March 2015 proposal and budget, we have increased the costs of our proposal to provide more extensive surveys to ensure the data needs of the Navy are met. For the stand-alone Flora and Fauna survey we have added 2 full survey days for crew of 2 staff and associated travel costs. We have also increased the hours of the Task Order Manager, and GIS Analyst per facility to provide more labor to develop specific study plans, project oversight, client interactions, and to better meet the database and GIS requirements for the program. The amended cost proposal is in the added pages below the original proposal. Costs include costs for services provided by VIMS and the Virginia Aquarium.

Base Tasks
See amended cost proposal on added pages

NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC						
GMI-AECOM JV N62470-13-D-8017						
NEARSHORE SURVEYS FOR DAM NECK, OWL'S CREEK, NWS YORKTOWN, CHEATHAM ANNEX AND YORKTOWN FUEL TERMINAL						
GMI		TASK 1	TASK 2	TASK 3		
Labor Category	RATE	NASO Owl's Creek	NASO-DNA	NWSY	HOURS	COST
Program Manager	139.32	24	24	24	72	10,031.04
Task Order Manager	100.09	8	8	8	24	2,402.16
Marine Biologist	75.13	160	160	160	480	36,062.40
Wildlife Biologist /Zoologist	72.97				0	0.00
Botanist	69.50				0	0.00
Biostatistician	90.94	12	12	12	36	3,273.84
Professional Wetland Scientist	79.43	40	40	40	120	9,531.60
Fisheries Biologist	79.32	160	160	160	480	38,073.60
Oceanographer	75.40				0	0.00
Marine Chemist	75.40				0	0.00
Toxicologist	77.61				0	0.00
Chemist/Organic Chemist	74.57				0	0.00
Bio-Technician	54.52	96	96	96	288	15,701.76
Diver	84.52				0	0.00
Laboratory Technician	50.03	32	32	32	96	4,802.88
BASH Specialist/Ornithologist	75.54				0	0.00
Forester	68.96				0	0.00
Soil Scientist	69.21				0	0.00
Entomologist	75.54				0	0.00
Hydrologist	66.77				0	0.00
Geologist	64.13				0	0.00
Environmental Scientist	67.84	24	24	24	72	4,884.48
Senior Archaeologist	81.40				0	0.00
Archaeologist	65.04				0	0.00
Archaeologist - Field Technician	54.52				0	0.00
Historian	62.26				0	0.00
Senior Architectural Historian	73.21				0	0.00
Architectural Historian	61.83				0	0.00
Historic Architect	119.72				0	0.00
Landscape Architect	70.35				0	0.00
NEPA Specialist	79.51				0	0.00
Civil / Environmental Engineer	80.44				0	0.00
GIS Analyst	73.18	24	24	24	72	5,268.96
Graphic Artist / Illustrator	58.52				0	0.00
Editor	59.08	16	16	16	48	2,835.84
Clerical/Administrative	49.74	23	23	23	69	3,432.06
Total Hours		619	619	619	1,857	136,301
Total Cost	\$	45,433.54	\$ 45,433.54	\$ 45,433.54		\$ 136,300.62
TRAVEL						
			U/M	RATE	QUAN	TOTAL
Site Visits			MI	0.565	7500	4,237.50
Site Visits (air fare)			EA	0		0.00
per diem (lodging)			RT	83	72	5,976.00
per diem (M&IE)			DA	56	108	6,048.00
Total Travel Costs						16,261.50

Base Tasks (Cont'd)
See amended cost proposal on added pages

OTHER DIRECT COSTS			U/M	RATE	QUAN	TOTAL
Benthic Sample Processing (subtidal)			EA	236.25	48	11,340.00
Benthic Sample Processing (inter-tidal)			EA	236.25	48	11,340.00
Sediment Grain Size (subtidal)			EA	52.50	48	2,520.00
Sediment Grain Size (inter-tidal)			EA	52.50	48	2,520.00
Nitrogen			EA	20.00	48	960.00
Phosphorous			EA	20.00	48	960.00
TSS			EA	20.00	48	960.00
Trawl nets			EA	800.00	3	2,400.00
Seine nets			EA	650.00	3	1,950.00
Boat/day			EA	275.00	36	9,900.00
Ship rental			EA	50.00	36	1,800.00
Material			EA	200.00	3	600.00
Boat Fuel (per fill up)			EA	250.00	3	750.00
Truck fuel (per fill up)			EA	150.00	24	3,600.00
Printing and Photocopying			PG	0.09		0.00
Color Copies			EA	0.25		0.00
Color GIS Plots - D size			EA	10.00		0.00
Color GIS Plots - E size			EA	18.00		0.00
Library Reference Materials			LS	150.00		0.00
GIS Supplies - Recordable CDs and 8mm Tapes			LS	1.50		0.00
GIS Supplies - Recordable DVDs			LS	1.50		0.00
Overnight Shipping			LS	25.00		0.00
Equipment Rental (1-week for Trimble GeoXT & Antenna)			EA	630.00		0.00
Environmental Equipment			EA	15.00		0.00
Aerial Photograph (Purchase of Orthophoto Quads)			EA			0.00
Physical Land Surveys			EA	1.00		0.00
Bioassays/Lab Analysis			EA	1.00		0.00
Expendable Supplies - (Flagging, pin flags, etc.)			EA	15.00		0.00
Non-Expendable Supplies			EA			0.00
Expendable Supplies - Reference Materials/Interlibrary Loans, etc.			EA	300.00		0.00
Newspaper (NOA)			EA	500.00		0.00
Electronic Literature Scanning for PDFs			PG	0.09		0.00
Sum Other Direct Costs						51,600.00
Total ODCs						51,600.00
SUBCONTRACTS		TASK 1	TASK 2	TASK 3		
Subcontractor						
Subcontractor						
Sum Subcontractor						
3% Fee for Subcontracts						
Total Subcontracts		0.00	0.00	0.00		0.00
SUMMARY OF PROJECT COSTS:						
Total Labor Direct Costs						136,300.62
Total Travel Costs						16,261.50
Total Other Direct Costs						51,600.00
Total Subcontractor Costs						0.00
TOTAL ESTIMATED COSTS						204,162.12

Option 1
See amended cost proposal on added pages

NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC GMI-AECOM JV N62470-13-D-8047							
NEARSHORE SURVEYS FOR DAM NECK, OWL'S CREEK, NWS YORKTOWN, CHEATHAM ANNEX AND YORKTOWN FUEL TERMINAL							
GMI							
OPTION 1							
Labor Category	RATE	NASO-DNA Range One				HOURS	COST
Program Manager	139.32					0	0.00
Task Order Manager	100.09					0	0.00
Marine Biologist	75.13		67			67	5,033.71
Wildlife Biologist /Zoologist	72.97					0	0.00
Botanist	69.50					0	0.00
Biostatistician	90.94					0	0.00
Professional Wetland Scientist	79.43					0	0.00
Fisheries Biologist	79.32		67			67	5,314.44
Oceanographer	75.40					0	0.00
Marine Chemist	75.40					0	0.00
Toxicologist	77.61					0	0.00
Chemist/Organic Chemist	74.57					0	0.00
Bio-Technician	54.52		67			67	3,652.84
Diver	84.52					0	0.00
Laboratory Technician	50.03					0	0.00
BASH Specialist/Ornithologist	75.54					0	0.00
Forester	68.96					0	0.00
Soil Scientist	69.21					0	0.00
Entomologist	75.54					0	0.00
Hydrologist	66.77					0	0.00
Geologist	64.13					0	0.00
Environmental Scientist	67.84					0	0.00
Senior Archaeologist	81.40					0	0.00
Archaeologist	65.04					0	0.00
Archaeologist - Field Technician	54.52					0	0.00
Historian	62.26					0	0.00
Senior Architectural Historian	73.21					0	0.00
Architectural Historian	61.83					0	0.00
Historic Architect	119.72					0	0.00
Landscape Architect	70.35					0	0.00
NEPA Specialist	79.51					0	0.00
Civil / Environmental Engineer	80.44					0	0.00
GIS Analyst	73.18					0	0.00
Graphic Artist / Illustrator	58.52					0	0.00
Editor	59.08					0	0.00
Clerical/Administrative	49.74					0	0.00
	Total Hours	201	0	0	0	201	14,001
	Total Cost						\$ 14,000.99
TRAVEL							
			U/M	RATE		QUAN	TOTAL
Site Visits			M	0.565		25	14.13
Site Visits (air fare)			EA	0			0.00
per diem (lodging)			RT	83		8	664.00
per diem (M&IE)			DA	56		24	1,344.00
Total Travel Costs							2,022.13

Option 1 (Cont'd)
See amended cost proposal on added pages

OTHER DIRECT COSTS		U/M	RATE	QUAN	TOTAL
Benthic Sample Processing (subtidal)		EA	236.25	16	3,780.00
Benthic Sample Processing (inter-tidal)		EA	236.25	16	3,780.00
Sediment Grain Size (subtidal)		EA	52.50	16	840.00
Sediment Grain Size (inter-tidal)		EA	52.50	16	840.00
Nitrogen		EA	20.00	16	320.00
Phosphorous		EA	20.00	16	320.00
TSS		EA	20.00	16	320.00
Trawl nets		EA	800.00	0	0.00
Seine nets		EA	650.00	0	0.00
Boat/day		EA	275.00	8	2,200.00
Slip rental		EA	50.00	8	400.00
Material		EA	200.00	1	200.00
Boat Fuel (per fill up)		EA	250.00	1	250.00
Truck fuel (per fill up)		EA	150.00	0	0.00
Printing and Photocopying		PG	0.09		0.00
Color Copies		EA	0.25		0.00
Color GIS Plots - D size		EA	10.00		0.00
Color GIS Plots - E size		EA	18.00		0.00
Library Reference Materials		LS	150.00		0.00
GIS Supplies - Recordable CDs and 8mm Tapes		LS	1.50		0.00
GIS Supplies - Recordable DVDs		LS	1.50		0.00
Overnight Shipping		LS	25.00		0.00
Equipment Rental (1-week for Trimble GeoXT & Antenna)		EA	630.00		0.00
Environmental Equipment		EA	15.00		0.00
Aerial Photograph (Purchase of Orthophoto Quads)		EA			0.00
Physical Land Surveys		EA	1.00		0.00
Bioassays/Lab Analysis		EA	1.00		0.00
Expendable Supplies - (Flagging, pin flags, etc.)		EA	15.00		0.00
Non-Expendable Supplies		EA			0.00
Expendable Supplies - Reference Materials/Interlibrary Loans, etc.		EA	300.00		0.00
Newspaper (NOA)		EA	500.00		0.00
Electronic Literature Scanning for PDFs		PG	0.09		0.00
Sum Other Direct Costs					13,250.00
Total ODCs					13,250.00
SUBCONTRACTS					
Subcontractor					
Subcontractor					
Sum Subcontractor					
3% Fee for Subcontracts					
Total Subcontracts					0.00
SUMMARY OF PROJECT COSTS:					
Total Labor Direct Costs					14,000.99
Total Travel Costs					2,022.13
Total Other Direct Costs					13,250.00
Total Subcontractor Costs					0.00
TOTAL ESTIMATED COSTS					29,273.12

Option 2
See amended cost proposal on added pages

NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC					
GMI-AECOM JV N62470-13-D-8017					
NEARSHORE SURVEYS FOR DAM NECK, OWL'S CREEK, NWS YORKTOWN, CHEATHAM ANNEX AND YORKTOWN FUEL TERMINAL					
GMI		OPTION 2			
Labor Category	RATE	NASO-DNA Range Two		HOURS	COST
Program Manager	139.32			0	0.00
Task Order Manager	100.09			0	0.00
Marine Biologist	75.13	67		67	5,033.71
Wildlife Biologist /Zoologist	72.97			0	0.00
Botanist	69.50			0	0.00
Biostatistician	90.94			0	0.00
Professional Wetland Scientist	79.43			0	0.00
Fisheries Biologist	79.32	67		67	5,314.44
Oceanographer	75.40			0	0.00
Marine Chemist	75.40			0	0.00
Toxicologist	77.61			0	0.00
Chemist/Organic Chemist	74.57			0	0.00
Bio-Technician	54.52	67		67	3,652.84
Diver	84.52			0	0.00
Laboratory Technician	50.03			0	0.00
BASH Specialist/Ornithologist	75.54			0	0.00
Forester	68.96			0	0.00
Soil Scientist	69.21			0	0.00
Entomologist	75.54			0	0.00
Hydrologist	66.77			0	0.00
Geologist	64.13			0	0.00
Environmental Scientist	67.84			0	0.00
Senior Archaeologist	81.40			0	0.00
Archaeologist	65.04			0	0.00
Archaeologist - Field Technician	54.52			0	0.00
Historian	62.26			0	0.00
Senior Architectural Historian	73.21			0	0.00
Architectural Historian	61.83			0	0.00
Historic Architect	119.72			0	0.00
Landscape Architect	70.35			0	0.00
NEPA Specialist	79.51			0	0.00
Civil / Environmental Engineer	80.44			0	0.00
GIS Analyst	73.18			0	0.00
Graphic Artist / Illustrator	58.52			0	0.00
Editor	59.08			0	0.00
Clerical/Administrative	49.74			0	0.00
	Total Hours	201		201	14,001
	Total Cost	\$14,000.99			\$ 14,000.99
TRAVEL					
		U/M	RATE	QUAN	TOTAL
Site Visits		M	0.565	25	14.13
Site Visits (air fare)		EA	0		0.00
per diem (lodging)		RT	83	8	664.00
per diem (M&IE)		DA	56	24	1,344.00
Total Travel Costs					2,022.13

Option 2 (Cont'd)
See amended cost proposal on added pages

OTHER DIRECT COSTS		U/M	RATE	QUAN	TOTAL
Benthic Sample Processing (subtidal)		EA	236.25	16	3,780.00
Benthic Sample Processing (inter-tidal)		EA	236.25	16	3,780.00
Sediment Grain Size (subtidal)		EA	52.50	16	840.00
Sediment Grain Size (inter-tidal)		EA	52.50	16	840.00
Nitrogen		EA	20.00	16	320.00
Phosphorous		EA	20.00	16	320.00
TSS		EA	20.00	16	320.00
Trawl nets		EA	800.00	0	0.00
Seine nets		EA	650.00	0	0.00
Boat/day		EA	275.00	8	2,200.00
Ship rental		EA	50.00	8	400.00
Material		EA	200.00	1	200.00
Boat Fuel (per fill up)		EA	250.00	1	250.00
Truck fuel (per fill up)		EA	150.00	0	0.00
Printing and Photocopying		PG	0.09		0.00
Color Copies		EA	0.25		0.00
Color GIS Plots - D size		EA	10.00		0.00
Color GIS Plots - E size		EA	18.00		0.00
Library Reference Materials		LS	150.00		0.00
GIS Supplies - Recordable CDs and 8mm Tapes		LS	1.50		0.00
GIS Supplies - Recordable DVDs		LS	1.50		0.00
Overnight Shipping		LS	25.00		0.00
Equipment Rental (1-week for Trimble GeoXT & Antenna)		EA	630.00		0.00
Environmental Equipment		EA	15.00		0.00
Aerial Photograph (Purchase of Orthophoto Quads)		EA			0.00
Physical Land Surveys		EA	1.00		0.00
Bioassays/Lab Analysis		EA	1.00		0.00
Expendable Supplies - (Flagging, pin flags, etc.)		EA	15.00		0.00
Non-Expendable Supplies		EA			0.00
Expendable Supplies - Reference Materials/Interlibrary Loans, etc.		EA	300.00		0.00
Newspaper (NOA)		EA	500.00		0.00
Electronic Literature Scanning for PDFs		PG	0.09		0.00
Sum Other Direct Costs					13,250.00
Total ODCs					13,250.00
SUBCONTRACTS					
Subcontractor					
Subcontractor					
Sum Subcontractor					
3% Fee for Subcontracts					
Total Subcontracts					0.00
SUMMARY OF PROJECT COSTS:					
Total Labor Direct Costs					14,000.99
Total Travel Costs					2,022.13
Total Other Direct Costs					13,250.00
Total Subcontractor Costs					0.00
TOTAL ESTIMATED COSTS					29,273.12

Option 3
See amended cost proposal on added pages

NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC					
GMI-AECOM JV N62470-13-D-8017					
NEARSHORE SURVEYS FOR DAM NECK, OWL'S CREEK, NWS YORKTOWN, CHEATHAM ANNEX AND YORKTOWN FUEL TERMINAL					
GMI		OPTION 3		HOURS	COST
Labor Category	RATE	NAVSTA	NPT		
Program Manager	139.32	24		24	3,343.68
Task Order Manager	100.09	8		8	800.72
Marine Biologist	75.13	160		160	12,020.80
Wildlife Biologist /Zoologist	72.97			0	0.00
Botanist	69.50			0	0.00
Biostatistician	90.94	12		12	1,091.28
Professional Wetland Scientist	79.43	40		40	3,177.20
Fisheries Biologist	79.32	160		160	12,691.20
Oceanographer	75.40			0	0.00
Marine Chemist	75.40			0	0.00
Toxicologist	77.61			0	0.00
Chemist/Organic Chemist	74.57			0	0.00
Bio-Technician	54.52	96		96	5,233.92
Diver	84.52			0	0.00
Laboratory Technician	50.03	32		32	1,600.96
BASH Specialist/Ornithologist	75.54			0	0.00
Forester	68.96			0	0.00
Soil Scientist	69.21			0	0.00
Entomologist	75.54			0	0.00
Hydrologist	66.77			0	0.00
Geologist	64.13			0	0.00
Environmental Scientist	67.84	24		24	1,628.16
Senior Archaeologist	81.40			0	0.00
Archaeologist	65.04			0	0.00
Archaeologist - Field Technician	54.52			0	0.00
Historian	62.26			0	0.00
Senior Architectural Historian	73.21			0	0.00
Architectural Historian	61.83			0	0.00
Historic Architect	119.72			0	0.00
Landscape Architect	70.35			0	0.00
NEPA Specialist	79.51			0	0.00
Civil / Environmental Engineer	80.44			0	0.00
GIS Analyst	73.18	24		24	1,756.32
Graphic Artist / Illustrator	58.52			0	0.00
Editor	59.08	16		16	945.28
Clerical/Administrative	49.74	23		23	1,144.02
Total Hours		619		619	45,434
Total Cost		\$45,433.54			\$ 45,433.54
TRAVEL		U/M	RATE	QUAN	TOTAL
Site Visits		MI	0.565	2500	1,412.50
Site Visits (air fare)		EA	0		0.00
per diem (lodging)		RT	83	24	1,992.00
per diem (M&IE)		DA	56	36	2,016.00
Total Travel Costs					5,420.50

Option 3 (Cont'd)
See amended cost proposal on added pages

OTHER DIRECT COSTS		U/M	RATE	QUAN	TOTAL
Benthic Sample Processing (subtidal)		EA	236.25	16	3,780.00
Benthic Sample Processing (inter-tidal)		EA	236.25	16	3,780.00
Sediment Grain Size (subtidal)		EA	52.50	16	840.00
Sediment Grain Size (inter-tidal)		EA	52.50	16	840.00
Nitrogen		EA	20.00	16	320.00
Phosphorous		EA	20.00	16	320.00
TSS		EA	20.00	16	320.00
Trawl nets		EA	800.00	1	800.00
Seine nets		EA	650.00	1	650.00
Boat/day		EA	275.00	12	3,300.00
Ship rental		EA	50.00	12	600.00
Material		EA	200.00	1	200.00
Boat Fuel (per fill up)		EA	250.00	1	250.00
Truck fuel (per fill up)		EA	150.00	8	1,200.00
Printing and Photocopying		PG	0.09		0.00
Color Copies		EA	0.25		0.00
Color GIS Plots - D size		EA	10.00		0.00
Color GIS Plots- E size		EA	18.00		0.00
Library Reference Materials		LS	150.00		0.00
GIS Supplies - Recordable CDs and 8mm Tapes		LS	1.50		0.00
GIS Supplies - Recordable DVDs		LS	1.50		0.00
Overnight Shipping		LS	25.00		0.00
Equipment Rental (1-week for Trimble GeoXT & Antenna)		EA	630.00		0.00
Environmental Equipment		EA	15.00		0.00
Aerial Photograph (Purchase of Orthophoto Quads)		EA			0.00
Physical Land Surveys		EA	1.00		0.00
Bioassays/Lab Analysis		EA	1.00		0.00
Expendable Supplies - (Flagging, pin flags, etc.)		EA	15.00		0.00
Non-Expendable Supplies		EA			0.00
Expendable Supplies - Reference Materials/Interlibrary Loans, etc.		EA	300.00		0.00
Newspaper (NOA)		EA	500.00		0.00
Electronic Literature Scanning for PDFs		PG	0.09		0.00
Sum Other Direct Costs					17,200.00
Total ODCs					17,200.00
SUBCONTRACTS					
Subcontractor					
Subcontractor					
Sum Subcontractor					
3% Fee for Subcontracts					
Total Subcontracts					0.00
SUMMARY OF PROJECT COSTS:					
Total Labor Direct Costs					45,433.54
Total Travel Costs					5,420.50
Total Other Direct Costs					17,200.00
Total Subcontractor Costs					0.00
TOTAL ESTIMATED COSTS					68,054.04

Option 4
See amended cost proposal on added pages

NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC					
GMI-AECOM JV N62470-13-D-8017					
NEARSHORE SURVEYS FOR DAM NECK, OWL'S CREEK, NWS YORKTOWN, CHEATHAM ANNEX AND YORKTOWN FUEL TERMINAL					
OPTION 4					
GMI Labor Category	RATE	NWSE	HOURS	COST	
Program Manager	139.32	24	24	3,343.68	
Task Order Manager	100.09	8	8	800.72	
Marine Biologist	75.13	160	160	12,020.80	
Wildlife Biologist /Zoologist	72.97		0	0.00	
Botanist	69.50		0	0.00	
Biostatistician	90.94	12	12	1,091.28	
Professional Wetland Scientist	79.43	40	40	3,177.20	
Fisheries Biologist	79.32	160	160	12,691.20	
Oceanographer	75.40		0	0.00	
Marine Chemist	75.40		0	0.00	
Toxicologist	77.61		0	0.00	
Chemist/Organic Chemist	74.57		0	0.00	
Bio-Technician	54.52	96	96	5,233.92	
Diver	84.52		0	0.00	
Laboratory Technician	50.03	32	32	1,600.96	
BASH Specialist/Ornithologist	75.54		0	0.00	
Forester	68.96		0	0.00	
Soil Scientist	69.21		0	0.00	
Entomologist	75.54		0	0.00	
Hydrologist	66.77		0	0.00	
Geologist	64.13		0	0.00	
Environmental Scientist	67.84	24	24	1,628.16	
Senior Archaeologist	81.40		0	0.00	
Archaeologist	65.04		0	0.00	
Archaeologist - Field Technician	54.52		0	0.00	
Historian	62.26		0	0.00	
Senior Architectural Historian	73.21		0	0.00	
Architectural Historian	61.83		0	0.00	
Historic Architect	119.72		0	0.00	
Landscape Architect	70.35		0	0.00	
NEPA Specialist	79.51		0	0.00	
Civil / Environmental Engineer	80.44		0	0.00	
GIS Analyst	73.18	24	24	1,756.32	
Graphic Artist / Illustrator	58.52		0	0.00	
Editor	59.08	16	16	945.28	
Clerical/Administrative	49.74	23	23	1,144.02	
Total Hours		619	619	45,434	
Total Cost		\$45,433.54		\$ 45,433.54	
TRAVEL		U/M	RATE	QUAN	TOTAL
Site Visits		MI	0.565	2500	1,412.50
Site Visits (air fare)		EA	0		0.00
per diem (lodging)		RT	83	24	1,992.00
per diem (M&IE)		DA	56	36	2,016.00
Total Travel Costs					5,420.50

Option 4 (Cont'd)
See amended cost proposal on added pages

OTHER DIRECT COSTS		U/M	RATE	QUAN	TOTAL
Benthic Sample Processing (subtidal)		EA	236.25	16	3,780.00
Benthic Sample Processing (inter-tidal)		EA	236.25	16	3,780.00
Sediment Grain Size (subtidal)		EA	52.50	16	840.00
Sediment Grain Size (inter-tidal)		EA	52.50	16	840.00
Nitrogen		EA	20.00	16	320.00
Phosphorous		EA	20.00	16	320.00
TSS		EA	20.00	16	320.00
Trawl nets		EA	800.00	1	800.00
Seine nets		EA	650.00	1	650.00
Boat/day		EA	275.00	12	3,300.00
Slip rental		EA	50.00	12	600.00
Material		EA	200.00	1	200.00
Boat Fuel (per fill up)		EA	250.00	1	250.00
Truck fuel (per fill up)		EA	150.00	8	1,200.00
Printing and Photocopying		PG	0.09		0.00
Color Copies		EA	0.25		0.00
Color GIS Plots - D size		EA	10.00		0.00
Color GIS Plots- E size		EA	18.00		0.00
Library Reference Materials		LS	150.00		0.00
GIS Supplies - Recordable CDs and 8mm Tapes		LS	1.50		0.00
GIS Supplies - Recordable DVDs		LS	1.50		0.00
Overnight Shipping		LS	25.00		0.00
Equipment Rental (1-week for Trimble GeoXT & Antenna)		EA	630.00		0.00
Environmental Equipment		EA	15.00		0.00
Aerial Photograph (Purchase of Orthophoto Quads)		EA			0.00
Physical Land Surveys		EA	1.00		0.00
Bioassays/Lab Analysis		EA	1.00		0.00
Expendable Supplies - (Flagging, pin flags, etc.)		EA	15.00		0.00
Non-Expendable Supplies		EA			0.00
Expendable Supplies - Reference Materials/Interlibrary Loans, etc.		EA	300.00		0.00
Newspaper (NOA)		EA	500.00		0.00
Electronic Literature Scanning for PDFs		PG	0.09		0.00
Sum Other Direct Costs					17,200.00
Total ODCs					17,200.00
SUBCONTRACTS					
Subcontractor					
Subcontractor					
Sum Subcontractor					
3% Fee for Subcontracts					
Total Subcontracts					0.00
SUMMARY OF PROJECT COSTS:					
Total Labor Direct Costs					45,433.54
Total Travel Costs					5,420.50
Total Other Direct Costs					17,200.00
Total Subcontractor Costs					0.00
TOTAL ESTIMATED COSTS					68,054.04

Base Tasks (Cont'd)

OTHER DIRECT COSTS			U/M	RATE	QUAN	TOTAL
Plankton Tow Processing			EA	236.25	36	8,505.00
Benthic Sample Processing (subtidal)			EA	236.25	48	11,340.00
Benthic Sample Processing (inter-tidal)			EA	236.25	48	11,340.00
Sediment Grain Size (subtidal)			EA	52.50	48	2,520.00
Sediment Grain Size (inter-tidal)			EA	52.50	48	2,520.00
Nitrogen			EA	20.00	48	960.00
Phosphorous			EA	20.00	48	960.00
TSS			EA	20.00	48	960.00
Trawl nets			EA	800.00	3	2,400.00
Seine nets			EA	650.00	3	1,950.00
Boat/day			EA	275.00	36	9,900.00
Slip rental			EA	50.00	36	1,800.00
Material			EA	200.00	3	600.00
Boat Fuel (per fill up)			EA	250.00	3	750.00
Truck fuel (per fill up)			EA	150.00	24	3,600.00
Printing and Photocopying			PG	0.09		0.00
Color Copies			EA	0.25		0.00
Color GIS Plots - D size			EA	10.00		0.00
Color GIS Plots- E size			EA	18.00		0.00
Library Reference Materials			LS	150.00		0.00
GIS Supplies - Recordable CDs and 8mm Tapes			LS	1.50		0.00
GIS Supplies - Recordable DVDs			LS	1.50		0.00
Overnight Shipping			LS	25.00		0.00
Equipment Rental (1-week for Trimble GeoXT & Antenna)			EA	630.00		0.00
Environmental Equipment			EA	15.00		0.00
Aerial Photograph (Purchase of Orthophoto Quads)			EA			0.00
Physical Land Surveys			EA	1.00		0.00
Bioassays/Lab Analysis			EA	1.00		0.00
Expendable Supplies - (Flagging, pin flags, etc.)			EA	15.00		0.00
Non-Expendable Supplies			EA			0.00
Expendable Supplies - Reference Materials/Interlibrary Loans, etc.			EA	300.00		0.00
Newspaper (NOA)			EA	500.00		0.00
Electronic Literature Scanning for PDFs			PG	0.09		0.00
Sum Other Direct Costs						60,105.00
Total ODCs						60,105.00
SUBCONTRACTS	TASK 1	TASK 2	TASK 3			
Subcontractor - marine mammal	23,500.00	26,500.00	32,000.00			
Subcontractor - fisheries	5,000.00	5,000.00	5,000.00			
Sum Subcontractor						
3% Fee for Subcontracts	705.00	795.00	960.00			
Total Subcontracts	29,205.00	32,295.00	37,960.00			99,460.00
SUMMARY OF PROJECT COSTS:						
Total Labor Direct Costs						174,103.92
Total Travel Costs						20,941.50
Total Other Direct Costs						60,105.00
Total Subcontractor Costs						99,460.00
TOTAL ESTIMATED COSTS						354,610.42

Option 1

NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC						
GMI-AECOM JV N62470-13-D-8017						
NEARSHORE SURVEYS FOR DAM NECK, OWL'S CREEK, NWS YORKTOWN, CHEATHAM ANNEX AND YORKTOWN FUEL TERMINAL						
GMI						
OPTION 1						
Labor Category	RATE	NASO-DNA Range One			HOURS	COST
Program Manager	139.32				0	0.00
Task Order Manager	100.09				0	0.00
Marine Biologist	75.13	67			67	5,033.71
Wildlife Biologist /Zoologist	72.97				0	0.00
Botanist	69.50				0	0.00
Biostatistician	90.94				0	0.00
Professional Wetland Scientist	79.43				0	0.00
Fisheries Biologist	79.32	67			67	5,314.44
Oceanographer	75.40				0	0.00
Marine Chemist	75.40				0	0.00
Toxicologist	77.61				0	0.00
Chemist/Organic Chemist	74.57				0	0.00
Bio-Technician	54.52	67			67	3,652.84
Diver	84.52				0	0.00
Laboratory Technician	50.03				0	0.00
BASH Specialist/Ornithologist	75.54				0	0.00
Forester	68.96				0	0.00
Soil Scientist	69.21				0	0.00
Entomologist	75.54				0	0.00
Hydrologist	66.77				0	0.00
Geologist	64.13				0	0.00
Environmental Scientist	67.84				0	0.00
Senior Archaeologist	81.40				0	0.00
Archaeologist	65.04				0	0.00
Archaeologist - Field Technician	54.52				0	0.00
Historian	62.26				0	0.00
Senior Architectural Historian	73.21				0	0.00
Architectural Historian	61.83				0	0.00
Historic Architect	119.72				0	0.00
Landscape Architect	70.35				0	0.00
NEPA Specialist	79.51				0	0.00
Civil / Environmental Engineer	80.44				0	0.00
GIS Analyst	73.18				0	0.00
Graphic Artist / Illustrator	58.52				0	0.00
Editor	59.08				0	0.00
Clerical/Administrative	49.74				0	0.00
	Total Hours	201	0	0	201	14,001
	Total Cost		\$14,000.99			\$ 14,000.99
TRAVEL						
			U/M	RATE	QUAN	TOTAL
Site Visits			MI	0.565	25	14.13
Site Visits (air fare)			EA	0		0.00
per diem (lodging)			RT	83	8	664.00
per diem (M&IE)			DA	56	24	1,344.00
Total Travel Costs						2,022.13

Option 1 (Cont'd)

OTHER DIRECT COSTS			U/M	RATE	QUAN	TOTAL
Plankton Two Processing			EA	236.25	12	2,835.00
Benthic Sample Processing (subtidal)			EA	236.25	16	3,780.00
Benthic Sample Processing (inter-tidal)			EA	236.25	16	3,780.00
Sediment Grain Size (subtidal)			EA	52.50	16	840.00
Sediment Grain Size (inter-tidal)			EA	52.50	16	840.00
Nitrogen			EA	20.00	16	320.00
Phosphorous			EA	20.00	16	320.00
TSS			EA	20.00	16	320.00
Trawl nets			EA	800.00	0	0.00
Seine nets			EA	650.00	0	0.00
Boat/day			EA	275.00	8	2,200.00
Slip rental			EA	50.00	8	400.00
Material			EA	200.00	1	200.00
Boat Fuel (per fill up)			EA	250.00	1	250.00
Truck fuel (per fill up)			EA	150.00	0	0.00
Printing and Photocopying			PG	0.09		0.00
Color Copies			EA	0.25		0.00
Color GIS Plots - D size			EA	10.00		0.00
Color GIS Plots- E size			EA	18.00		0.00
Library Reference Materials			LS	150.00		0.00
GIS Supplies - Recordable CDs and 8mm Tapes			LS	1.50		0.00
GIS Supplies - Recordable DVDs			LS	1.50		0.00
Overnight Shipping			LS	25.00		0.00
Equipment Rental (1-week for Trimble GeoXT & Antenna)			EA	630.00		0.00
Environmental Equipment			EA	15.00		0.00
Aerial Photograph (Purchase of Orthophoto Quads)			EA			0.00
Physical Land Surveys			EA	1.00		0.00
Bioassays/Lab Analysis			EA	1.00		0.00
Expendable Supplies - (Flagging, pin flags, etc.)			EA	15.00		0.00
Non-Expendable Supplies			EA			0.00
Expendable Supplies - Reference Materials/Interlibrary Loans, etc.			EA	300.00		0.00
Newspaper (NOA)			EA	500.00		0.00
Electronic Literature Scanning for PDFs			PG	0.09		0.00
Sum Other Direct Costs						16,085.00
Total ODCs						16,085.00
SUBCONTRACTS						
Subcontractor - marine mammal				48,400.00		
Subcontractor - fisheries				5,000.00		
Sum Subcontractor						
3% Fee for Subcontracts				1,452.00		
Total Subcontracts				49,852.00		49,852.00
SUMMARY OF PROJECT COSTS:						
Total Labor Direct Costs						14,000.99
Total Travel Costs						2,022.13
Total Other Direct Costs						16,085.00
Total Subcontractor Costs						49,852.00
TOTAL ESTIMATED COSTS						81,960.12

Option 2 (Cont'd)

OTHER DIRECT COSTS		U/M	RATE	QUAN	TOTAL
Plankton Two Processing		EA	236.25	12	2,835.00
Benthic Sample Processing (subtidal)		EA	236.25	16	3,780.00
Benthic Sample Processing (inter-tidal)		EA	236.25	16	3,780.00
Sediment Grain Size (subtidal)		EA	52.50	16	840.00
Sediment Grain Size (inter-tidal)		EA	52.50	16	840.00
Nitrogen		EA	20.00	16	320.00
Phosphorous		EA	20.00	16	320.00
TSS		EA	20.00	16	320.00
Trawl nets		EA	800.00	0	0.00
Seine nets		EA	650.00	0	0.00
Boat/day		EA	275.00	8	2,200.00
Slip rental		EA	50.00	8	400.00
Material		EA	200.00	1	200.00
Boat Fuel (per fill up)		EA	250.00	1	250.00
Truck fuel (per fill up)		EA	150.00	0	0.00
Printing and Photocopying		PG	0.09		0.00
Color Copies		EA	0.25		0.00
Color GIS Plots - D size		EA	10.00		0.00
Color GIS Plots- E size		EA	18.00		0.00
Library Reference Materials		LS	150.00		0.00
GIS Supplies - Recordable CDs and 8mm Tapes		LS	1.50		0.00
GIS Supplies - Recordable DVDs		LS	1.50		0.00
Overnight Shipping		LS	25.00		0.00
Equipment Rental (1-week for Trimble GeoXT & Antenna)		EA	630.00		0.00
Environmental Equipment		EA	15.00		0.00
Aerial Photograph (Purchase of Orthophoto Quads)		EA			0.00
Physical Land Surveys		EA	1.00		0.00
Bioassays/Lab Analysis		EA	1.00		0.00
Expendable Supplies - (Flagging, pin flags, etc.)		EA	15.00		0.00
Non-Expendable Supplies		EA			0.00
Expendable Supplies - Reference Materials/Interlibrary Loans, etc.		EA	300.00		0.00
Newspaper (NOA)		EA	500.00		0.00
Electronic Literature Scanning for PDFs		PG	0.09		0.00
Sum Other Direct Costs					16,085.00
Total ODCs					16,085.00
SUBCONTRACTS					
Subcontractor - marine mammal			168,480.00		
Subcontractor - fisheries			5,000.00		
Sum Subcontractor					
3% Fee for Subcontracts			5,054.40		
Total Subcontracts			173,534.40		173,534.40
SUMMARY OF PROJECT COSTS:					
Total Labor Direct Costs					14,000.99
Total Travel Costs					2,022.13
Total Other Direct Costs					16,085.00
Total Subcontractor Costs					173,534.40
TOTAL ESTIMATED COSTS					205,642.52

Option 3 (Cont'd)

OTHER DIRECT COSTS		U/M	RATE	QUAN	TOTAL
Plankton Two Processing		EA	236.25	12	2,835.00
Benthic Sample Processing (subtidal)		EA	236.25	16	3,780.00
Benthic Sample Processing (inter-tidal)		EA	236.25	16	3,780.00
Sediment Grain Size (subtidal)		EA	52.50	16	840.00
Sediment Grain Size (inter-tidal)		EA	52.50	16	840.00
Nitrogen		EA	20.00	16	320.00
Phosphorous		EA	20.00	16	320.00
TSS		EA	20.00	16	320.00
Trawl nets		EA	800.00	1	800.00
Seine nets		EA	650.00	1	650.00
Boat/day		EA	275.00	12	3,300.00
Slip rental		EA	50.00	12	600.00
Material		EA	200.00	1	200.00
Boat Fuel (per fill up)		EA	250.00	1	250.00
Truck fuel (per fill up)		EA	150.00	8	1,200.00
Printing and Photocopying		PG	0.09		0.00
Color Copies		EA	0.25		0.00
Color GIS Plots - D size		EA	10.00		0.00
Color GIS Plots- E size		EA	18.00		0.00
Library Reference Materials		LS	150.00		0.00
GIS Supplies - Recordable CDs and 8mm Tapes		LS	1.50		0.00
GIS Supplies - Recordable DVDs		LS	1.50		0.00
Overnight Shipping		LS	25.00		0.00
Equipment Rental (1-week for Trimble GeoXT & Antenna)		EA	630.00		0.00
Environmental Equipment		EA	15.00		0.00
Aerial Photograph (Purchase of Orthophoto Quads)		EA			0.00
Physical Land Surveys		EA	1.00		0.00
Bioassays/Lab Analysis		EA	1.00		0.00
Expendable Supplies - (Flagging, pin flags, etc.)		EA	15.00		0.00
Non-Expendable Supplies		EA			0.00
Expendable Supplies - Reference Materials/Interlibrary Loans, etc.		EA	300.00		0.00
Newspaper (NOA)		EA	500.00		0.00
Electronic Literature Scanning for PDFs		PG	0.09		0.00
Sum Other Direct Costs					20,035.00
Total ODCs					20,035.00
SUBCONTRACTS					
Subcontractor - marine mammal			32,000.00		
Subcontractor - fisheries			5,000.00		
Sum Subcontractor					
3% Fee for Subcontracts			960.00		
Total Subcontracts			32,960.00		32,960.00
SUMMARY OF PROJECT COSTS:					
Total Labor Direct Costs					58,034.64
Total Travel Costs					6,980.50
Total Other Direct Costs					20,035.00
Total Subcontractor Costs					32,960.00
TOTAL ESTIMATED COSTS					118,010.14

Option 4

NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC				
GMI-AECOM JV N62470-13-D-8017				
NEARSHORE SURVEYS FOR DAM NECK, OWL'S CREEK, NWS YORKTOWN, CHEATHAM ANNEX AND YORKTOWN FUEL				
GMI	OPTION 4			
Labor Category	RATE	NWSE	HOURS	COST
Program Manager	139.32	24	24	3,343.68
Task Order Manager	100.09	40	40	4,003.60
Marine Biologist	75.13	184	184	13,823.92
Wildlife Biologist /Zoologist	72.97		0	0.00
Botanist	69.50		0	0.00
Biostatistician	90.94	12	12	1,091.28
Professional Wetland Scientist	79.43	80	80	6,354.40
Fisheries Biologist	79.32	160	160	12,691.20
Oceanographer	75.40		0	0.00
Marine Chemist	75.40		0	0.00
Toxicologist	77.61		0	0.00
Chemist/Organic Chemist	74.57		0	0.00
Bio-Technician	54.52	96	96	5,233.92
Diver	84.52		0	0.00
Laboratory Technician	50.03	80	80	4,002.40
BASH Specialist/Ornithologist	75.54		0	0.00
Forester	68.96		0	0.00
Soil Scientist	69.21		0	0.00
Entomologist	75.54		0	0.00
Hydrologist	66.77		0	0.00
Geologist	64.13		0	0.00
Environmental Scientist	67.84	24	24	1,628.16
Senior Archaeologist	81.40		0	0.00
Archaeologist	65.04		0	0.00
Archaeologist - Field Technician	54.52		0	0.00
Historian	62.26		0	0.00
Senior Architectural Historian	73.21		0	0.00
Architectural Historian	61.83		0	0.00
Historic Architect	119.72		0	0.00
Landscape Architect	70.35		0	0.00
NEPA Specialist	79.51		0	0.00
Civil / Environmental Engineer	80.44		0	0.00
GIS Analyst	73.18	40	40	2,927.20
Graphic Artist / Illustrator	58.52		0	0.00
Editor	59.08	16	16	945.28
Clerical/Administrative	49.74	40	40	1,989.60
Total Hours		796	796	58,035
Total Cost		\$58,034.64		\$ 58,034.64
TRAVEL	U/M	RATE	QUAN	TOTAL
Site Visits	MI	0.565	2500	1,412.50
Site Visits (air fare)	EA	0		0.00
per diem (lodging)	RT	83	32	2,656.00
per diem (M&IE)	DA	56	52	2,912.00
Total Travel Costs				6,980.50

Option 4 (Cont'd)

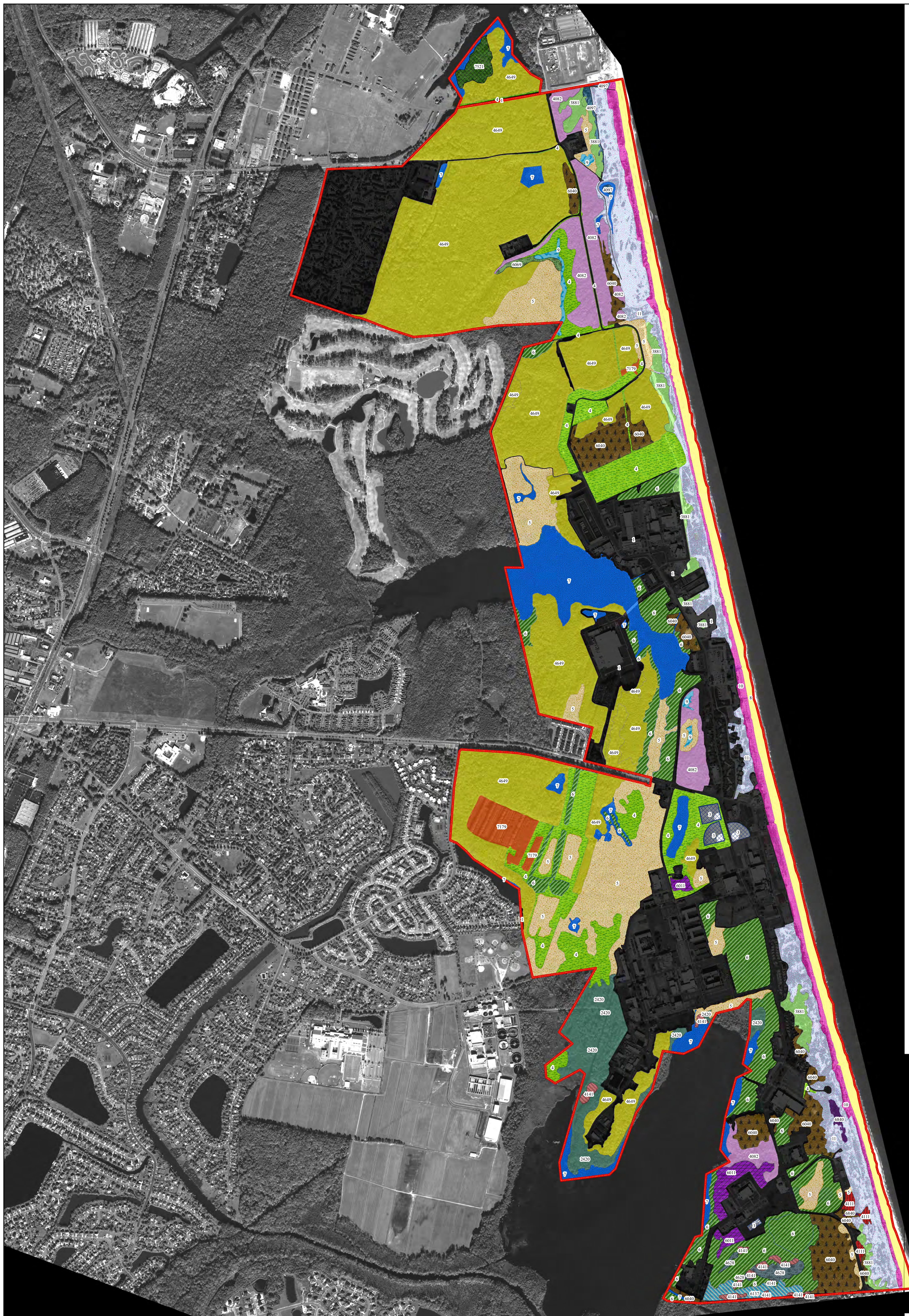
OTHER DIRECT COSTS		U/M	RATE	QUAN	TOTAL
Plankton Two Processing		EA	236.25	12	2,835.00
Benthic Sample Processing (subtidal)		EA	236.25	16	3,780.00
Benthic Sample Processing (inter-tidal)		EA	236.25	16	3,780.00
Sediment Grain Size (subtidal)		EA	52.50	16	840.00
Sediment Grain Size (inter-tidal)		EA	52.50	16	840.00
Nitrogen		EA	20.00	16	320.00
Phosphorous		EA	20.00	16	320.00
TSS		EA	20.00	16	320.00
Trawl nets		EA	800.00	1	800.00
Seine nets		EA	650.00	1	650.00
Boat/day		EA	275.00	12	3,300.00
Slip rental		EA	50.00	12	600.00
Material		EA	200.00	1	200.00
Boat Fuel (per fill up)		EA	250.00	1	250.00
Truck fuel (per fill up)		EA	150.00	8	1,200.00
Printing and Photocopying		PG	0.09		0.00
Color Copies		EA	0.25		0.00
Color GIS Plots - D size		EA	10.00		0.00
Color GIS Plots- E size		EA	18.00		0.00
Library Reference Materials		LS	150.00		0.00
GIS Supplies - Recordable CDs and 8mm Tapes		LS	1.50		0.00
GIS Supplies - Recordable DVDs		LS	1.50		0.00
Overnight Shipping		LS	25.00		0.00
Equipment Rental (1-week for Trimble GeoXT & Antenna)		EA	630.00		0.00
Environmental Equipment		EA	15.00		0.00
Aerial Photograph (Purchase of Orthophoto Quads)		EA			0.00
Physical Land Surveys		EA	1.00		0.00
Bioassays/Lab Analysis		EA	1.00		0.00
Expendable Supplies - (Flagging, pin flags, etc.)		EA	15.00		0.00
Non-Expendable Supplies		EA			0.00
Expendable Supplies - Reference Materials/Interlibrary Loans,		EA	300.00		0.00
Newspaper (NOA)		EA	500.00		0.00
Electronic Literature Scanning for PDFs		PG	0.09		0.00
Sum Other Direct Costs					20,035.00
Total ODCs					20,035.00
SUBCONTRACTS					
Subcontractor - marine mammal			36,000.00		
Subcontractor - fisheries			5,000.00		
Sum Subcontractor					
3% Fee for Subcontracts			1,080.00		
Total Subcontracts			37,080.00		37,080.00
SUMMARY OF PROJECT COSTS:					
Total Labor Direct Costs					58,034.64
Total Travel Costs					6,980.50
Total Other Direct Costs					20,035.00
Total Subcontractor Costs					37,080.00
TOTAL ESTIMATED COSTS					122,130.14

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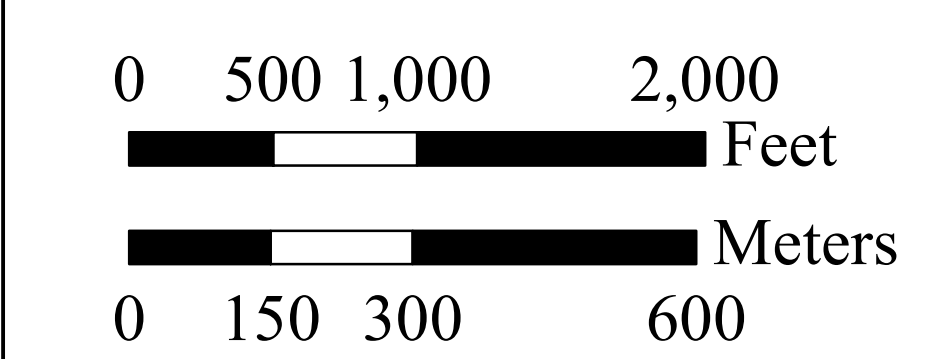
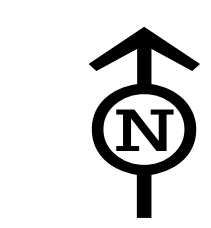
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Enclosure 3. Vegetative Community Characterization Mapping

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- Legend**
- NASO DNA Installation Area**
- Land Cover**
- 1 - Urban
 - 2 - Agriculture
 - 3 - Recreation
 - 4 - Non-NVC Herbaceous
 - 5 - Non-NVC Shrub
 - 6 - Non-NVC Forest
 - 7 - Water
 - 8 - Beach
 - 9 - Interdunal Pond
- National Vegetation Classification**
- Global EL Code (Association Level)**
- 10 - NVC Primary Dune Complex
 - 11 - NVC Secondary Dune Complex
 - 2420
 - 3881
 - 4082
 - 4097
 - 4111
 - 4141
 - 4628
 - 4649
 - 6011
 - 6040
 - 6069
 - 6137
 - 6840
 - 7179
 - 7521



Vegetation Classification Mapping at NASO DNA, Virginia Beach, Virginia.

Date: January 2015

Source: Digital Globe Imagery 2013, Navy 2012, and Tetra Tech 2014.

Coordinate System: World Geodetic System 1984
Universal Transverse Mercator, Zone 18, North, Meters

Global EL Code	National Vegetation Classification Association Level Common Name
2420	Bald-cypress Swamp
3881	Chesapeake Bay Maritime Shrubland
4082	Maritime Swamp Forest (Red Maple - Tupelo Type)
4097	Overwash Dune Grassland
4111	Forked Rush Dune Swale
4141	Eastern Reed Marsh
4628	Atlantic Coast Tidal Oligohaline Spikerush Marsh
4649	Great Dismal Swamp Successional Peat Dome Pine-Hardwood Forest
6011	Early- to Mid- Successional Loblolly Pine Forest
6040	Mid-Atlantic Coastal Maritime Forest
6069	Northeastern Buttonbush Shrub Swamp
6137	Coastal Loblolly Pine Wetland Forest
6840	Centella Interdunal Swale
7179	Loblolly Pine Plantation
7521	Successional Tuliptree - Loblolly Pine Upland Forest
10 - NVC Primary Dune Complex	Includes: South Atlantic Loamy Coastal Dunegrass (4039), Beachgrass – Panicgrass Dune Grassland (4043), Overwash, Dune Grassland (4097), and Planted Seaots
11 - NVC Secondary Dune Complex	Includes: Chesapeake Bay Maritime Shrubland (3881), Beach Heather Dwarf Dune Scrub (3950), South Atlantic Loamy Coastal Dunegrass (4039), Overwash Dune Grassland (4097), Forked Rush Dune Swale (4111), and Centella Interdunal Swale (6840)

Enclosure 4. Primary and Secondary Dune Delineation

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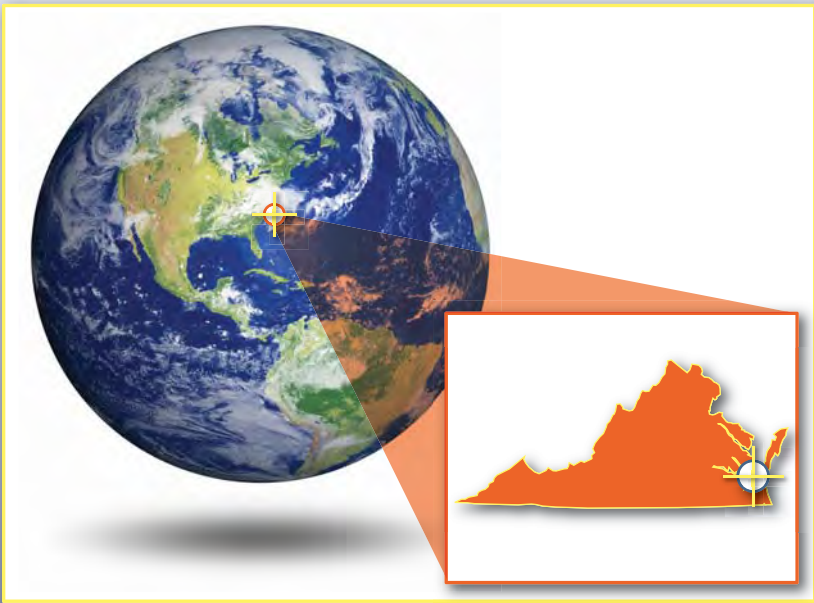
NAVFAC Atlantic Biological Resource Services

Contract: N62470-08-D-1008; Task Order: WE43

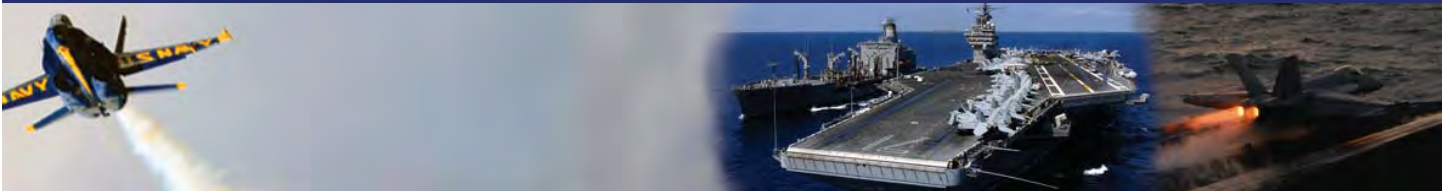
FINAL March 2014



Dune Delineation Report



Naval Air Station Oceana
Dam Neck Annex,
Virginia Beach, VA



NAVFAC Atlantic Biological Resource Services

Contract: N62470-08-D-1008; Task Order: WE43

Dune Delineation Report

Naval Air Station Oceana Dam Neck
Annex, Virginia Beach, Virginia

FINAL – March 2014

Prepared for:

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Prepared by:

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1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) was contracted by the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command Atlantic (NAVFAC Atlantic) to conduct a Dune Delineation at Naval Air Station Oceana (NASO) Dam Neck Annex (DNA). NASO DNA is located in the southeast section of the City of Virginia Beach, Virginia (Figure 1).

1.1 BACKGROUND AND REGULATION

Coastal dune systems provide important physical and ecological functions for estuarine species as well as adjacent communities. These functions or “services” include providing important habitat for flora and fauna, hazard protection in the form of erosion and storm protection, sand replenishment, and improved water quality (VIMS 2009). The physical processes involved in the creation and maintenance of coastal dune systems include three key components: sand, water, and wind. Wind and water act together to transport sand along and across the shoreline. Sand that is deposited on beaches during periods of low energy wave action is moved inland via aeolian (wind-driven) transport. Vegetation that has taken hold within the rack line just above the intertidal zone or on existing dunes trap the sand and thus begins or continues the formation of a dune (Hardaway et al. 2003).

In many areas of coastal Virginia, human activities along coasts and shorelines have directly and indirectly hindered the natural processes that create and maintain these important ecosystems, thereby compromising their ability to perform important ecological services. Activities such as dredging and shoreline hardening limit the amount of sand available for dune creation and maintenance (VIMS 2009). Other activities such as recreation and development often destroy or alter vegetation resulting in destabilization of the dune and accelerated erosion.

Recognition of the importance of coastal dunes and their vulnerabilities to human activities was the impetus for passage of the Coastal Primary Sand Dune Protection Act of 1980, now called the Coastal Primary Sand Dune and Beach Act (Act). The Act, including modifications made in 2008¹, provides definitions for a beach and coastal primary dune, and the features that meet these definitions receive protection under the Act. The 2008 modifications authorize all local governments of Tidewater Virginia to administer the Act; this responsibility is most often delegated to the local wetland board to administer. If a coastal locality chooses not to administer the Act, the local wetland board or Virginia Marine Resources Commission (VMRC) may regulate development affecting dunes and beaches in that area. Broadly, the Act prohibits any permanent alterations of or construction upon coastal primary sand dunes that impair the natural functions of or physically alter the contour of the dune, or destroy vegetation growing on the dune. However, the local wetland board or VMRC may permit activities that fail to meet these standards if it is found that the proposed activities will result in no significant adverse ecological impacts or are necessary and consistent with the public interest.

¹The General Assembly of Virginia enacted the Coastal Primary Sand Dune Protection Act in 1980. The Act was originally codified in Code §62.1-13.21 to -13.28. In 2008, the Act was recodified as Coastal Primary Sand Dunes and Beaches in Code §28.2-1400 to -1420.

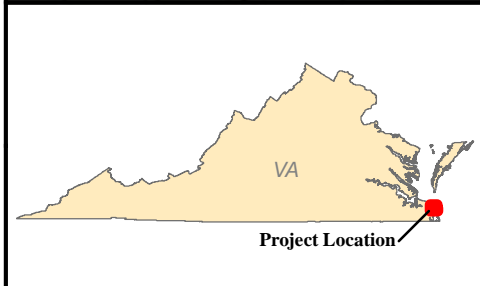
It is often difficult to quantitatively assess the loss or degradation of values provided by coastal primary sand dunes (e.g., flood and erosion protection) from proposed development. The consequences of altering natural dunes are, to some extent, dependent upon the dune location and its role in protection and beach replenishment; thus decisions regarding proposed development are made on a case-by-case basis. However, a scale of alterations from most to least severe follows (adapted from VMRC 1993):

1. Leveling dunes (i.e., obliterating the buffering capability provided by the natural levee of the dune and its source of sand).
2. Displacing dunes to a more seaward or landward location, which can expose the dune to more wave action, breach the dune line, and cause a loss of sand.
3. Building on the beach backshore (seaward of the dune), which can reduce dune elevation, interfere with wind patterns, or result in pedestrian traffic over the dune.
4. Introducing pedestrian or vehicular traffic across the dune (e.g., that alter the dune's contour or destroy dune vegetation).
5. Building on the dune crest (foreface), which will likely result in changes to the dune contours, sand removal, and an increase in pedestrian traffic over the dune.
6. Building on the dune backface, particularly if significant amounts of material are excavated.

The Act is a state-level regulation. However, noncompliance with the Act could jeopardize Coastal Zone Consistency under the National Environmental Policy Act (NEPA). The Act is part of Virginia's Coastal Zone Management Act which falls under regulation of the Federal Coastal Zone Management Act. NEPA Section 6.200 *The Environmental Impact Statement* includes the following subsection:

(d) Coastal zone management. The Coastal Zone Management Act, 16 U.S.C. 1451 et seq., requires that all Federal activities in coastal areas be consistent with approved State Coastal Zone Management Programs, to the maximum extent possible. If an EPA action may affect a coastal zone area, the responsible official shall assess the impact of the action on the coastal zone. If the action significantly affects the coastal zone area and the State has an approved coastal zone management program, a consistency determination shall be sought in accordance with procedures promulgated by the Office of Coastal Zone Management in 15 CFR part 930.

Although secondary dunes are not regulated under the Act, they are considered an important component of dune complexes. Secondary dunes function as estuarine edge habitat and provide important habitat for coastal plain flora and fauna. In addition, these areas provide natural upland erosion control thereby protecting adjacent upland property (Varnell and Hardaway 2002).



Legend
 Dam Neck Annex

0 0.5 1 2 Kilometers

0 0.5 1 Miles



Figure 1. Site Location for NASO Dam Neck Annex, Virginia Beach, Virginia.

Date:
07/2013

Source: NAVFAC Data DVD, 2013, ESRI Topo Maps, 2010.

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1.2 PURPOSE

The dune systems at NASO DNA provide important training areas for conducting military exercises. These dune systems simultaneously support habitat for flora and fauna (including some uncommon and rare species and communities), as well as storm protection for the developed areas that are located behind the dunes. Effective management of the dune system must begin with locating and mapping the existing primary and secondary dunes. This information would augment existing dune management plans and allow for prioritization of restoration activities to ensure sustainable, multiple-use management of these sensitive habitats.

1.3 REPORT ORGANIZATION

This report is organized into the following sections:

- **Section 1.0 Introduction** – Describes the Project overview, discusses the background and regulation of dune resources, and describes the Project objectives.
- **Section 2.0 Description of the Study Area** – Describes the coastal area that is the focus of the Project at NASO DNA.
- **Section 3.0 Dune Delineation Methods** – Outlines the survey methodology, including pre-field activities and on-site surveys.
- **Section 4.0 Dune Delineation Results** – Summarizes the results of the field efforts.
- **Section 5.0 Discussion** – Provides a discussion of the results of the dune delineation.
- **Section 6.0 General Recommendations** – Provides a preliminary assessment of existing and recommended dune restoration and protection activities.
- **Section 7.0 Conclusions** – Summarizes the overall conclusions.
- **Section 8.0 References** – Provides a complete list of references used during the field survey effort and in preparation of this report.

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2.0 DESCRIPTION OF THE STUDY AREA

2.1 INSTALLATION SETTING AND LAND USE

NASO DNA is located along the Atlantic coast in the City of Virginia Beach, Virginia (Figure 1). It encompasses approximately 1,372 acres and is bordered by the City of Virginia Beach, private property, and Hampton Roads Sanitation District property to the west, the community of Sandbridge to the south, Virginia Army National Guard Camp Pendleton to the north, and the Atlantic Ocean to the east (Navy 2006). The surrounding land area is densely developed with residential, commercial and industrial developments, and recreational facilities.

2.2 DUNE DELINEATION SURVEY AREA

The survey area for the dune delineation field effort included the dune complexes at NASO DNA. The dune complex at NASO DNA abuts approximately 4 miles of beach area and the Atlantic Ocean to the east.

2.3 CLIMATE

NASO DNA is located in an area where temperature extremes are moderated by the Atlantic Ocean. The climate summary in Table 1 includes data recorded at the Southeast Regional Climate Center at the Norfolk Airport from 1946 to 2012. The average yearly temperature is 60 degrees Fahrenheit (°F) (16 degrees Celsius [°C]) (Table 3). The average winter temperature (December through February) is approximately 42 °F (6 °C), and the average growing season temperature (March through November) is approximately 66 °F (19 °C). January is the coldest month with an average low of 32.6 °F (0.3 °C), and July is the warmest month with an average high of 87.4 °F (30.8 °C). The average growing season (daily minimum temperatures higher than 32 °F [0 °C] for a light frost) lasts approximately 250 days from the middle of March to late November. The average annual precipitation is approximately 45.7 inches (in) (116.1 centimeters [cm]) with maximum monthly precipitation occurring in late summer. The prevailing wind is from the southwest in summer and north and northeast in winter. Monthly tide data for 2013 show that the highest high tides occurred in November with an average of 2.13 feet above Mean Sea Level (MSL) and the lowest low tide levels occurred December and January with averages of 1.3 and 1.36 feet below MSL, respectively (Table 2). During hurricane events that typically occur from June through September, torrential rainfall may accompany winds greater than 75 miles per hour (121 kilometers per hour).

Table 1. Weather Data Recorded at Norfolk International Airport, 1946–2012¹.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Ave. Max. Temp. (°F)	48.9	51.0	58.3	68.2	75.9	83.6	87.4	85.6	80.0	70.3	61.4	52.4	68.6
Ave. Min. Temp. (°F)	32.6	33.5	40.2	48.5	57.6	66.2	70.9	70.1	64.8	53.6	43.8	35.7	51.5
Ave. Temp. (°F)	40.8	42.3	49.3	58.4	66.8	74.9	79.2	77.9	72.4	62.0	52.6	44.1	60.1
Ave. Precip. (in.)	3.49	3.14	3.65	3.12	3.62	3.88	5.37	5.48	4.49	3.24	3.06	3.14	45.68
Ave. Wind Speed (mph) ²	10	10	11	10	9	8	8	7	10	10	8	8	-
Prevailing Wind	N	N	N	SW	SW	SW	SW	SW	NE	N	SW	SW	-

¹Source: Southeast Regional Climate Center 2013

²Source: Southeast Regional Climate Center 2008 for years 1948–2007

Table 2. 2013 Tidal Data Recorded at Chesapeake Bay Bridge Tunnel, Virginia.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High Tide (ft above MSL)	1.23	1.34	1.92	1.58	1.53	1.52	1.50	1.77	1.89	2.13	1.42	1.29
Low Tide (ft below MSL)	-1.36	-1.23	-0.76	-1.1	-1.07	-1.09	-1.01	-0.73	-0.63	-0.41	-1.13	-1.30

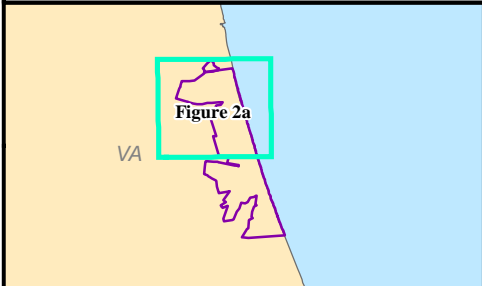
Source: NOAA tides and currents, 2013. Water levels: Verified high/low tides for Chesapeake Bay Bridge Tunnel, VA. Datum: MSL. <http://tidesandcurrents.noaa.gov/waterlevels>

2.4 SOILS

The dune survey area at NASO DNA encompasses six soil map units: Beaches; Newhan fine sands, 2–30 percent slopes; Newhan–Corolla Fine Sands, 0–15 percent slopes; Corolla Fine Sands; Corolla-Duckston Fine Sands; and Duckston Fine Sands (USDA SCS 1985) (Figure 2a and Figure 2b). The Beaches map unit is a miscellaneous area that includes the shore areas bordering the Atlantic Ocean. These areas are flooded regularly during daily tidal cycles. The most abundant soil component throughout the survey area is the Duckston Fine Sand. These soils occur immediately landward of the Beaches unit in most areas. Small areas of Newhan–Corolla Fine Sands and Newhan Fine Sand are found along the edge of the survey area to the west of the NASO DNA survey area.



- SOIL DESCRIPTIONS**
- 1—Acredale silt oam
 - 3—Augusta loam
 - 5—Backbay mucky peat
 - 6—Beaches
 - 8—Chapanoke silt loam
 - 10—Corolla fine sand
 - 11—Corolla-Duckston fine sands
 - 13—Dragston fine sandy loam
 - 15—Duckston fine sand
 - 19—Munden fine sandy loam
 - 21—Nawney silt loam
 - 22E—Newhan fine sand, 2 to 30 percent slopes
 - 23C—Newhan-Corolla fine sands, 0 to 15 percent slopes
 - 24—Nimmo loam
 - 36—Tetotum loam
 - 38—Tomotley loam
 - 40—Udorthents, loamy
 - 42—Urban land
 - W—Water



Legend

- Dam Neck Annex
- USDA Soils
- Dune Delineation Survey Area

0 0.25 0.5
 Kilometers

0 0.25 0.5
 Miles

**Figure 2a. USDA Soils,
 NASO Dam Neck
 Annex Survey Area,
 Virginia Beach, Virginia.**

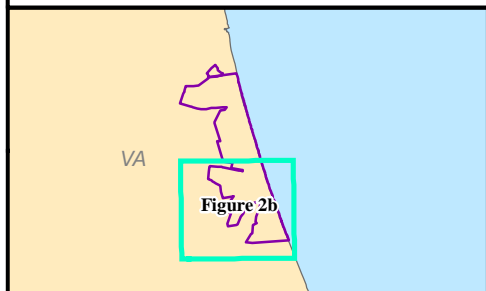
Date:
 07/2013

Source: NAVFAC Data DVD, 2013, ESRI Topo Maps, 2010.



SOIL DESCRIPTIONS

- 1—Acredale silt oam
- 3—Augusta loam
- 5—Backbay mucky peat
- 6—Beaches
- 8—Chapanoke silt loam
- 10—Corolla fine sand
- 11—Corolla-Duckston fine sands
- 13—Dragston fine sandy loam
- 15—Duckston fine sand
- 19—Munden fine sandy loam
- 21—Nawney silt loam
- 22E—Newhan fine sand, 2 to 30 percent slopes
- 23C—Newhan-Corolla fine sands, 0 to 15 percent slopes
- 24—Nimmo loam
- 36—Tetotum loam
- 38—Tomotley loam
- 40—Udortheents, loamy
- 42—Urban land
- W—Water



Legend

- Dam Neck Annex
- USDA Soils
- Dune Delineation Survey Area

0 0.25 0.5
 Kilometers

0 0.25 0.5
 Miles

Figure 2b. USDA Soils, NASO Dam Neck Annex Survey Area, Virginia Beach, Virginia.

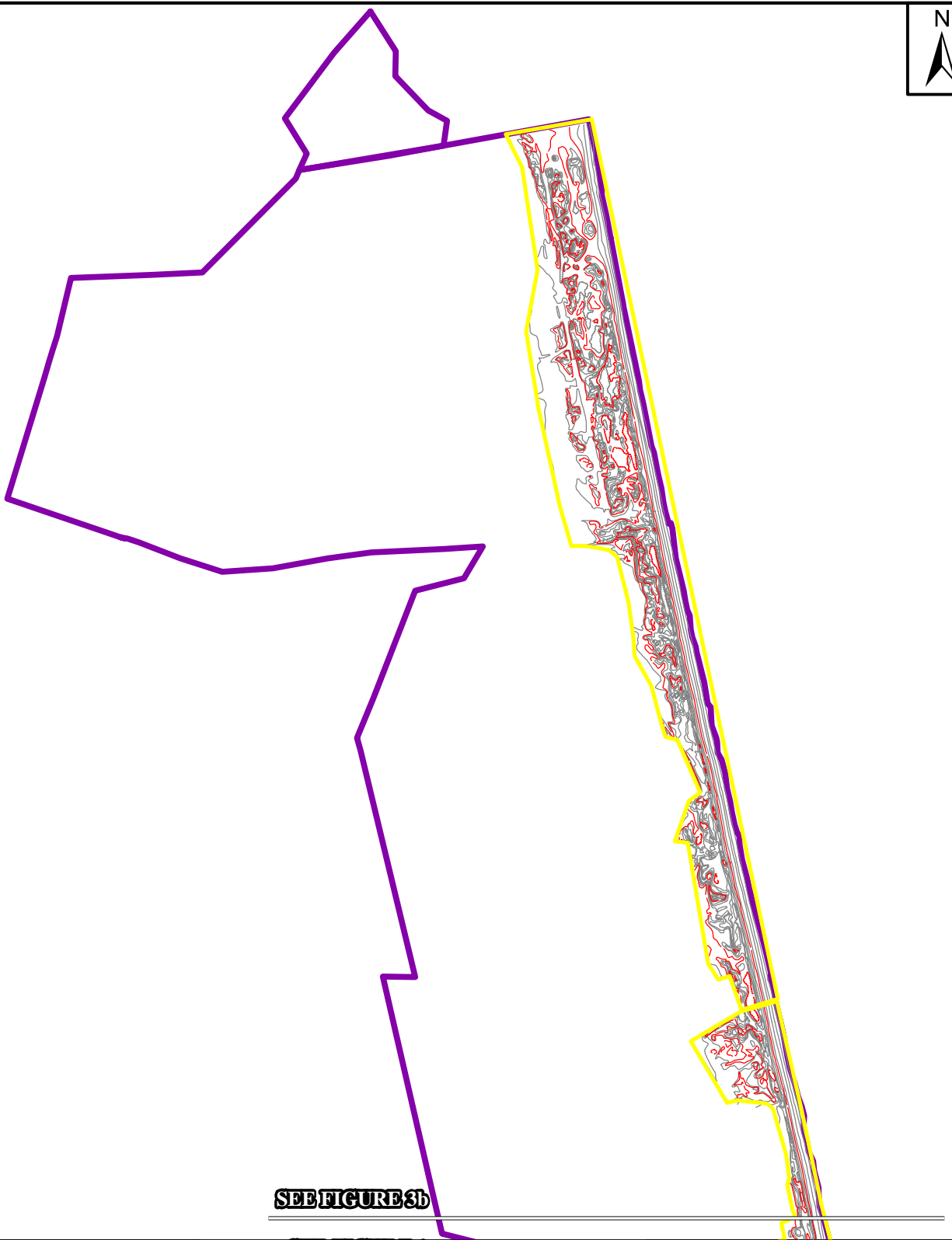
Date:
 07/2013

Source: NAVFAC Data DVD, 2013, ESRI Topo Maps, 2010.

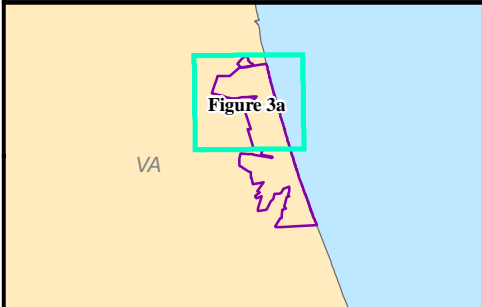
2.5 TOPOGRAPHY

The elevation within the NASO DNA survey area ranges from MSL along the beach on the east side of NASO DNA to 27 feet above MSL (Figure 3a and Figure 3b). The highest point within the dune survey area occurs at the south end of NASO DNA.

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


SEE FIGURE 3b



Source: NAVFAC Data DVD, 2013.

Legend

-  Dam Neck Annex
-  Dune Delimitation Survey Area
-  Elevation Contour (10 ft)
-  Elevation Contour (2 ft)

0 150 300
Meters

0 700 1,400
Feet

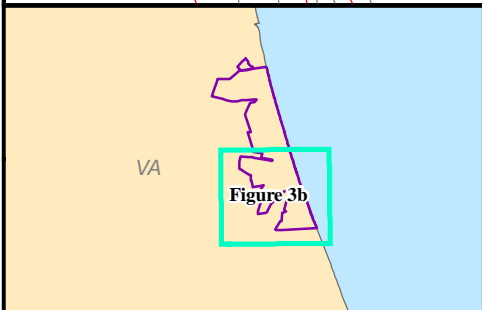
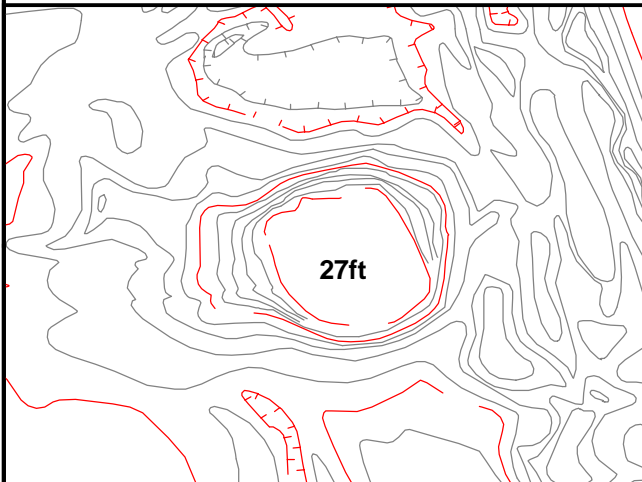
**Figure 3a. Topographic Map,
NASO Dam Neck
Annex Survey Area,
Virginia Beach, Virginia.**

**Date:
07/2013**





SEE FIGURE 3a



Highest Elevation Inset



Legend

-  Dam Neck Annex
-  Dune Delination Survey Area
-  Elevation Contour (10 ft)
-  Elevation Contour (2 ft)

0 150 300
Meters

0 700 1,400
Feet

**Figure 3b. Topographic Map,
NASO Dam Neck
Annex Survey Area,
Virginia Beach, Virginia.**

**Date:
07/2013**

3.0 METHODS

Field delineations of the landward edges of primary and secondary dunes were led by biologists from Kerr Environmental Services, Inc. and assisted by a Tetra Tech biologist. Primary dunes in NASO DNA were identified and mapped using the three parameters that are set forth in the Act and listed below.

1. **Substance** – a mound of unconsolidated sandy soil contiguous to mean high water (MHW).
2. **Morphology** – landward and lateral limits are marked by a change in grade from >10 percent to <10 percent.
3. **Character** – primary dunes must support specific plant species or communities, which are named in the Act and include: American beach grass (*Ammophila breviligulata*); beach heather (*Hudsonia tomentosa*); dune bean (*Strophostyles* spp.); dusty miller (*Artemisia stelleriana*); saltmeadow hay (*Spartina patens*); seabeach sandwort (*Hockenya peploides*); sea oats (*Uniola paniculata*); sea rocket (*Cakile edentula*); seaside goldenrod (*Solidago sempervirens*); short dune grass (*Panicum amarum*); Japanese sedge (*Carex kobomugi*); Virginia pine (*Pinus virginiana*); and broom sedge (*Andropogon virginicus*).

The landward boundaries of secondary dunes were identified as the convergence of the maritime grassland communities and communities dominated by woody species such as maritime forest or woodland communities. Although secondary dunes are not regulated under the Act, they are considered an important component of dune complexes. The primary and secondary dunes that were delineated as part of this field effort are collectively referred to as Dune Protection Areas (DPAs).

The front of the primary dune was hand digitized in the Arc GIS environment using high quality aerial photographs provided by ESRI World Imagery (Imagery Date: 11/27/2010). The digitized boundary corresponds to the seaward edge of the dune vegetation. The landward boundaries of the primary and secondary dunes were located and mapped using Trimble GEO XH Geoplotter 6000 Series Global Positioning System (GPS). Tetra Tech followed Trimble's specifications for collecting data and post processing for submeter accuracy.

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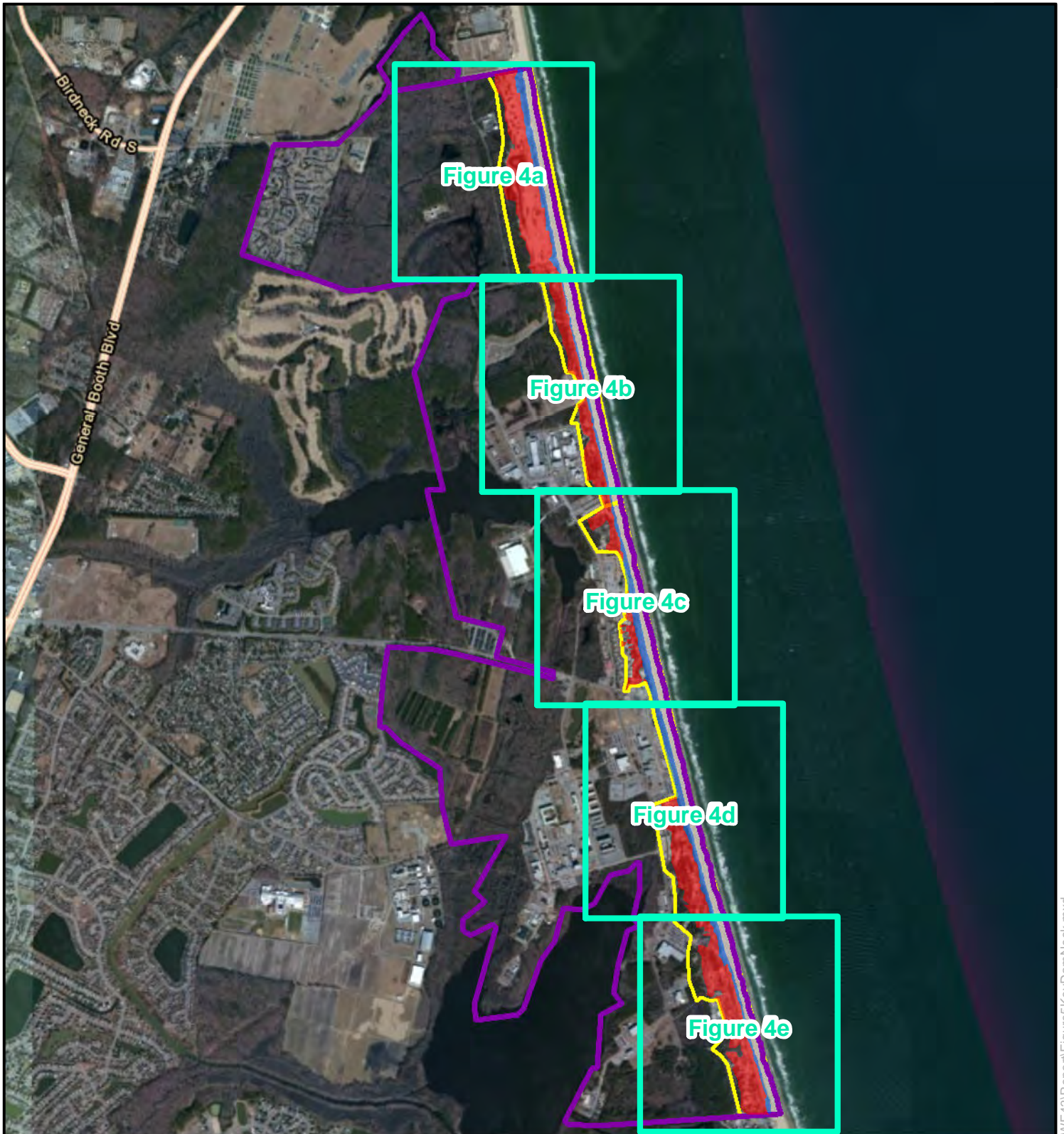
4.0 RESULTS

The primary and secondary dunes at NASO DNA were delineated on 8–11 June 2013. The DPA encompasses 165 acres including 39 acres of primary dune and 126 acres of secondary dune (Figures 4a–4e). Primary dunes were documented along the entire length (100 percent) of shoreline at the installation with a total length of 21,124 feet. Approximately 4500 feet of the primary dune includes a manmade dune constructed of a hard, rock core with sand and native dune vegetation placed on top. Five noncontiguous sections of secondary dune were delineated with a total length of 17,449 feet.






Numerous multi-use access routes were observed that run perpendicular to the shoreline. These routes—most of them approximately 10–15 feet wide—appeared to be used by vehicles and pedestrians for beach access from points landward of the DPA. In addition to the direct access routes, circuitous paths wind through the dunes and were particularly abundant in the secondary dunes located east of Beach Cottage Court (Figure 4c.).

Seven boardwalks have been constructed as alternative access points across the primary dunes and are located in the central and southern sections of the installation. The boardwalks are all well-constructed, sturdy features that elevate foot traffic above the dunes via concrete pillars.

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Legend

-  Dam Neck Annex
-  Dune Delineation Survey Area
- Dune Protection Area and Segments**
-  Primary Dune
-  Secondary Dune
-  Primary Dune Only

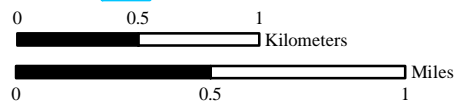


Figure 4. Dune Protection Area Segments by Dune Type, NASO Dam Neck Annex, Virginia Beach, Virginia.

SHEET KEY

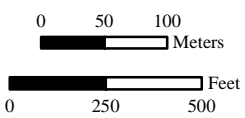
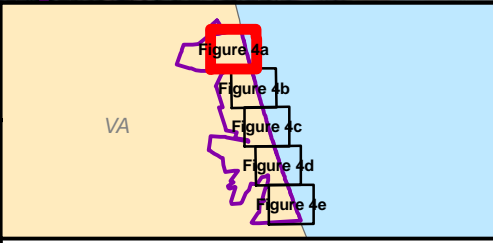
Date:
01/2014

Source: NAVFAC Data DVD, 2013, ESRI Topo Maps, 2010.



Legend

- Dam Neck Annex
- Dune Delineation Survey Area
- Dune Protection Area and Segments**
- Primary Dune
- Secondary Dune
- Primary Dune Only








**Figure 4a .
Dune Protection Area
Segments, by Dune Type,
NASO Dam Neck Annex,
Virginia Beach, Virginia.**

**Date:
01/2014**

Source: NAVFAC Data DVD, 2013, ESRI World Imagery; Imagery Date: 11/27/2010



Legend

-  Dam Neck Annex
-  Dune Delineation Survey Area
- Dune Protection Area and Segments**
-  Primary Dune
-  Secondary Dune
-  Primary Dune Only

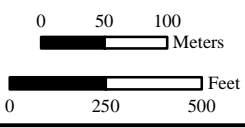
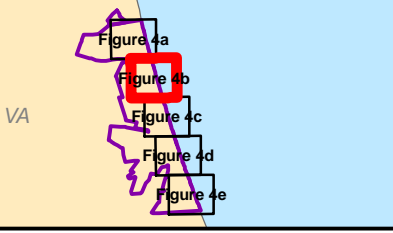
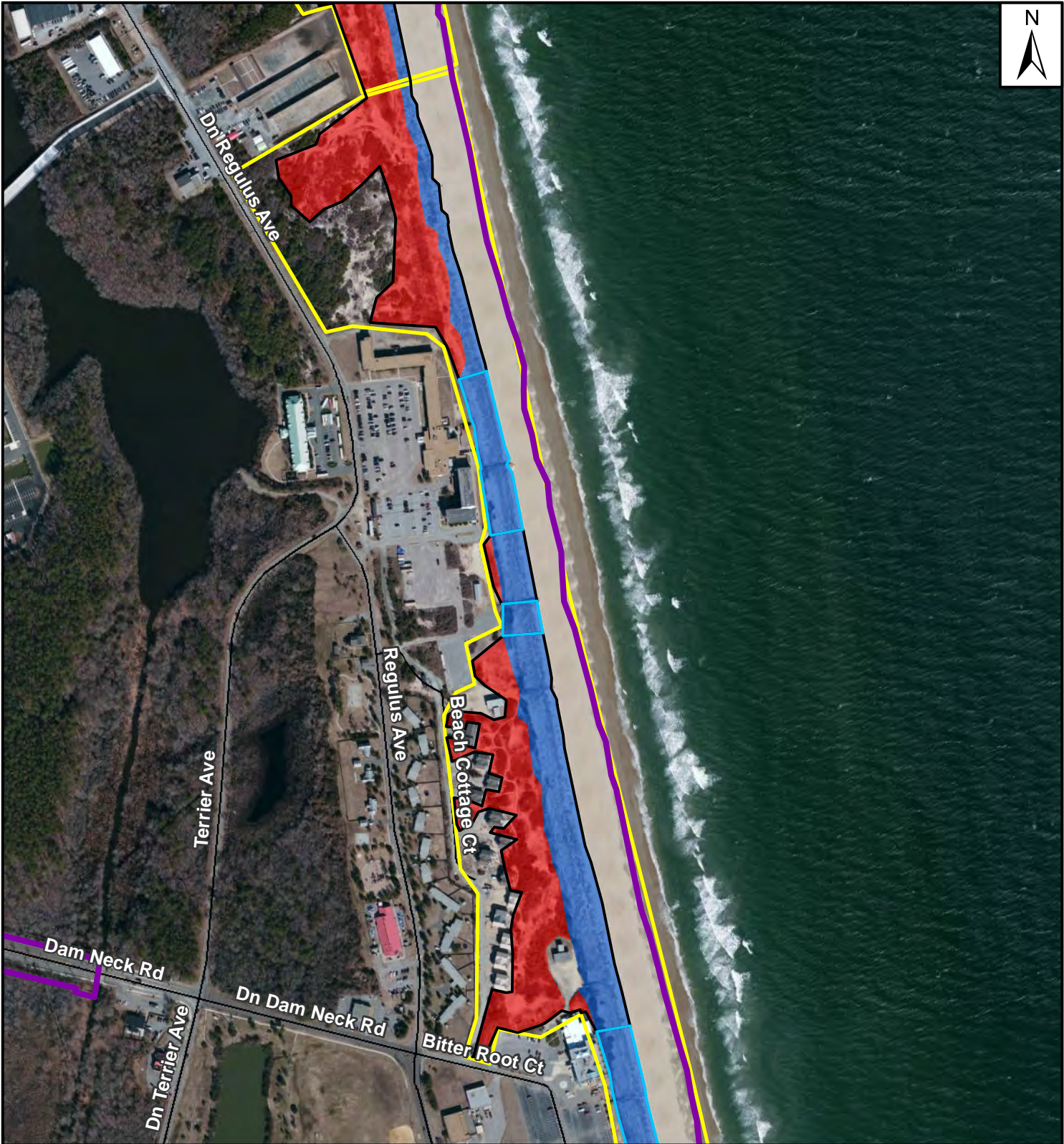







Figure 4b.
Dune Protection Area
Segments, by Dune Type,
NASO Dam Neck Annex,
Virginia Beach, Virginia.

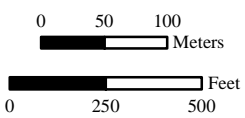
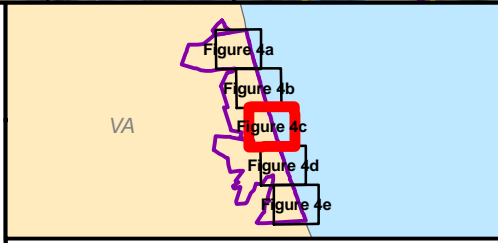
Date:
01/2014

Source: NAVFAC Data DVD, 2013, ESRI World Imagery; Imagery Date: 11/27/2010



Legend

-  Dam Neck Annex
-  Dune Delineation Survey Area
- Dune Protection Area and Segments**
-  Primary Dune
-  Secondary Dune
-  Primary Dune Only








**Figure 4c .
Dune Protection Area
Segments, by Dune Type,
NASO Dam Neck Annex,
Virginia Beach, Virginia.**

**Date:
01/2014**

Source: NAVFAC Data DVD, 2013, ESRI World Imagery; Imagery Date: 11/27/2010



Legend

-  Dam Neck Annex
-  Dune Delineation Survey Area
- Dune Protection Area and Segments**
-  Primary Dune
-  Secondary Dune
-  Primary Dune Only

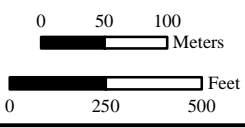
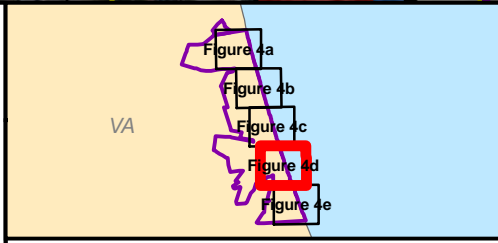







Figure 4d.
Dune Protection Area
Segments, by Dune Type,
NASO Dam Neck Annex,
Virginia Beach, Virginia.

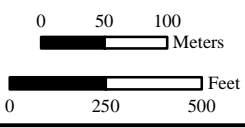
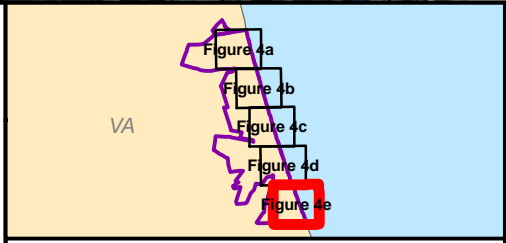
Date:
01/2014

Source: NAVFAC Data DVD, 2013, ESRI World Imagery; Imagery Date: 11/27/2010



Legend

-  Dam Neck Annex
-  Dune Delineation Survey Area
- Dune Protection Area and Segments**
-  Primary Dune
-  Secondary Dune
-  Primary Dune Only



**Figure 4e .
Dune Protection Area
Segments, by Dune Type,
NASO Dam Neck Annex,
Virginia Beach, Virginia.**

**Date:
01/2014**

Source: NAVFAC Data DVD, 2013, ESRI World Imagery; Imagery Date: 11/27/2010

5.0 DISCUSSION

Natural, stable, dune systems possess relatively continuous primary and secondary dunes. Therefore, one way to assess the condition of dune systems in an anthropomorphically disturbed area relative to an undisturbed system is to compare the length of intact primary and secondary dunes to that of areas lacking secondary dunes. As such, the NASO DNA DPA was broken into segments based on the presence of primary or primary and secondary dune. Therefore, a dune segment is a continuous section of dune that is bounded by a change dune type present (i.e., change from an area with primary and secondary dunes to an areas with primary dunes and no secondary dune). These results are compared to the results of dune delineations completed at two nearby installations, Joint Expeditionary Base Little Creek (JEBLC) and Joint Expeditionary Base Little Creek – Fort Story (JEBLC FS). JEBLC is located in Norfolk and the City of Virginia Beach and JEBLC FS is entirely within the City of Virginia Beach (Navy 2012). Photographs of the NASO DNA dune system are provided in Appendix A.

Compared to JEBLC and JEBLC FS, NASO DNA had the greatest amount of shoreline and the most contiguous (100 percent) dune system (Table 3 and Table 4). NASO DNA also possessed the greatest average length of dune system containing only primary dune (no secondary dune). The majority of the primary dune only areas correspond to the constructed dune that is present in the middle section of the DPA. While the width of area with just primary dune is generally comparable to the width of similar sections at the other two installations, the NASO DNA primary dune is more regular in shape due to its man-made origin.

NASO DNA had fewer segments with both primary and secondary dunes but these segments had a greater average length per segment than at JEBLC or JEBLC FS. NASO DNA has the lowest overall percentage at 83 percent of the total dune length with both primary and secondary dune, compared to the percentage of total length at JEBLC and JEBLC FS with 92 percent and 93 percent, respectively. However, when comparing the percent of DPA containing both primary and secondary dune relative to the entire installation shoreline, NASO DNA was similar to the other two installations due to the fact that 100 percent of its shoreline contained dune while dunes were present along less than the entire length of shoreline at JEBLC and JEBLC FS.

Table 3. Dune Protection Area (DPA) Overview, NASO DNA, JEBLC, and JEBLC FS, Virginia.

Installation Name	Total Area of DPA (acres)	Area of Primary Dune (acres)	Length of Primary Dune (feet)	Area of Secondary Dune ^a (acres)	Length of Secondary Dune (feet)
NASO DNA	164	39	21,124	126	17,449
JEBLC	58	17	13,840	41 ^a	12,690
JEBLC FS	76	23	15,472	53 ^a	14,406

^aA slightly different method was used to map the secondary dunes during the delineations at JEB LC and JEB FS (Navy 2012). For the purpose of comparison, the combined areas within the secondary dunes and the secondary dune field at those installations are analogous to the secondary dune area at NASO DNA.

Table 4. Dune Delineation Summary and Comparison Table, NASO DNA, JEBLC, and JEBLC FS, Virginia.

Installation Name	Total Shore Length (ft)	Total Dune Length (ft)	Total Dune Length (%)	Primary Dune Only					Primary & Secondary Dunes				
				No. Dune Segments	Total Length (ft)	Total Length of Dune (%)	Total Length of Shoreline (%)	Average Site Length (ft)	No. Dune Segments	Total Length (ft)	Total Length of Dune (%)	Total Length of Shoreline (%)	Average Site Length (ft)
NASO DNA	21,124	21,124	100	3	3,676	17	17	1,224	4	17,449	83	83	4,362
JEBLC	15,220	13,840	91	5	1,150	8	8	230	14	12,690	92	83	916
JEBLC FS	19,060	15,472	81	4	1,066	7	6	266	9	14,406	93	76	1,583

^aPercent of total dune length.

The primary dunes at NASO DNA occur as one contiguous segment. However, the secondary dune area exhibits evidence of anthropomorphic disturbance including development within backdune areas, multiple beach access routes oriented perpendicular to shore, and training routes that meander throughout dunes. The access routes currently do not appear to hinder the dunes ecological properties, as they are vegetated and likely stable. However, the training routes in the northern portion of NASO DNA have created a disturbance through the secondary dune field that has altered the dune contours and destroy dune vegetation.

Furthermore, development such as existing buildings, active construction sites, recreational areas and parking lots occur throughout the secondary dunes. The absence of secondary dunes provides easier access for pedestrians making the primary dunes vulnerable to trampling and traversing by foot traffic. In addition, infrastructure that is built in the backdune area is at higher risk from storm surge via breaches of the primary dune.

Similar to NASO DNA, the DPAs at JEBLC and JEBLC FS face related issues. At JEBLC, erosion of the numerous beach access routes has resulted in a DPA that is comprised of dune fragments. Meandering training routes and excavations have resulted in an atypical dune surface, patchy vegetation, and large areas of bare sand. JEBLC FS appears to be more intact and exhibits longer sections of vegetated and stable dunes than those present at JEBLC. Although the conditions at NASO DNA at the time of the survey appeared to be more similar to JEBLC FS in that it possessed a less fragmented dune system as well as intact communities of stabilizing dune vegetation, the conditions at JEBLC may be a good indication of potential future conditions. Despite efforts to prohibit unauthorized access (e.g., no-entry signs and fencing) the presence of some non-designated pathways in the DPA suggests that additional enforcement of regulations could be strengthened. If the access routes and training paths within the dunes remain unchecked, the forces of wind and water may create a degraded and fragmented dune system that would make installation infrastructure vulnerable to damage to future storm surges.

However, differences between the two installations also exist. Unlike NASO DNA, JEBLC and JEBLC FS have shoreline protection structures including revetments and breakwaters. As with most shoreline hardening projects, the revetment was built to protect infrastructure behind it from a rapidly eroding shoreline. However the presence of the revetment may be starving the adjacent remnant dunes landward of it of sand. Several sections of the DPAs at JEBLC and JEBLC FS are exhibiting evidence of considerable erosion in recent years. It is difficult to ascertain the exact cause of the erosion. Possible causes may include sand starvation caused by the shoreline protection structures up drift, wave action exacerbated by sea level rise, storm surge damage from past storms, or some combination of these factors. Although there are currently no areas in NASO DNA's DPA that are experiencing high rates of erosion similar to that which is occurring at JEBLC and JEBLC FS, removal of secondary dunes could increase the primary dunes vulnerability and overtime eliminate a necessary sand source for stability.

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6.0 GENERAL RECOMMENDATIONS

In addition to mapping primary and secondary dunes at NASO DNA, potential problem areas were noted to the extent that it did not interfere with the primary goal of dune delineation. Problem areas within the boundary of the DPA that exhibited signs of recent or historic disturbance causing varying degrees of erosion to the dune and therefore would benefit from the implementation of restoration and/or protection measures.

The following sections describe dune restoration and protection activities that are currently being employed, as well as general dune restoration and protection options that could be implemented at NASO DNA. These recommendations are preliminary in nature and should be used as a guide for future restoration and protection objectives.

6.1 CURRENT RESTORATION AND PROTECTION ACTIVITIES

There are two general types of techniques used to protect shorelines from the eroding forces of waves and wind: structural and non-structural. Structural protection measures include hard, fixed features such as revetments and bulkheads. Structural techniques can work against the natural dynamism of dunes, specifically by interrupting natural sediment transport (VIMS 2009). However, non-structural techniques such as sand fencing and beach nourishment work with these processes to rebuild dunes. An example of a combined structural and non-structural technique includes constructed dunes with a hardened core. These dunes are usually linear in appearance and horizontal movement over time is limited due to the immobile core. However, such dune features are often capable of supporting healthy plant and animal communities and aeolian transport between the dune and surrounding area facilitates development of a somewhat natural appearance over time. The dune system at NASO DNA has approximately 1-mile of underlying hardened core that is considered have successfully naturalized.

The Navy is currently utilizing several nonstructural techniques at NASO DNA. These techniques include exclusion signs and sand-trapping measures (sand fencing and strategically placed discarded Christmas trees). The signs are located throughout the secondary dune areas and the sand-trapping measures are located along the seaward side of the primary dunes in an area at the southern end of NASO DNA. Furthermore, there is at least one authorized access route located mid-way in the DPA that was constructed at an angle less than exactly perpendicular to the shoreline. The angle reduces the risk of erosion that is associated with access routes situated perpendicular to shorelines. In addition to these efforts, other areas within the DPA may benefit from implementing similar restoration techniques.

6.2 DUNE RESTORATION AND PROTECTION OPTIONS

It is recommended that a thorough assessment of the NASO DNA dunes is completed to identify and prioritize all problem areas. Once the inventory of problem areas is complete, a combination of restoration techniques can be prescribed for each area. The following sections describe examples of nonstructural dune restoration and protection techniques that are feasible within the DPAs at NASO DNA.

6.2.1 Exclusion and Informational Signage

Currently, basic signage does exist at various locations throughout the primary and secondary dune systems, but they are often remnants of older signs. Replacing the signage and providing additional details will increase public awareness of the DPA. A combination of “Access Prohibited” and informative signage should be placed throughout the NASO DNA DPA. The “Access Prohibited” signs should be placed at any location that provides unimpeded access to the DPA by pedestrians and/or vehicles but is not a designated route. In general, fewer well used routes are preferred to multiple routes. The informative signage or kiosks should be located in areas that receive high volumes of pedestrian traffic such as at the beach access areas. These kiosks should provide information on dune ecosystems, emphasizing the important role they play protecting the installation infrastructure and in providing habitat for wildlife, and why walking and driving vehicles through them weaken the dunes.

6.2.2 Sand Trapping Techniques

Sand fencing is one of the most frequently utilized methods of dune restoration due to the relative ease of installation, cost effectiveness, and the fact that they are one of the few structures allowed seaward of dunes in many regions (Nordstrom 2008). This technique can be used to create dunes, restore breaches, or bolster existing dunes by making them broader or taller.

Sand fences can be constructed from a variety of material but are most often made from individual tree branches anchored in the sand, wooden slat fencing, and plastic or biodegradable jute fabric attached to wooden fence poles. Results of a study that evaluated the effectiveness of several types of sand fence materials and configurations indicate that jute fabric performs as well as common wood sand fencing before the onset of degradation at 12–18 months post-installation (Miller et al. 2001). Using a biodegradable material such as jute fabric and/or wooden fence posts would be beneficial at NASO DNA for several reasons. Replacing the metal stakes with wood poles reduces the safety hazard created by metal stakes; these stakes can become partially exposed when dunes shift or they rust and break, often less than 1 foot above the ground. Such partially exposed or broken stakes are very difficult to see when surrounded by vegetation and create a serious safety hazard. Other benefits to using biodegradable materials include lessening the human footprint, particularly if several successive levels of dune fencing are erected to restore dunes. Sand fence materials that do not break down over time litter the landscape with wood debris, wire, and metal stakes. Also, sand fencing that is not biodegradable and is left in place may impede burrowing animals that inhabit the restored dunes. Jute fabric is also readily available and can be ordered from erosion control materials suppliers.

There is little consensus on what is the most effective sand fence configuration (Miller et al. 2001). A single row of fencing installed straight and parallel to shore is the most common configuration and is effective at low wind speeds. However, the resulting dune may have a slope that is too steep for planting to be successful (Nordstrom 2008). Paired sets of straight sand fence, spaced at distances apart of four times the fence height, may be more efficient for high wind speeds and create dunes with a broader base and a lower slope that are more conducive to planting (CERC 1984 and Nordstrom 2008). Zigzag configurations in single or double rows may be more effective in areas with strong alongshore winds (Nordstrom 2008). However, some studies suggest that other configurations hold no advantage over the typical straight and parallel

to shore fence (Miller et al. 2001). Finally, creating gaps in long lengths of sand fencing provide access for fauna and lessen the possible barrier effect (Nordstrom 2008).

All sand fencing should be inspected on an annual basis, at a minimum. Fencing should be maintained by removing any parts that do not appear to be functioning as intended, are in disrepair, or pose a physical hazard. Buried sand fencing should not be unearthed as this will destabilize the restored dune. Routine inspection and maintenance is critical to the functioning of the sand fencing as well as the safety of people that traverse the dunes.

Discarded Christmas trees may be used alone or in combination with sand fencing. Christmas trees placed behind sand fencing may increase the rate of entrapment, and Christmas trees used alone may also successfully entrap sand. However, if the trees are not anchored they are susceptible to being repositioned—most likely by strong winds—into an orientation that renders them ineffective. As with sand fencing, Christmas trees that are installed to restore dunes should be inspected regularly to ensure they are functioning as intended.

6.2.3 Dune Reconstruction

At nearly any location where sand fencing is recommended, the creation or repair of existing dunes can be hastened by reconstruction. This also may be an attractive alternative where past restoration attempts using sand fence have not had success due to an insufficient volume of aeolian transport. Reconstruction entails the placement of clean sand from external, upland soils using heavy equipment. Such a resource-intensive technique may be a viable option where the protective dunes are substantially impaired and the infrastructure landward of the site is at high risk from storm surge. Dunes that are created in this manner are often berm-like and lack the natural undulations and surface diversity of natural dunes. However, actions can be taken when contouring the reconstructed dune to increase surface variability, thereby increasing resemblance in habitat function and appearance to natural dunes (Nordstrom 2008). Material used in dune reconstruction should comprise well-sorted sands, and great care should be taken to ensure it is free of undesirable organisms such as nonnative plant species.

6.2.4 Native Species Planting

Planting bare or sparsely vegetated sand with native plant species is an important step in dune restoration and/or reconstruction because it hastens the recolonization process. The roots of vegetation trap sand, stabilizing the dune. Plantings may be useful in areas of the DPA where vegetation is sparse. General guidelines for establishing vegetation on dunes are provided in Appendix B.

Plant species that occur in dune habitat have adapted tolerances to the harsh conditions that occur in the beach/dune environment. Some of the stresses that these plants must endure include salt spray, sand burial, high light intensity, high temperatures, strong winds, and poor soil conditions (Nordstrom 2008). The species that are selected for any given planting area should be chosen according to the position with the DPA. For example, American beach grass is a common inhabitant of the highly dynamic primary dunes at NASO DNA. This plant is most vigorous in areas of abundant sand deposition and may deteriorate as deposition decreases (van der Putten and Peters 1995). Later successional species should be selected in areas less prone to sand

deposition such as the landward slope of protected primary dunes or on secondary dunes. Planting may include a single species used to stabilize the dune sufficiently, allowing the natural recolonization of species present nearby. However, planting two or more species will diversify the vegetation and may improve long-term viability of the site (Woodhouse et al. 1977).

Based on the species that are currently present within the DPAs at NASO DNA, American beach grass, sea oats, bitter seabeach grass, and beach panic grass are appropriate species to plant in active primary dune restoration areas. Saltmeadow cordgrass, broomsedge, beach panic grass, and seaside goldenrod are feasible species for less active areas such as secondary dune restoration sites. Planting activities should occur between November and March (O'Connell 2008).

7.0 CONCLUSIONS

The dunes at NASO DNA exhibit evidence of disturbance including multiple beach access routes oriented perpendicular to shore, training routes that meander throughout dunes, and development in secondary dunes areas. Although the primary dunes have remained intact as one contiguous segment, vehicular and pedestrian impacts are threatening the stability of the primary dunes and development activities have fragmented the secondary dunes.

Preliminary recommendations for dune restoration and protection at NASO DNA include conducting a thorough assessment of the DPA to inventory and prioritize problem areas. Once these areas are identified nonstructural techniques can be implemented to protect and restore, and/or bolster the existing dunes. Four general types of nonstructural restoration and protection measures are recommended, including installing exclusion and informational signage, erecting sand trapping measures, reconstructing the dunes, and planting native dune vegetation. The overall goal of restoration activities at NASO DNA would be to create and maintain more extensive and more stable dunes. This can only be accomplished by minimizing the number of beach access roads and restoring or bolstering the primary and secondary dunes. Maintaining an intact dune system at NASO DNA will provide greater protection for the installation infrastructure over time, as well as provide an important ecological habitat to this highly developed region.

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APPENDIX A

Photographic Documentation

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/09/13
Photo No.: 1
Direction: South

Comments:
View of a maritime grassland community on primary dune. Common species include American beach grass, sea oats, bitter seabeach grass, and beach panic grass.



Photographer: L. Staszak
Date: 06/09/13
Photo No.: 2
Direction: Southeast

Comments:
View of a maritime grassland community on primary dune. Common species include American beach grass, sea oats, bitter seabeach grass, and beach panic grass.

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/09/13
Photo No.: 3
Direction: North

Comments:
Backside of the primary abutting maintained grass around developed area.



Photographer: L. Staszak
Date: 06/09/13
Photo No.: 4
Direction: North

Comments:
Backside of the primary dune, that ends at edge of recreational shelter.

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/09/13
Photo No.: 5
Direction: South

Comments:
Backside of a primary dune that abuts developed land.



Photographer: L. Staszak
Date: 06/09/13
Photo No.: 6
Direction: South

Comments:
View of maritime grassland community on secondary dune. Common species include saltmeadow cordgrass, broomsedge, seaside goldenrod, and beach heather.

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/09/13
Photo No.: 7
Direction: East

Comments:
Foot trail providing access through secondary dunes from housing development. Access is perpendicular to shoreline.



Photographer: L. Staszak
Date: 06/09/13
Photo No.: 8
Direction: Northeast

Comments:
Secondary dunes immediately abutting residence.

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 9
Direction: Northeast

Comments:
Backside of rebuilt primary dune with dune fence to deter foot traffic. Secondary dunes in this section are absent due to existing development.



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 10
Direction: North

Comments:
View of maritime grassland community on secondary dune field. Common species include saltmeadow cordgrass, broomsedge, seaside goldenrod, live oak, black cherry, and beach heather.

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 11
Direction: South

Comments:
View of maritime grassland community on secondary dune field. Common species include saltmeadow cordgrass, broomsedge, seaside goldenrod, live oak, black cherry, and beach heather.



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 12
Direction: West

Comments:
View of maritime grassland on secondary dune field. Common species include saltmeadow cordgrass, broomsedge, seaside goldenrod, live oak, black cherry, and beach heather.

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 13
Direction: North

Comments:
View of seaward side of primary dune.



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 14
Direction: South

Comments:
View of developing primary dune.

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 15
Direction: South

Comments:
View of extensive secondary dune field.



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 16
Direction: South

Comments:
View of the backside of the secondary dunes at a sand fence behind the campground.

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 17
Direction: North

Comments:
View of eroding primary dune and existing sand trapping features including sand fencing bolstered by discarded Christmas trees.



Photographer: L. Staszak
Date: 06/11/13
Photo No.: 18
Direction: North

Comments:
View of Virginia pine mature forest encroaching into secondary dune field.

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/11/13
Photo No.: 19
Direction: North

Comments:
View of Virginia Pine mature forest encroaching into secondary dune field.



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 20
Direction: East

Comments:
View of secondary dune field and backside of primary dunes.

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 21
Direction: South

Comments:
View of maritime grassland community on primary and secondary dune field.



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 22
Direction: South

Comments:
Housing development area extending into secondary dune field.

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 23
Direction: North

Comments:
View of disturbance within the dune areas that is likely caused by foot traffic in the area.



Photographer: L. Staszak
Date: 06/10/13
Photo No.: 24
Direction: North

Comments:
Housing development extending into secondary dune field.

TETRA TECH, INC.

PHOTOGRAPHIC RECORD

Client: NAVFAC Atlantic
Project: Hampton Roads Wildlife Surveys and Dune Delineation Project
Document: NASO Dam Neck Annex Dune Delineation Report



Photographer: L. Staszak
Date: 06/11/13
Photo No.: 25
Direction: North

Comments:
View of disturbance within the dune areas caused by vehicular traffic.

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APPENDIX B

General Planting Guidance

DUNE REVEGETATION GUIDANCE AND RECOMMENDATIONS

1. BACKGROUND

This dune revegetation guidance was originally developed in support of a comprehensive dune restoration and protection plan for use by JEB Little Creek – Fort Story natural resource managers as part of the sustainable, multiple-use management of sensitive coastal dune ecosystems. However, the information herein is directly applicable to NASO DNA as the overall goal of restoration activities is to create more extensive and more stable dunes.

Planting bare or sparsely vegetated sand with native plant species is recognized as an important step in dune restoration and/or reconstruction because it hastens the recolonization process, and the roots of vegetation help stabilize the dune by trapping sand. Plantings may be particularly useful in areas where vegetation is sparse. However, before undergoing resource-intensive revegetation efforts, one must determine why the dune is eroding or why sand cannot accumulate to form a dune. For example, a dense stand of trees may have eliminated sand-trapping plants, or a jetty across a littoral zone may be causing beach erosion. Removing the cause is sometimes all that is needed to allow natural revegetation (Craig 1984).

Coastal dunes have three general vegetation zones that are largely based on soil salinity: frontal (primary), backdune (secondary), and forest. Each can vary in width or may even be entirely absent from a coastal dune system, and they can also overlap; sharp distinctions between zones are usually absent (Williams 2007). This set of recommendations will focus only on grassland species recommended for use in primary and secondary dune reconstruction and stabilization.

Landward of the highest tides and closest to the ocean and beach, primary dunes are stabilized by the sand trapping action of a few species of plants adapted to extreme conditions including high levels of salt spray, continuous winds, large amounts of windblown sand, and other environmental factors that continuously impact these frontal zone species (Rogers and Nash 2003, Williams 2007). Coastal dune plants must also be able to survive in soils that are low in nutrients and moisture and experience severe fluctuations in temperature and ocean overwash. The specific attributes developed to help dune species survive and thrive in these harsh environments include high growth rates, dense root systems, low profiles, and high flower and seed production rates. Landward of the primary dune area, the secondary dune supports less salt tolerant grasses and forbs as well as shrubs and some trees (Williams 2007).

2. GENERAL PLANTING GUIDANCE

Following is general planting guidance that pertains to all grassland species including recommended planting times, spacing and depth, fertilization, irrigation, maintenance, and other relevant information. Species-specific guidance can be found in Section 3.

- **Plant during the correct season.** Most species will establish best when planted early in their planting windows.

- Because seed is often difficult to acquire and seed quality can be poor, most coastal sites are stabilized using **vegetative transplants**, either potted plants (plants in 2- to 4-inch pots are adequate for most stabilization and building work), bareroot plants, or culms (Williams 2007). Be sure to obtain healthy seedlings that have not been allowed to dry out.
- **Planting tools:** A shovel, dibble, or spade can be used for hand planting. Large, flat sites can be planted more efficiently using a tractor-drawn transplanter with plows that create furrows 8–15 inches deep (Williams 2007).
- Storm tides and waves prevent vegetation from growing, so vegetation should be planted at least 100 feet landward of mean high water. If a **100-foot buffer** is not possible, begin dune restoration the farthest possible distance landward from mean high water and the average seasonal storm inundation area (O’Connell 2008).
- **Spacing:**
 - Areas being planted should be a minimum of 10-feet wide, though wider extents may be required on more severely eroded sites. When replanting existing dunes suffering from storm damage, start planting on the unvegetated dune face if the scarp has collapsed; if the scarp has not collapsed, plant at the base of the dune. Plant as far landward as possible on flat overwashed areas (Williams 2007).
 - Spacing between rows varies from 1 to 3 feet. Closer rows provide more rapid cover, but the cost is higher as a result of increased vegetation and labor needs.
 - Plant spacing depends on the desired location of maximum sand accumulation (more dense plant spacing [e.g., 12 inches] captures more sand more quickly), elevation, the number of plants available, and the presence of protected shorebird habitat (less dense plantings are generally required in rare, threatened, and endangered shorebird habitat areas—generally 36 inches—if planting is allowed at all) (O’Connell 2008). Plant spacing ranges from 1 to 3 feet within each row, but is typically 18 inches for 1- to 4-inch-potted plants or bareroot plugs and stolons of comparable size (Williams 2007).
 - One suggested planting pattern is to have the closest plant spacing, 12 x 12 inches, as far landward as possible; after a few rows of this spacing, increase the spacing to 18–24 inches for several rows. To finish, the rows closest to the ocean would be planted at the 3-foot spacing. This would allow more sand to blow toward the back where plants are densest, which would build the dune the highest and fastest toward the back (Williams 2007).
- Regardless of spacing, **stagger plants** in adjacent rows to prevent open aisles (lined up spaces between plants), which are more susceptible to erosion (Williams 2007).
- **Plant in moist sand**, ideally following a good rain. If the sand is dry when planting, irrigate the seedlings and the surrounding sand as they are placed in the hole. A water adsorbing polymer gel product (e.g., Terrasorb®, Stock-osorb®) can also be placed in the hole prior to planting (use between 8 and 12 ounces of hydrated gel per transplant) (Williams 2007).

- **Plant at the correct depth:** Failure to plant deep enough is the most common cause of plant death. In general, grasses should be planted with the rootball 8 inches below the soil surface. Care should be taken to fill the hole completely with firmly packed soil to eliminate any air pockets around the roots (Williams 2007).
- **Fertilization:** Fertilize as recommended; initial fertilization is usually best done at, or within 30 days of, planting. Applying fertilizer over planted areas in the first year usually helps the plants establish quickly. When adding fertilizer at planting, use only time-released fertilizer that will not burn plant roots, especially in warmer months (do not fertilize in the peak hot season when the plant is heat stressed) (Rogers and Nash 2003). Time-release fertilizer is also recommended because fertilizer can leach through the porous sand and pollute groundwater or nearby bays and estuaries causing water quality problems (O'Connell 2008). Be cautious not to overfertilize; dune plants are adapted to low-nutrient, sandy soils.
- **Irrigation:** Irrigation is advisable, where practical, on all dune plantings to ensure sufficient moisture during initial establishment. However, excessive irrigation rinses salt spray off the leaves and out of the soil, which allows other species to compete with dune vegetation. Therefore, regular irrigation or fixed irrigation systems are not recommended, and irrigation should not be used after stands are established (Rogers and Nash 2003).
- **Maintenance:** Native dune species should require little maintenance after establishment. Sites should be monitored for invasive species and weeded as necessary. Additionally, all sites should be protected as much as possible from foot and vehicular traffic using a combination of signs, fencing, and dune crossover structures (Williams 2007).

3. RECOMMENDED SPECIES FOR DUNE REVEGETATION

In the mid- to south-Atlantic, grassland species commonly used in primary dune revegetation efforts include American beachgrass (*Ammophila breviligulata*), sea oats (*Uniola paniculata*), and bitter panicum (*Panicum amarum*) and one of its subspecies bitter seabeach grass (*Panicum amarum* ssp. *amarum*). Saltmeadow cordgrass (*Spartina patens*) and beach panicgrass (*Panicum amarum* ssp. *amarulum*) are commonly used to restore secondary dune sites. All of these grassland species were frequently observed at NASO DNA and are recommended for the revegetation of coastal dunes on the installation.

Whenever possible, several species should be used in dune revegetation, particularly on primary dunes; a good rule of thumb is to include three or more frontal zone species whenever possible. Dune restoration plantings should try to mirror the species diversity found nearby to provide food and shelter for coastal wildlife in addition to dune stabilization (Williams 2007).

Climate is the primary factor limiting the range of frontal zone coastal dune plant species. Along the mid-Atlantic coast, the dunes between the Chesapeake Bay and Cape Lookout, North Carolina are the approximate transition zone for several species. Sea oats prefer the warmer climate found south of this area and appear to be limited by cold temperatures in their northern range, whereas American beachgrass is the dominant species north of the transition zone and tend to be stressed by the hotter, dryer conditions found farther south. Also, while the native geographical range of a coastal species may extend for hundreds of miles along the Atlantic

coastline, plants from one end may not adapt well at the other end of their native habitat. For example, research has demonstrated that the genetic makeup of sea oats—which influences plant hardiness, vigor, seed production, temperature tolerance, growth rate and reproduction—differs among populations. Local plants are usually best adapted to the climate where they were first grown since they take years to evolve. Therefore, it is always best to obtain dune plants grown from seeds or parent material originating as close as possible to the beach where they will be planted; if possible, acquire seedlings or transplants that were grown from seeds or cuttings originating within a 100-mile radius of the beach being revegetated (Rogers and Nash 2003).

PRIMARY DUNE SPECIES

American beachgrass (*Ammophila breviligulata*)

- The ‘Cape’ variety is the most recent variety developed (in 1970) and is now the dominant dune building plant along the north Atlantic coast. Its nearly perfect performance and ease of establishment has made this the only species extensively planted on coastal sand dunes—particularly the primary dune—from Maine to North Carolina (O’Connell 2008). That being said, the ‘Hatteras’ variety, which is characterized by early vigor, was developed by the North Carolina Agricultural Experiment Station and is better adapted to southern climates (Miller and Peterson 2000).
- Avoid using a pure stand of American beachgrass in warmer climates. Including sea oats within the beachgrass allows the sea oats to become the primary vegetation if the beachgrass begins to have problems. Bitter panicum can also be randomly mixed with the beachgrass (Rogers and Nash 2003).
- This species is generally planted 12 inches, 18 inches, 24 inches, or 36 inches apart. Space plants 18 x 18 inches unless wind erosion is severe, then reduce spacing to 12 x 12 inches. A spacing of 24 x 24 inches is suitable on very stable areas where wind is not a factor. Stagger the plantings in alternate rows (ideally, a minimum of 10 rows) to provide maximum erosion control.
- Plant two to three culms per hole (though USDA NRCS [2003] states that planting more than two stems per hole does not appear to be more beneficial and in some cases may even be detrimental to plant survival).
- Culms must be planted 8–10 inches deep in moist sand to prevent drying out and being blown out by the wind.
- Plant spacing densities can be the same throughout a project area or, if space allows, can be graduated from dense spacing landward to gradually wider spacing moving seaward. This method will begin dune formation in the landwardmost area and will grow the dune seaward, resulting in a wide stable dune.
- Optimum planting season for American Beachgrass in the Mid-Atlantic region is October 1 to March 30 (Miller and Peterson 2000).
- Apply fertilizer 30 days after planting, but preferably no earlier than April 1.

Sea oats (*Uniola paniculata*)

- Sea oats is the most widely recognized plant on coastal dunes throughout the southern Atlantic coastal region and is one of the most important species on primary. This grass provides the best long-term stability for coastal dunes when planted in its native range, which includes the Virginia coast. Sea oats tolerates the harsh conditions of the frontal zone and are capable of trapping large quantities of sand during their first growing season (Rogers and Nash 2003).
- Sea oats is relatively slow to establish, so planting faster growing companion species such as bitter panicum or other desirable pioneering species is recommended (Fine no date).
- Because sea oats is a warm-season perennial grass, seedlings may be planted during the warmer months of April through September, though early spring planting is recommended since the best time for planting is after a rainfall when the sand is sufficiently moist. When planted in the spring and early summer months, seedlings will grow robustly if properly fertilized and watered at planting, if necessary (Rogers and Nash 2003).
- Healthy seedlings that are between 15 and 24 inches tall can be found at local nurseries. Seedlings should be placed at least 8 inches deep in moist sand (don't worry about planting the seedlings too deep as planting too shallow often results in poor survival).
- Including one teaspoon (or a tablet) of a time-release fertilizer in the planting hole will boost the new plant's growth and expansion (Rogers and Nash 2003).

Bitter panicum, bitter panicgrass (*Panicum amarum*)

- Bitter panicum is a widely adapted perennial grass ideally suited for stabilizing the primary dunes of coastal beaches. This species actually establishes more easily than sea oats. Its tall, straight stems and leaves reduce wind speeds and allow sand to collect, and its extensive fibrous root and rhizome system stabilizes and holds sand in place (Williams 2007). It also works well in combination with other dune species, as mentioned previously (Rogers and Nash 2003).
- The Brooksville Plant Materials Center has released two cultivars of bitter panicum, 'Northpa' and 'Southpa.' Northpa is from a collection from North Carolina and is better suited to Virginia's coastal areas (Williams 2007).
- Plant potted plants and bareroot plants in staggered rows 2–3 feet apart, with plants 2 feet apart in each row and planted 8–10 inches deep in moist sand (USDA NRCS 1996a). Like sea oats, rooted cuttings respond well to one teaspoon of a time-release fertilizer added to the bottom of the planting hole (Rogers and Nash 2003).
- Bury unrooted stems end to end in trenches 2–3 feet apart and 6–8 inches deep, leaving the top 6–10 inches of the stem exposed (Rogers and Nash 2003, USDA NRCS 1996a).
- Plant unrooted cuttings three per hole in staggered rows 2–3 feet apart with holes 2 feet apart in each row (USDA NRCS 1996a).

- Plant cuttings in the late fall, potted plants in the late winter or early spring, and young tillers in the late spring (the beginning of rainy season) (USDA NRCS 1996a). Rhizomes planted in the early spring have a better chance of survival than those planted during the summer heat.

Bitter seabeach grass (*Panicum amarum ssp. amarum*)

- Bitter seabeach grass is a subspecies of bitter panicum and is also considered appropriate to plant in active primary dune restoration areas. Refer to the species profile for bitter panicum for planting guidance.

SECONDARY DUNE SPECIES

Saltmeadow cordgrass, marshhay cordgrass (*Spartina patens*)

- Saltmeadow cordgrass is highly adapted to backdune areas with less windblown sand. It prefers moist sites but is fairly drought tolerant and will grow in drier areas. The grass also has a very high salt tolerance, and the seeds will germinate in saline soils where the seeds of other dune species will not survive. Saltmeadow cordgrass can therefore be planted in low areas subject to washover and flooding by salt water (Rogers and Nash 2003).
- Because saltmeadow cordgrass is a warm-season perennial, it can be planted from the spring through the summer, though early spring planting is most recommended (Rogers and Nash 2003). Potted plants or bareroot planting stock from vigorous, uncrowded stands (5–10 stems per transplant) can be planted (USDA 1996b), though containerized plants are preferred for coastal dune sites (Williams 2007).
- Plant cordgrass landward of the dunes, 12–24 inches apart, depending on the site severity, and 6–8 inches or deeper in moist sand (USDA 1996b, Rogers and Nash 2003).
- These plants respond well to fertilization. To get the plants off to a healthy start, incorporate one teaspoon of time-released fertilizer into the planting (Rogers and Nash 2003).

Beach panicgrass, coastal panicgrass (*Panicum amarum ssp. amarulum*)

- This subspecies of bitter panicum, also called ‘Atlantic’ coastal panicgrass, is a tall, robust, warm-season grass with strong seedling vigor (USDA 1982). It can be used to stabilize windblown sand and beach replenishment projects, as well as to create new dune systems (USDA NRCS 1996c). The variety originated from a naturally occurring stand located at the Back Bay Wildlife Refuge just south of NASO DNA.
- Coastal panicgrass will perform well on droughty, very sandy sites, but when established on sand dunes it will only survive where other species have initially stabilized the location. It will tolerate moderate saline overspray and pH as low as 5.0. It does not tolerate large sand deposits (USDA NRCS 2002).
- It can be propagated by seed or vegetative divisions, and is the only species known to be successfully established on mid-Atlantic sand dunes by direct seeding. It is best to sow from early spring until May (USDA NRCS 2002).

- Seeds can be planted 2 inches deep in dune sand; surface seeding on sand dunes will not produce successful stands (USDA 1982). Adequate rainfall following germination influences seedling survival (Craig 1984).
- If sands shift and cover newly planted seeds more than 2 inches deep, their emergence may be obstructed (USDA NRCS 2002).
- Refer to the species profile for bitter panicum for potted and bareroot planting guidance.

4. ADDITIONAL INFORMATION

- Sand trapping devices such as sand fences or brush matting can be included in the revegetation/stabilization plans when appropriate. Sand fences are used primarily to build frontal dunes where the use of sand fences is more effective than vegetation alone in building the dune in width and/or height (Williams 2007).
- Other dune revegetation efforts have found that even moderate storms eroded newly rebuilt dunes when reconstruction and revegetation were focused on the frontal dune scarp. In other words, dune rebuilding was taking place too far seaward to provide adequate protection and longevity. The revised procedure for frontal dunes reconstruction following storms is to rebuild the backside of the frontal dune, not the seaward side, an approach that works together with landward migrating barrier beach processes (O'Connell 2008).
- One must determine if enough wind-blown sand is available to naturally rebuild the dune. The nearby accumulation of sand around sand fences or the general condition of adjacent dunes can indicate this availability (3–8 foot or higher dunes in the interdune or backdune areas, with rolling sand surfaces and moderate to dense vegetation, are a sign of available wind-blown sand). If wind-blown sand is not available, clean sand of compatible grain size can be imported for dune reconstruction, and sand fencing and plantings can occur after the imported sand is shaped (O'Connell 2008).
 - Through experimentation, a Massachusetts-based organization developed an effective method to rebuild an artificial dune on Duxbury Beach by covering imported quarry sand with approximately 6 inches of native dune sand. Vegetation was then planted on the natural sand layer to create a natural appearing dune.

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Enclosure 5. Invasive Species Inventory Survey for NASO DNA, Virginia Beach, Virginia



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NAVFAC Atlantic Biological Resource Services

Contract: N62470-08-D-1008; Task Order: WE39

January 2014



Final Invasive Species Inventory Survey for Naval Air Station Oceana Dam Neck Annex Virginia Beach, Virginia



Prepared for:
NAVFAC Mid-Atlantic
Hampton Roads IPT
9742 Maryland Avenue
Norfolk, VA 23511



Prepared by:
Tetra Tech, Inc.
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INVASIVE SPECIES INVENTORY SURVEY
FOR
NAVAL AIR STATION OCEANA DAM NECK ANNEX
VIRGINIA BEACH, VIRGINIA

NAVFAC Atlantic Biological Resource Services
Contract No.: N62470-08-D-1008
Task Order No.: WE39
Task Order Date: 06 June 2012

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FINAL
January 2014

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EXECUTIVE SUMMARY

The purpose of this study is to characterize the invasive plant species community within Naval Air Station Oceana Dam Neck Annex (NASO DNA). This report serves to supplement other vegetation surveys conducted on site. The findings in this report can be used to guide natural resource management, and to supplement natural resource assessments and other environmental planning documents, such as Integrated Natural Resources Management Plans and Environmental Assessments.

The survey focused on 14 species which were identified as high-priority invasive species. These priority species were identified based on a survey questionnaire completed by natural resource managers in the area. A total of 240 plots were surveyed for their invasive species community composition at NASO DNA using a method developed by Tetra Tech and its subcontractor. Invasive plant species were documented in 163 (68 percent [%]) of the plots surveyed at NASO DNA, and high-priority species were recorded in 158 (66%) of the total number of plots surveyed. The abundance of high-priority and non-target invasive species was highest in the northern reaches of the base, north of South Birdneck Road, and the central portion of the base between Tartar Avenue and Redwing Lake.

A total of 16 invasive plant species were identified within the NASO DNA survey plots, including six high-priority species. Japanese honeysuckle (*Lonicera japonica*) was the most abundant species, occurring in 47% of the survey plots, followed by Japanese stilt grass (*Microstegium vimineum*) at 38%, Chinese privet (*Ligustrum sinense*) at 12%, alligator weed (*Alternanthera philoxeroides*) at 3% and Johnson-grass (*Sorghum halepense*) at 2%. In addition, approximately 160 plots or populations of common reed (*Phragmites australis*) totaling approximately 17.9 acres (7.2 hectares) were recorded at NASO DNA. Mimosa (*Albizia julibrissin*) was not recorded in any of the survey plots, but is known to occur on the Installation (M. Wright, personal communication, 18 February 2014).

Eight (8) of the high-priority invasive plant species were not observed at NASO DNA: beach vitex (*Vitex rotundifolia*), Chinese wisteria (*Wisteria sinensis*), European water-milfoil (*Myriophyllum spicatum*), kudzu (*Pueraria montana*), mimosa, princess tree (*Paulownia tomentosa*), tall fescue (*Festuca elatior* [*F. pratensis*]), and tree-of-heaven (*Ailanthus altissima*).

The 16 invasive plant species observed during the survey are typical of the Virginia coastal plain in Virginia (Virginia Department of Conservation and Recreation [VDNR] 2009). In addition to the priority species, 10 other invasive species were identified. The additional species were autumn olive (*Elaeagnus umbellata*), border privet (*Ligustrum obtusifolium*), Chinese lespedeza (*Lespedeza cuneata*), common dayflower (*Commelina communis*), English ivy (*Hedera helix*), gill-over-the-ground (*Glechoma hederacea*), multiflora rose (*Rosa multiflora*), pampas grass (*Cortaderia selloana*), Parrot feather milfoil (*Myriophyllum aquaticum*), and thorny elaeagnus (*Elaeagnus pungens*).

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LIST OF ACRONYMS AND ABBREVIATIONS

%	percent
APWG	Alien Plant Working Group
BPJ	best professional judgment
Carolina Silvics	Carolina Silvics, Inc.
DoD	Department of Defense
EA	Environmental Assessment
EO	Executive Order
ESRI	Environmental Systems Research Institute
GIS	Geographic Information System
GPS	global positioning system
INRMP	Integrated Natural Resources Management Plan
Installation	Naval Air Station Oceana, Dam Neck Annex
IPAMS	Invasive Plant Atlas of the MidSouth
IPANE	Invasive Plant Atlas of New England
IPAUS	Invasive Plant Atlas of the United States
IPM	integrated pest management
NAISN	North America Invasive Species Network
NALF	Naval Auxiliary Landing Field
NAS Oceana	Naval Air Station Oceana
NASO DNA	Naval Air Station Oceana Dam Neck Annex
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NRM	Natural Resources Manager
NSAHR NWA	Naval Support Activity Hampton Roads Northwest Annex
NTR	Navy Technical Representative
OPNAVINST	Office of the Chief of Naval Operations Instruction
Tetra Tech	Tetra Tech, Inc.
US	United States
VDCR	Virginia Department of Conservation and Recreation

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1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) presents this *Invasive Species Inventory Survey for Naval Air Station Oceana Dam Neck Annex, Virginia Beach, Virginia* to the United States (US) Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic. This report was prepared for Naval Air Station Oceana Dam Neck Annex (NASO DNA or the Installation) in accordance with Task Order WE39 under Contract N62470-08-D-1008. Similar reports were completed for three other installations as part of this Task Order (i.e., Naval Air Station Oceana [NAS Oceana] located in Virginia Beach, Virginia; Naval Auxiliary Landing Field [NALF] Fentress in Chesapeake, Virginia; and Naval Support Activity Hampton Roads Northwest Annex [NSAHR NWA] located in Chesapeake, Virginia and Currituck County, North Carolina) (Figure 1).

NASO DNA is a part of NAS Oceana, but is considered separately from the main portion of NAS Oceana for this Task Order.

NASO DNA provides training in special warfare, ordnance, overland assault, beach assault, and tactical air operations radar. The mission of the Installation is to provide quality education and training to sailors in specified combat systems operation and maintenance, specialized skills training, training systems support to operational and systems commands, and to perform other functions and tasks as directed by higher authority. More than 5,600 instructors, students, and support personnel live or work at NASO DNA daily. The major tenant commands associated with NASO DNA include: Commander Undersea Surveillance; Naval Education and Training Command, Center for Personal and Professional Development; Center for Surface Combat Systems Unit; NASO DNA Command Staff; Tactical Training Group, Atlantic; Distributed Training Center, Atlantic; Galley; Marine Air Control Squadron 24; Navy and Marine Corps Intelligence Training Center Marine Detachment; Maritime Civil Affairs and Security Training Command; Marine Corps Intelligence Schools; Medical/Dental Clinic; Maritime Intelligence Fusion Center, Atlantic; Navy Region Mid-Atlantic Fleet Readiness Morale, Welfare & Recreation & Child & Youth Programs; NAVFAC Mid-Atlantic Public Works Department; Combat Direction Systems Activity; Navy Expeditionary Intelligence Command; Navy Exchange Service Command; Navy Federal Credit Union; Navy and Marine Corps Intelligence Training Center; Naval Ocean Processing Facility; Naval Surface Warfare Center Port Hueneme Division, Virginia Beach Detachment; Naval Special Warfare Development Group; Tactical Training Group, Atlantic; Training Support Center Hampton Roads; Naval Air Warfare Center, Aircraft Division, Atlantic Targets & Marine Operations; and Commander Navy Region Mid Atlantic Fire Station #8 (NAVFAC Atlantic 2006 and Wright 2013).

In addition to training and mission activities, NASO DNA is managed for hunting, fishing, trapping, and other recreational and non-consumptive uses (NAVFAC Atlantic 2006).

Invasive species—including plants, animals, and microorganisms—are defined as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health” (National Invasive Species Act [Executive Order 13112]). Invasive species can pose a potential threat to NASO DNA’s natural resources, real property, and human health and safety; as well as interfere with military operations and readiness. Many of these invasive plants can overwhelm and cover native plants, cut off the light and nutrients that native plants need to

survive, and reduce plant species diversity, which, in turn, can impact wildlife populations and decrease crop yields and forest productivity. Invasive species can alter ecosystem processes, crack concrete, and potentially spread disease or have health effects for humans or animals (National Invasive Species Council 2008).

For these and other reasons, the Department of Defense (DoD) and Federal and state governments have instituted policies and guidance (such as Executive Order 13112) to prevent and control invasive species.

1.1 PURPOSE

The purpose of this Task Order was to develop an invasive plant species inventory for each of the four Navy installations: NAS Oceana, NASO DNA, NALF Fentress, and NSAHR NWA (Figure 1).

This report focuses on the invasive plants at NASO DNA. Companion reports prepared for NAS Oceana, NALF Fentress, and NSAHR NWA document invasive species at each of those installations.

1.2 OBJECTIVE & GOALS

The objectives of this Task Order were to develop a structured and repeatable monitoring protocol that could be used to survey invasive species on the Installation; plan, coordinate, and conduct the invasive plant inventory surveys; and map the locations of invasive flora populations using a handheld global positioning system (GPS) receiver and Geographic Information System (GIS). The specific goals of the Task Order were to conduct surveys for those species identified as high-priority invasive plant species, including a specific focus on mapping populations of common reed (*Phragmites australis*), hereafter referred to as *Phragmites*, which is a species of special interest for the installations in the Hampton Roads area.

1.3 MONITORING AREA

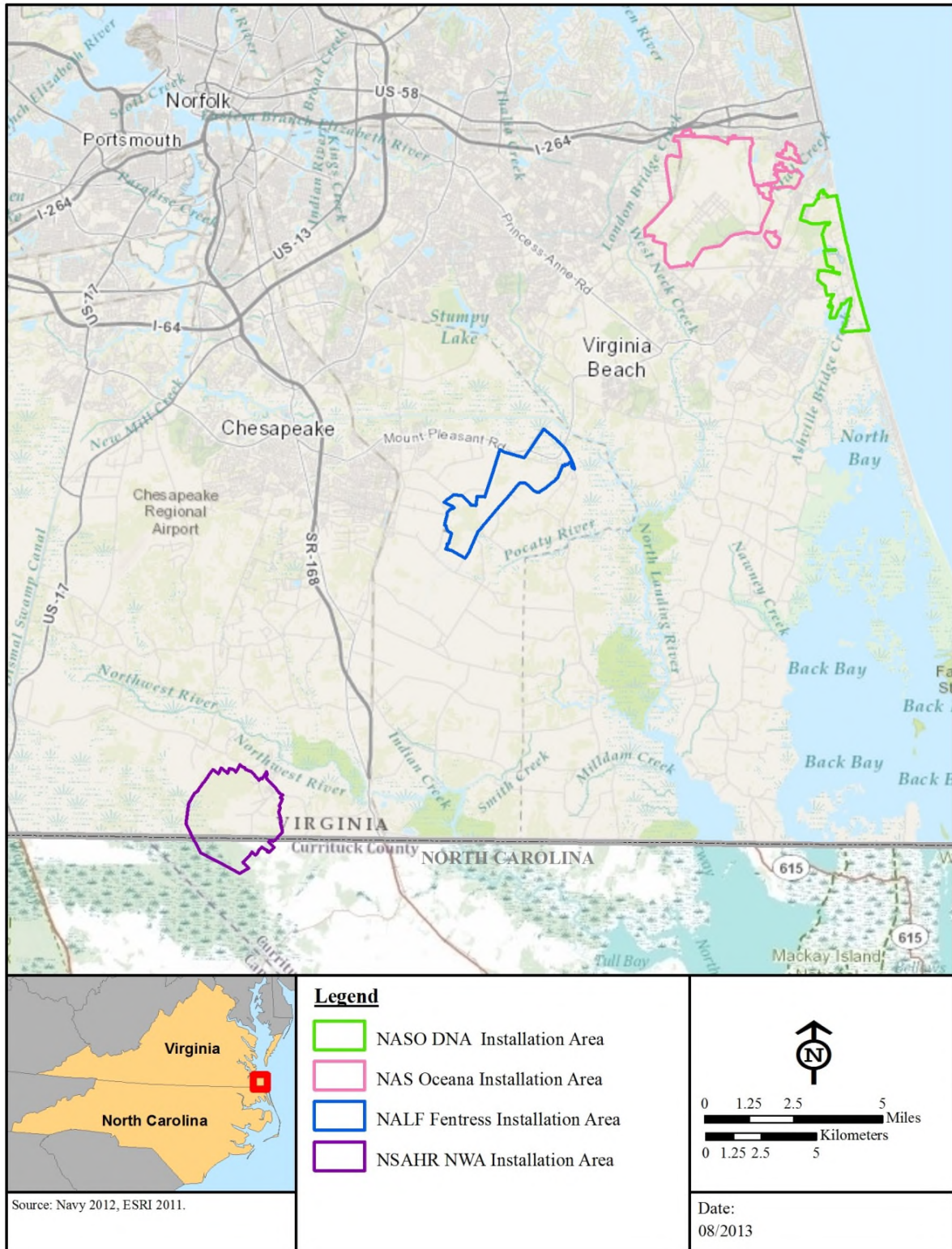
NASO DNA encompasses approximately 1,830 acres (741 hectares)¹ and is located in the southeastern portion of the City of Virginia Beach, Virginia (Figure 2).

The topography of NASO DNA is characterized as generally flat with low relief and elevations ranging from 0 to 27 feet (0 to 8.2 meters) above mean sea level (NAVFAC Atlantic 2006). The majority of the Installation occupies a basin behind (west of) the primary and secondary dunes, with an elevation of less than 5 feet (1.5 meters) above mean sea level.

The Installation includes developed operational areas, and undeveloped land managed for forest products, agriculture, and wildlife values. NASO DNA is the only installation of the four survey areas included in this Task Order that includes beach front property. The Installation includes approximately four miles (6.4 kilometers) of ocean beach and primary and secondary coastal

¹ The current total Installation acreage, as provided by the Navy Real Estate Office, is 1,919 acres (777 hectares). Total acreage based on Navy GIS data for the Installation, which is used throughout this document for natural resources summary purposes, is 1,830 acres (741 hectares).

Figure 1. Overview of Project Area for NAS Oceana, NASO DNA, NALF Fentress, and NSAHR NWA in Virginia and North Carolina.



dune habitat. A portion of the survey area (approximately 390 acres [157.8 hectares]) is composed of pre-existing developed areas including impermeable surface, buildings, mowed lawns, shade trees, and ornamental trees and shrubs. The remainder of the survey area is forested wetlands dominated by a mix of hardwood species or a mix of pine and hardwood and non-forested marshes (NAVFAC Atlantic 2006). The Installation also includes marshes, open water waterbodies, portions of Redwing Lake, and approximately two-thirds of the shoreline of Lake Tecumseh.

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2.0 METHODS

2.1 BACKGROUND

The preliminary focus of this Task Order was to conduct the initial research, planning, and coordination necessary to conduct invasive plant inventory surveys. Preliminary involvement included a kick-off meeting, desktop research, coordination with the Installation’s Natural Resources Manager (NRM) and Navy Technical Representative (NTR), identification of stakeholders, a stakeholder survey, the selection of high-priority invasive plant species, site visit reconnaissance, and development of an invasive plant inventory survey methodology.

The final list of 14 high-priority invasive plant species (Table 1) was selected based on the desktop research, survey questionnaire responses, and input from the NRM and NTR (Appendix A provides more details of this specific task). Field surveys focused on these high-priority invasive plant species; however, field teams also documented non-target invasive plant species that were observed during field surveys. Additional information on the preliminary tasks for this project can be found in Appendix A.

Table 1. High-Priority Invasive Plant Species to Be Surveyed at NASO DNA.

Species	Scientific Name
Alligator weed	<i>Alternanthera philoxeroides</i>
Beach vitex	<i>Vitex rotundifolia</i>
Chinese privet	<i>Ligustrum sinense</i>
Chinese wisteria	<i>Wisteria sinensis</i>
European water-milfoil	<i>Myriophyllum spicatum</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Japanese stilt grass	<i>Microstegium vimineum</i>
Johnson-grass	<i>Sorghum halepense</i>
Kudzu	<i>Pueraria montana</i>
Mimosa	<i>Albizia julibrissin</i>
<i>Phragmites</i> or common reed	<i>Phragmites australis</i>
Princess tree	<i>Paulownia tomentosa</i>
Tall fescue	<i>Festuca elatior</i> [<i>F. pratensis</i>]
Tree-of-heaven	<i>Ailanthus altissima</i>

Previous invasive species survey and treatment efforts at NASO DNA were conducted in association with a 2006 Supplemental Environmental Assessment (EA), which was developed for the control of *Phragmites* and kudzu at 15 Naval installations in the Hampton Roads region. Prior to that, an EA was developed in 2002 for four of the region’s installations, titled *Environmental Assessment for Control of Invasive Plant Species at Naval Air Station Oceana, Naval Air Station Oceana – Dam Neck Annex, Naval Amphibious Base Little Creek, Naval Surface Warfare Center Dahlgren, and Naval Station Norfolk, Virginia* (NAVFAC Atlantic 2002). Invasive species management was addressed in the 2006 Integrated Natural Resources

Management Plan (INRMP) for NASO DNA (NAVFAC Atlantic 2006), and will be addressed in the 2013/2014 updated INRMP.

In addition, several invasive plant surveys and treatment efforts have already been conducted at Naval installations in the Hampton Roads area. *Phragmites* was mapped at NAS Oceana, NASO DNA, NALF Fentress, and NSAHR NWA in 2008 and 2009, and later treated by aerial spraying each year between 2006 and 2011. Ground-based treatment focused on *Phragmites* and kudzu was also performed at NASO DNA from 2006 to the present (Wright 2013).

2.2 INVASIVE SPECIES INVENTORY SURVEY AT NASO DNA

Tetra Tech utilized an adaptive survey methodology developed specifically for the Navy and this Task Order to maximize the level of effort and determine what the greatest opportunities for managing invasive plant are, while at the same time ensuring compliance with applicable Federal, state, and local statutes and regulations; including DoD policies, instructions, and guidance. Although it is not intended to be a fine-scaled inventory, this survey methodology was created to have a high degree of confidence. In addition, specialized methods were used to map populations of *Phragmites*, which is a priority species of special interest. This methodology was approved by the NRM and NTR prior to its application.

This approach was designed to complement national efforts to manage invasive plants through “early detection and rapid response,” and to produce data on invasive plant populations at each installation that can be used to prioritize efforts and guide future management and monitoring of selected invasive plant species. Non-invasive naturalized or weedy species, such as greenbrier (*Smilax* sp.) and buckthorn (*Rhamnus/Frangula* spp.) were excluded from the survey.

2.2.1 A Focused, Adaptive, and Systematic Survey Methodology

Tetra Tech used a focused, adaptive, and systematic invasive plant inventory survey methodology to survey populations of invasive plant species. The surveys focused on the 14 high-priority invasive plant species identified through consultation with local, state, and federal stakeholders (Appendix A).

NASO DNA was systematically surveyed using base plot spacing of approximately 150 meters-by-150 meters (492 feet-by-492 feet) along transects, with additional plots added to sample landscape features such as habitat edges, roads, ditches, etc. Transects and plot spacing were determined in the field based on parcel boundaries, habitat types, spreading vectors, and other conditions in order to create a representative survey of the site, according to the field team’s best professional judgment (BPJ). This allowed the field team to create an understanding of the overall invasive plant distribution while capturing information about invasive plant populations located in or near disturbed areas which may not occur within the systematic plots. Paved areas, the built environment/urban areas, and actively managed areas were excluded from the survey.

2.2.2 Transects and Plot Selection

The initial data point (i.e., plot) for each transect was recorded 5 meters (16.4 feet) from the edge of a parcel, in order to capture the edge habitat. Five (5)-meter-radius plots were evaluated at 150-meter intervals along transects following the cardinal directions (i.e., north, south, east, or

west) to the extent practical. Surveyors continued along transects, recording plots, until two subsequent plots were recorded without any of the priority invasive species. In large, homogenous parcels, once two sequential plots without any priority species were found along the transect, it was assumed that invasive species would not be present further into the parcel, and a new transect was initiated at the edge of the habitat.

Invasive plant distribution is often closely associated with roads, trails, habitat edges, and disturbed areas, rather than being evenly distributed. Therefore, when a feature such as a small ditch, road, or edge habitat was crossed that had one of the priority invasive species—but the feature did not coincide with the 150-meter plot spacing—then the field team used its BPJ to determine whether to add an additional supplemental plot. This did not trigger a new transect line of plots along that feature and the survey continued with the original transect spacing. If the same feature was crossed again on a different transect line, a plot was only collected if one of the priority invasive species was observed again; but in the absence of a high-priority invasive species, plot spacing continued to follow the transect spacing.

Several secondary protocols were also implemented, based on BPJ for the following types of conditions:

Identical Plots – In the event that two sequential plots along the same transect had identical priority invasive species and had similar composition of invasive species, where similar habitat extended for a substantial distance from that plot or extended beyond the project boundary, field personnel assumed that this composition of invasive species was consistent for this habitat type, and did not collect additional plots along that transect line.

Small Parcels – In small parcels, the 150-meter spacing between plots was adjusted based on BPJ to ensure proper coverage of the parcel. Additional plots were added, as needed.

Very Small Parcels (transects less than 150 meters) – A plot was surveyed as close to the center of the parcel as possible, and any invasive species identified while navigating to the center of the parcel were noted. Similar to the protocol described for *Small Parcels*, BPJ was employed in selecting the plot location.

Ditches – Plots were collected at 150-meter intervals along the length of main ditches. Plots were centered along the long axis of the ditch. A 5-meter radius plot was used, consistent with the other plots.

Dunes – Plots were spaced at 150-meter intervals or greater if no invasive species were encountered. Points were selected that targeted edge effects, because habitat edges are the most likely locations for invasive species. Additional plots were added and plot spacing was adjusted, as needed, to ensure proper coverage of the narrow dune area.

2.2.3 Data Collection at Plots

Plot observations were recorded in field notes and later transcribed into a Microsoft Excel spreadsheet (Appendix B. Invasive Plant Species Survey Field Summary Data). The types of plot information collected included: the date, plot number, a codified list of the high-priority invasive species observed, the abundance/coverage and density of each species, and GPS location of the plot (see Section 2.2.4 for a description of GPS data collection methodology). The level of

infestation, patch shape (i.e., point, linear, patch, or mix), current spreading vectors, and additional comments were also recorded in the field notes.

Practicality of data collection in the field was more conducive to entering data in a tabular format, and therefore resulted in a more effective data collection method. The benefit of using this tabular format enabled the data to be easily sorted or reorganized to answer different needs.

Plots that were inaccessible due to site conditions were surveyed using an offset from where a corresponding GPS point could be collected (additional information can be found in the discussion of Inaccessible Stands of *Phragmites* in Section 2.2.4).

Areas containing *Phragmites* were of particular interest to the Installation. Therefore, a specialized methodology was implemented when *Phragmites* patch size exceeded the 5-meter-radius plot size (see Section 2.2.4). When a patch of *Phragmites* was less than or equal to the 5-meter-radius plot size, a single point was taken and triggered the protocol for a plot, as described above.

In recognition of the seasonality of some invasive plant species, the field survey team returned to NASO DNA in 2013 to verify the presence of any additional invasive that occurred outside of the initial assessment period.

Weekly survey information (e.g., team members, survey area, etc.) and additional comments were recorded and submitted with the monthly progress report submitted to the Navy.

2.2.3.1 Photographic Record

Representative photographs were taken to help characterize the invasive plant communities, or to document any interesting or unique features that were relevant to invasive species mapping. For representative plot photos, photographs were taken of the plot looking toward the plot center. Basic information about the photograph (i.e., the date, photographer's name, photo number, and direction) was recorded in the field notes. A photographic record is included in Appendix C of this report.

2.2.3.2 GPS Data Collection

The location of each plot was recorded with a handheld GPS receiver. The field team used a Trimble GEO6000 XH GPS unit provided by Tetra Tech that had sub-meter accuracy (after differential correction). Data was collected in UTM Zone 18N, WGS 84 format. GPS points were collected in the plot center whenever possible. However, in locations where a GPS point could not be taken at the plot center (e.g., because of accessibility issues), an offset GPS point was taken away from the plot center. Information about the GPS point was collected using the BPJ of distance and compass bearing to the plot center.

2.2.4 Phragmites Mapping and Documentation

Occurrences of *Phragmites* within plots were recorded following the procedures described above. In addition, *Phragmites* populations (e.g., stands) were recorded and mapped based on the following protocols:

Stands Greater Than 5 Meters in Radius – The boundary of a *Phragmites* stand was delineated by collecting GPS points in order to map the total area of the *Phragmites* stand.

Linear Stands Greater Than 10 Meters in Length – GPS points were collected at each end of the linear area, and an approximate width was recorded. Additional GPS points were collected as necessary to delineate the polygon boundary.

Inaccessible Stands of Phragmites – Stands of *Phragmites* that were inaccessible or very difficult to access due to site conditions, were noted and described in the field notes. Portions of a *Phragmites* stand that could be GPSed accurately were mapped using the methodology described above, and the remaining approximate location and boundary of these stands were mapped digitally.

2.2.5 Additional Observations

Additional observations made during the field survey were noted, such as observations of invasive wildlife species (e.g., fire ants) and wildlife damage. Furthermore, sightings of Federally or state protected species were reported to the NRM and NTR.

2.2.6 Field Survey Personnel and Equipment

The field survey was performed by a team of two highly-skilled personnel from Carolina Silvics, Inc. (Carolina Silvics) of Edenton, North Carolina, with periodic assistance from a Tetra Tech environmental scientist. Carolina Silvics specializes in invasive species surveys and assessments; and they are familiar with the regional conditions.

The field team was equipped with the list of high-priority invasive plant species, field maps, a camera, a field notebook, miscellaneous field gear (e.g., personal protective equipment, compass, etc.), and a handheld Trimble GEO6000 XH (or equivalent) GPS unit.

2.2.7 Field Data Form Post-Processing

Field notes were entered into an electronic data file (i.e. Microsoft Excel) and submitted by the field survey team to Tetra Tech, along with photographs and weekly progress reports (the summarized field notes are provided in Appendix B).

2.2.8 GPS Data Post-Processing

GPS data was downloaded directly from the GPS unit onto a computer each day by the field crew using Trimble Pathfinder software, without any editing or modifications. These data files were sent via email to Tetra Tech's GIS team. Tetra Tech then post-processed the GPS data and converted and managed the data in a GIS geodatabase.

Additional data considered part of the metadata (such as county, state, scientific name, etc.) were later added by Tetra Tech as part of the post-processing effort.

All geospatial data was created and submitted in accordance with the GIS Data Deliverable Specifications in the Scope of Work (NAVFAC Mid-Atlantic 2012), including the current

NAVFAC GIS Data Guide GIS Data Deliverable Specifications (United States Navy 3.0 Data Model, Environmental Section, May 2012).

2.2.9 Geographic Information System Data

The GPS data collected in the field were incorporated and managed in a GIS using Environmental Systems Research Institute (ESRI) ArcGIS Desktop 9.3.1 software. GIS data was used to create the representative maps of invasive species distribution included in Section 3 Results.

2.3 QUALITY CONTROL

Several layers of quality control were built into the methodology to ensure complete and accurate data and reporting. The field team reviewed GPS data, field data, and field notes prior to submitting the material to Tetra Tech each week. Tetra Tech's GIS Team Leader or GIS Analyst reviewed the GPS data submitted by the field survey team for accuracy and completeness. The Tetra Tech Task Order Manager reviewed the digital displays of field data collected for completeness, and provided feedback to the field team on data gaps or where clarification was needed. GPS data and weekly reports provided regular updates of which areas were completed, and which areas remained to be surveyed. Data were analyzed by a Tetra Tech environmental scientist familiar with the Project. A Tetra Tech Technical Editor provided editorial review of the Draft and Final reports. Tetra Tech's Task Order Manager oversaw all work performed for the Project, and provided Quality Assurance/Quality Control and overall administrative and technical oversight.

Planning and coordination were coordinated or reviewed by the NRM and/or NTR; and monthly progress reports were submitted to the Navy on a regular basis. The Navy also reviewed and commented on the Draft Report.

3.0 RESULTS

3.1 INVASIVE SPECIES SURVEY AT NASO DNA

3.1.1 Survey Dates and Effort at NASO DNA

Tetra Tech's field team initiated the invasive plant inventory survey at NASO DNA on 18 September 2012 and continued field surveys until 16 October 2012. Surveys resumed in the spring on 25 April 2013 and continued until 26 June 2013.

3.1.2 Invasive Plant Species Survey Results

Invasive plant species were widespread at NASO DNA. A total of 240 plots were surveyed at NASO DNA (Figure 3). Invasive plants were documented in 163 (68%) of the plots surveyed (Figure 4 [a larger version of this figure is included in Appendix D]). Many of the plots were occupied by more than one invasive species. High-priority species were recorded in 158 (66%) of the total number of plots. Relevant geospatial data (including GPS data and metadata) have been submitted to the Navy along with this report.

3.1.2.1 Overall Character of Invasive Plants at NASO DNA

Table 2 summarizes the percentage of plots containing invasive plants by species. A total of 16 invasive plant species were identified, including six of the 14 high-priority species. Of the high-priority species, Japanese honeysuckle was the most frequently recorded species, occurring in 47 percent (%) of the survey plots, followed by Japanese stilt grass (38%), Chinese privet (12%), alligator weed (3%) and Johnson-grass (2%). In addition, approximately 160 plots or populations of *Phragmites* totaling an estimated 17.9 acres (7.2 hectares) were recorded at NASO DNA (Figure 4 and Figure 10). The largest population of *Phragmites* covered approximately 2 acres adjacent to Redwing Lake. Mimosa was not recorded in any of the surveyed plots, but the Installation's Natural Resources Manager confirmed the presence of mimosa on the Installation (M. Wright, personal communication, 18 February 2014).

Eight (8) of the high-priority species were not observed during the survey: beach vitex, Chinese wisteria, European water-milfoil, kudzu, mimosa, princess tree, tall fescue, and tree-of-heaven.

Ten (10) non-target invasive plant species were also documented during the survey: autumn olive (*Elaeagnus umbellata*), border privet (*Ligustrum obtusifolium*), Chinese lespedeza (*Lespedeza cuneata*), common dayflower (*Commelina communis*), English ivy (*Hedera helix*), gill-over-the-ground (*Glechoma hederacea*), multiflora rose (*Rosa multiflora*), pampas grass (*Cortaderia selleana*), Parrot feather milfoil (*Myriophyllum aquaticum*), and thorny elaeagnus (*Elaeagnus pungens*). Chinese lespedeza, the most common non-priority species, was only recorded in 8% of the plots.

Most plots occupied by invasive plants were patches (94%), as opposed to linear stands (4%), points, or a mixture of patch shapes. Approximately 55% of the plots were characterized as having a moderate level of infestation (which includes more than 30% desirable species in the plot), as opposed to a monotypic stand (1%) of an invasive species or a plot that had a large-scale infestation (37%). Plots with invasive species were most often located within edge habitat (66%) or forested areas (22%). Invasive species were most commonly found along roads and paths

(34% and 10%, respectively), which often act as vectors for spreading invasive plant seeds and plant fragments.

The abundance of high-priority and non-target invasive species was highest in the northern reaches of the base, north of South Birdneck Road, and the central portion of the base between Tartar Avenue and Redwing Lake. Most of the plots in the dune habitat had no invasive plants.

Characteristics and distribution of each of the invasive plant species are described in the following subsections (APWG 2010, IPAMS date unknown, IPANE date unknown, IPAUS 2013, NAISN 2013).

Table 2. Number and Percent of Plots Containing Invasive Plant Species at NASO DNA.

Common Name	Scientific Name	Number of Plots Containing Invasive Species	Percent of Plots Containing Invasive Species ¹
Alligator weed ²	<i>Alternanthera philoxeroides</i>	8	3
Autumn olive	<i>Elaeagnus umbellata</i>	10	4
Border privet	<i>Ligustrum obtusifolium</i>	2	1
Chinese lespedeza	<i>Lespedeza cuneata</i>	20	8
Chinese privet	<i>Ligustrum sinense</i>	28	12
Common dayflower	<i>Commelina communis</i>	12	5
English ivy	<i>Hedera helix</i>	6	3
Gill-over-the-ground	<i>Glechoma hederacea</i>	1	0
Japanese honeysuckle	<i>Lonicera japonica</i>	113	47
Japanese stilt grass	<i>Microstegium vimineum</i>	92	38
Johnson-grass	<i>Sorghum halepense</i>	5	2
Multiflora rose	<i>Rosa multiflora</i>	1	<1
Pampas grass	<i>Cortaderia selloana</i>	1	<1
Parrot feather milfoil	<i>Myriophyllum aquaticum</i>	1	<1
<i>Phragmites</i> or common reed	<i>Phragmites australis</i>	36 ³	15 ³
Thorny elaeagnus	<i>Elaeagnus pungens</i>	8	3
None	None	77	32

¹ Percentage of plots was calculated by dividing the number of plots with observed presence of each invasive species by the total number of plots in the NASO DNA survey area.

² Highlighted species represent high-priority species.

³ There are more populations of *Phragmites* than indicated by the number of plots in this table. Plot points were generally not recorded in stands of *Phragmites* greater than 5 meters in radius, which were mapped as polygons instead (see Figure 3 and Section 2.2.4).

Figure 3. Map of Invasive Flora Survey Plots and *Phragmites* Stands, NASO DNA.

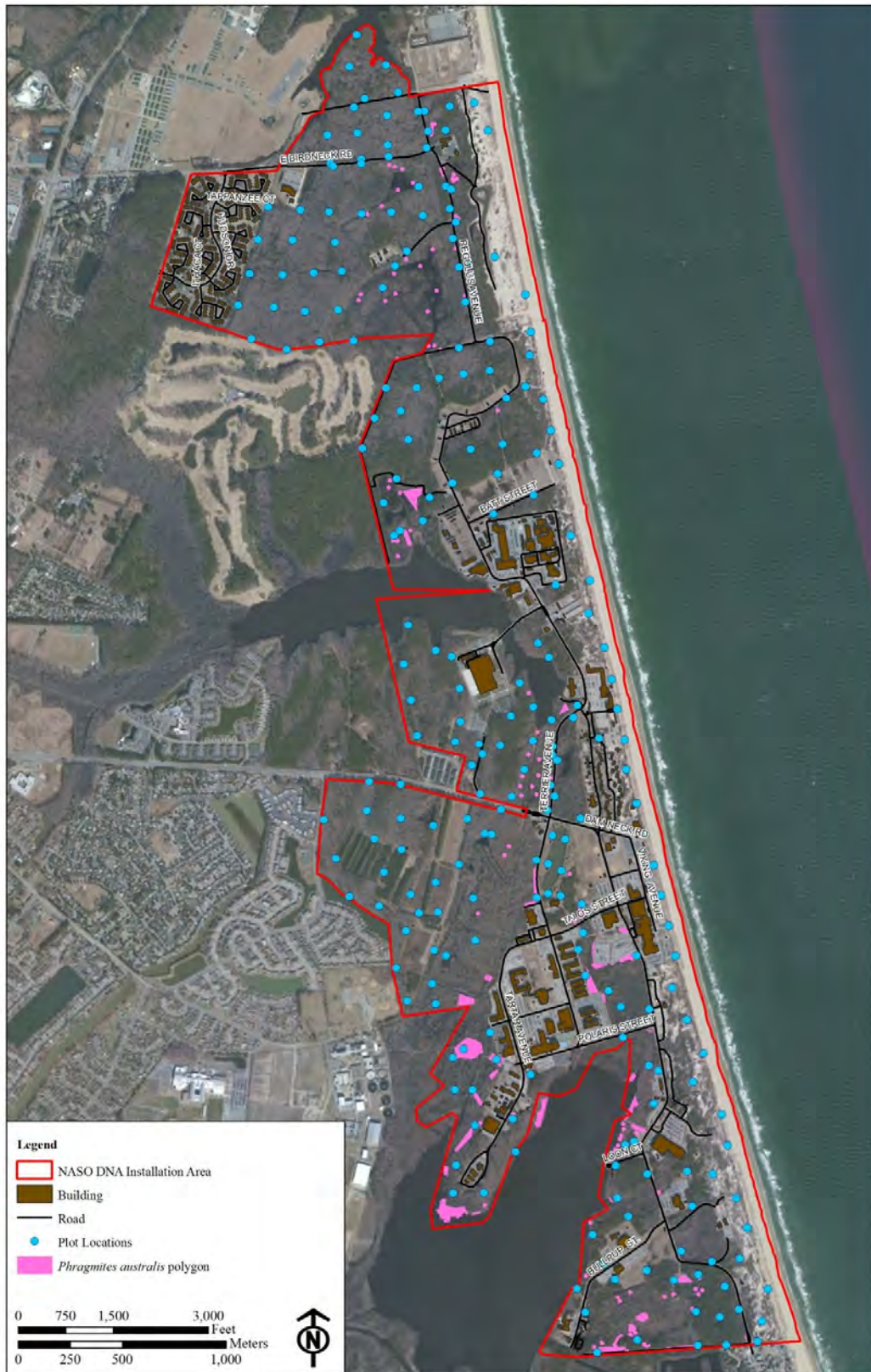


Figure 4. Distribution of Invasive Plant Species at NASO DNA.



3.1.2.2 *Alligator Weed*



Photo by Dwight McKinney, Carolina Silvics.

Alligator weed (*Alternanthera philoxeroides*) (also known as alligatorweed, pig weed, and *Achyranthes philoxeroides* [Mart.] Standl) is an aquatic plant that invades shallow open water habitats, wetlands, streams, ponds, and shorelines. It is often found in lakes, ponds, estuaries, and irrigation canals; but can also be found growing on dry land. Alligator weed can form thick mats that displace native vegetation, clog waterways, and interfere with agriculture, drainage, and irrigation. Dense mats can also lead to flooding and limit access to waterbodies. It spreads by animals or water, and can reproduce vegetatively from plant fragments that develop into entirely new plants, making it difficult to effectively eradicate. The terrestrial form can develop a massive rhizomatous root system (IPAMS date unknown).

Alligator weed was documented in eight plots (3%) on NASO DNA, and was distributed in isolated plots (Figure 5).

Figure 5. Distribution of Alligator Weed at NASO DNA.



3.1.2.3 *Beach Vitex*



Photo by Randy Westbrook, U.S. Geological Survey. Available from the National Agricultural Library, Agricultural Research Service, U.S. Department of Agriculture.
http://www.invasivespeciesinfo.gov/plants/beachvitex_child.shtml.
Accessed 27 December 2013.

Beach vitex (*Vitex rotundifolia*) is a deciduous woody vine that typically grows in seashore and nearshore habitats. It produces runners that allow the species to spread rapidly once established. It was commonly used for erosion control in seashore areas. However, it has spread rapidly and crowds out native species and can disrupt sea turtle nesting habitat. It spreads through prolific seed production, as well as from vegetative fragments which are dispersed by wind and water. It is also spread when planted as an ornamental plant (IPAMS date unknown).

There were no documented cases of beach vitex found on NASO DNA.

3.1.2.4 *Chinese Privet*



Photo by James H. Miller and Ted Bodner, Southern Weed Science Society, Bugwood.org. <http://www.invasive.org/browse/detail.cfm?imgnum=2307074>. Accessed 03 February 2014. Last updated 10 November 2008.

Chinese privet (*Ligustrum sinense*) is a deciduous tree or shrub that typically grows up to 7 feet tall. It is used for ornamental plantings and has spread throughout the southeastern United States where it has become naturalized. New plants can grow from seeds, as well as from root and stump sprouts. The seeds are eaten and spread by birds and other wildlife (IPAMS date unknown).

Chinese privet was documented in 28 (12%) of surveyed plots, and was distributed throughout the Installation. There was a concentration of plots in the northern forested block, with more isolated occurrences throughout the Installation (Figure 6).

Figure 6. Distribution of Chinese Privet at NASO DNA.



3.1.2.5 *Chinese Wisteria*



Photo by Kari Metcalf, Tetra Tech.

Chinese wisteria (*Wisteria sinensis*) is a woody, deciduous, perennial vine. Introduced from China in the early 1800s, it has become a popular flowering vine in home gardens. It grows rapidly, is difficult to eradicate, and can strangle or disfigure other species. The seeds, leaves, and fruit are toxic (IPAMS date unknown).

There were no documented cases of Chinese wisteria found on NASO DNA.

3.1.2.6 *European Water-milfoil*



Photo by Alison Fox, University of Florida, Bugwood.org.
<http://www.invasive.org/browse/detail.cfm?imgnum=1624031>.
Accessed 3 February 2014. Last Updated 02 November 2010.

European water-milfoil (*Myriophyllum spicatum*), also known as Eurasian watermilfoil, is an emergent, herbaceous aquatic plant. It forms dense canopies on the water surface that can interfere with recreational activities, and it competes with native plants. European water-milfoil has been known to invade lakes, rivers, and other fresh to brackish water bodies across North America. It commonly invades waterbodies with little to no established aquatic plants but will also crowd out other native species with dense mats. It spreads mainly vegetatively from plant fragments that can be dispersed by animals or by boats and trailers, when not adequately cleaned (IPAMS date unknown).

There were no documented cases of European water-milfoil found on NASO DNA.

3.1.2.7 *Japanese Honeysuckle*



Photo by John D. Byrd, Mississippi State University. Available from the National Agricultural Library, Agricultural Research Service, U.S. Department of Agriculture.
http://www.invasivespeciesinfo.gov/plants/honeysuckle_child.shtml. Accessed 27 December 2013.

Japanese honeysuckle (*Lonicera japonica*) is a species of vine or bush that can quickly spread via tiny fruit seeds. Japanese honeysuckle is often sold in nurseries for its ability to act as an effective ground cover and because it has strong sweet-smelling flowers. However, it can overwhelm and/or displace native plants. Common spreading mechanisms or vectors include birds and other wildlife that consume the fruits and then disperse the seeds. It can also spread vegetatively (IPAMS date unknown).

Japanese honeysuckle was the most abundant of any invasive plant species found at NASO DNA. It occupied 113 (47%) of the plots, and was widely distributed across the Installation (Figure 7). The central portion of the base surrounding Redwing Lake was the only area not impacted by Japanese honeysuckle.

Figure 7. Distribution of Japanese Honeysuckle at NASO DNA.



3.1.2.8 *Japanese Stilt Grass*



Photo by Chuck Barger, University of Georgia. Available from the National Agricultural Library, Agricultural Research Service, U.S. Department of Agriculture.
http://www.invasivespeciesinfo.gov/plants/stiltgrass_child.shtml. Accessed 27 December 2013.

Japanese stilt grass (*Microstegium vimineum*), also known as *Eulalia viminea* (Trin.) Kuntze, is an annual grass that is common throughout many types of habitats, including along roads, floodplains and other disturbed areas. Japanese stilt grass was accidentally introduced in the early 1900s and has since spread throughout the southeastern United States. Its invasive nature suppresses growth of native plant communities, alters insect communities, and slows plant succession, thereby altering nutrient cycling. Its dominance is promoted by local deer populations that feed on native species but avoid Japanese stilt grass, reducing competition for the invasive species (IPAUS 2013).

Japanese stilt grass occupied 92 plots (38%). It was distributed widely across the Installation (Figure 8). Japanese stilt grass dominated much of the northern portions of the base, as well as areas west of Terrier Avenue, and sporadic areas in the southern extent of the base.

Figure 8. Distribution of Japanese Stilt Grass at NASO DNA.



3.1.2.9 *Johnson-grass*



Photo by Bonnie Harper-Lore, Federal Highway Administration. Available from the National Agricultural Library, Agricultural Research Service, U.S. Department of Agriculture. http://www.invasivespeciesinfo.gov/plants/johnsongrass_child.shtml. Accessed 27 December 2013.

Johnson-grass (*Sorghum halepense*) is a grass commonly found in crop fields, pastures, right-of-ways, forest edges and along stream banks. It was often used for forage and to stop erosion, but its ability to grow and spread quickly can disrupt cash crops and native plants. It can be found throughout the US and is known as a noxious weed throughout Virginia. It can also cause cyanide poisoning in livestock. It spreads by seed and rhizomes, which can be dispersed by equipment and moving soils (IPAMS date unknown).

Johnson-grass was the least abundant of the high-priority species found at NASO DNA, occupying only five (2%) of the plots surveyed.

Figure 9. Distribution of Johnson-grass at NASO DNA.



3.1.2.10 *Kudzu*



Photo by Dwight McKinney, Carolina Silvics.

Kudzu (*Pueraria montana*), also known as Japanese arrowroot, is a vine in the pea plant family. Kudzu's ability to rapidly climb, coil, and trail over native trees and shrubs allows it to overwhelm and kill other plants where it has invaded. Kudzu spreads through runners that root new plants and by rhizomes and seeds. As a legume, it has been used to enhance soil and for erosion control, and it is also able to be used as forage materials for livestock in the southeastern US. The seeds and stem segments are dispersed by animals, wind, water, and human activity (IPAMS date unknown).

There were no documented cases of kudzu found on NASO DNA.

3.1.2.11 *Mimosa*



Photo by Famartin. Available from Wikimedia Commons.
http://en.wikipedia.org/wiki/File:Closeup_of_Albizia_julibrissin_foliage,_flowers_and_immature_fruits_in_Ewing,_New_Jersey_on_August_26th_2013.JPG. Accessed 27 December 2013.

Mimosa (*Albizia julibrissin*), is a small, deciduous tree species. Silky flowers led mimosa to become a popular ornamental species in parks and gardens. It can be found from New York to Missouri and south to Florida. Susceptible to a fungal disease that causes vascular wilt, it is now rarely recommended as an ornamental planting in the US (NAISN 2013).

Mimosa was not identified during the survey; however, the Installation's Natural Resources Manager confirmed the presence of mimosa on the Installation (M. Wright, personal communication, 18 February 2014).

3.1.2.12 *Phragmites*



Photo by Dwight McKinney, Carolina Silvics.

Common reed (*Phragmites australis*), also known as *Phragmites communis*, is a large, invasive perennial grass that can be found throughout the United States. It grows quickly and forms extensive, and often monotypic, stands that overwhelms other wetland species. Common spreading mechanisms or vectors have been attributed to nutrient enrichment and an increase in soil disturbance associated with coastal development. It is also a significant problem in freshwater systems, and is difficult to eradicate once it becomes established (IP AUS 2013).

Approximately 160 populations, or stands, of *Phragmites* were documented at NASO DNA, including stands greater than the 5 meter-radius plots (shown as polygons in Figure 10). The total area occupied by *Phragmites* was estimated to be 17.9 acres. *Phragmites* dominates many of the wet areas and inland shorelines of the Installation. The largest population of *Phragmites* covered approximately 2 acres adjacent to Redwing Lake.

Figure 10. Distribution of *Phragmites* at NASO DNA.



3.1.2.13 *Princess Tree*



Photo by James H. Miller, USDA, Forest Service. Available from the National Agricultural Library, Agricultural Research Service, U.S. Department of Agriculture.
http://www.invasivespeciesinfo.gov/plants/printree_child.shtml.
Accessed 27 December 2013.

Princess tree (*Paulownia tomentosa*) is a deciduous tree native to China. Princess tree is cultivated as an ornamental in parks and gardens. A single tree can produce 20 million seeds per year. The seeds are dispersed through wind and water and once established, the species is tolerant of pollution and various soil types. The ability of this species to survive has contributed to its invasive status in the eastern US (IPANE date unknown).

There were no documented cases of princess tree found on NASO DNA.

3.1.2.14 *Tall fescue*



Photo by Kristian Peters. Available from http://en.wikipedia.org/wiki/File:Festuca_pratensis.jpeg. Available from Wikimedia Commons. Accessed 27 December 2013.

Tall fescue (*Festuca elatior* [*F. pratensis*]) is a perennial bunchgrass that often grows in tufts in meadows, roadsides, old pastures, and riversides. Tall fescue prefers moist, rich soils, particularly loamy soils. It was used as an ornamental grass and can be an important forage crop (NAISN 2013).

There were no documented cases of tall fescue found on NASO DNA.

3.1.2.15 *Tree-of-heaven*



Photo by Lindsay Eiser. Tetra Tech, Inc.

Tree-of-heaven (*Ailanthus altissima*), also known as *Ailanthus glandulosa* Desf. is a deciduous tree native to China and Taiwan. It is a fast-growing tree that can reach approximately 50 feet in height in 25 years. First brought to the US in 1784, it was used extensively as an ornamental plant. It thrives as an opportunistic tree because of its ability to colonize disturbed areas quickly and to suppress competition via allelopathic chemicals. A single tree can produce more than 300,000 wind-dispersed seeds each year. It also spreads by root sprouts. It is considered a noxious weed throughout the US (IPAMS date unknown).

There were no documented cases of tree-of-heaven on NASO DNA.

3.1.3 Other Non-High-Priority Invasive Plant Species

Ten (10) other non-target invasive plant species were observed during the invasive species surveys at NASO DNA.

Autumn olive (*Elaeagnus umbellata*) is a deciduous shrub or small tree with large fruit that is spread by birds (IPANE date unknown). Autumn olive was recorded in 10 plots (4%).

Border privet (*Ligustrum obtusifolium*) is an evergreen shrub that can form dense thickets. The fruits are consumed and spread by birds (APWG 2010). Border privet was observed in two plots (1%).

Chinese lespedeza or sericea (*Lespedeza cuneata*) is a perennial herb with branching stems that grow from a taproot. Chinese lespedeza reduces the abundance and diversity of native plants and can make the area less attractive to wildlife (NAISN 2013). Chinese lespedeza was the most common non-target species documented at NASO DNA, but still only occupied 20 (8%) of the surveyed plots.



Chinese lespedeza (*Lespedeza cuneata*). Photo by Dwight McKinney, Carolina Silvics.

Common dayflower (*Commelina communis*), which is also known as Asiatic dayflower, is an herbaceous annual plant in the dayflower family. Considered an invasive weed, the VDCR calls it an “occasional invasive” meaning it will not affect ecosystem processes, but may alter the plant community composition. In areas where it has been introduced, the common dayflower can be found along field edges, woods, and marshes, as well as occasionally penetrating into woods (NAISN 2013). Common dayflower was observed in 12 (5%) of the plots at NASO DNA.



English ivy (*Hedera helix*). Photo by Dwight McKinney, Carolina Silvics.

English ivy (*Hedera helix*) is a species of climbing, evergreen vine. English ivy is an introduced species commonly found in gardens, tree trunks, and other habitats. Its ability to quickly shade out hedges, trees and ground vegetation have made it a nuisance plant (IPAMS date unknown). English ivy was recorded in six plots (3%).

Gill-over-the-ground (*Glechoma hederacea*), also known as ground ivy, is an evergreen vine that spreads readily by rhizomes or seeds. It is also an aggressive weed in lawns. It can tolerate shady or sunny conditions, and forms dense populations. Gill-over-the-ground was observed in just one plot (less than 1%).

Multiflora rose (*Rosa multiflora*) is a perennial vine or shrub that can form dense hedges, and can also be a vector for a viral disease that infects native rose species (IPAMS date unknown). Multiflora rose was recorded in one plot (less than 1%).

Pampas grass (*Cortaderia selloana*) is a grass species that forms large clumps. It can interfere with forestry operations and slow the growth of seedlings. It also poses a fire hazard. It is spread as an ornamental plant or is spread by seed. Pampas grass occurred in one plot (less than 1%).

Parrot feather milfoil (*Myriophyllum aquaticum*), is an invasive aquatic plant that can block waterways and provide habitat for mosquito larvae. It can reproduce and spread vegetatively (IPAMS date unknown). Parrot feather milfoil was recorded in one plot (less than 1%).



Pampas grass (*Cortaderia selloana*). Photo by Dwight McKinney, Carolina Silvics.

Thorny elaeagnus (*Elaeagnus pungens*), also known as thorny olive, is a perennial shrub or vine that forms dense thickets that displace native plants and can be a barrier to human or animal activity. It is spread when planted as an ornamental, and the fruit is eaten and disseminated by wildlife (IPAMS date unknown). Thorny elaeagnus was documented in eight (3%) of the plots at NASO DNA.

3.1.4 Additional Observations

Continued observations were made in the spring of 2013, following the full site survey. This provided an additional quality measure to ensure that any early and or late blooming species were included in the survey. Results of the springtime survey yielded no additional species present that were not initially identified during the fall 2012 survey period.

No other additional wildlife observations were made during the NASO DNA survey.

3.2 INVASIVE PLANT SPECIES MANAGEMENT

Invasive plant species can interfere with military operations and readiness, kill or shade out native plants, impact fish and wildlife and their habitats, or have negative economic impacts on crop yields and forest productivity. Invasive plants can also pose serious health risks for military and civilian personnel. Therefore, the focus of pest management at NASO DNA is to prevent interference with military operations and preparedness by protecting infrastructure, real property, and human health and safety.

There are a variety of policies, regulations, and resources available for developing management strategies to eradicate or control invasive plants.

Invasive species management plans and actions shall be developed and pursued in accordance with:

- OPNAVINST 6250.4c, Navy Pest Management Programs;
- Executive Order (EO) 13112 Invasive Species;
- DoD Instruction 4150.07;
- other Navy policies and instructions; and
- federal and state regulations for invasive species management, pesticide use, health and safety regulations, etc.

In accordance with OPNAVINST 6250.4c, it is the Navy's policy to use an integrated pest management (IPM) approach to control pests, including invasive plants. IPM "may include techniques such as education, habitat modification, biological control, genetic control, cultural control, mechanical control, physical control, regulatory control, and where necessary, the judicious use of least-hazardous pesticides. Pesticides, when needed, shall be selected consistent with IPM principles in order to minimize negative impacts on human health and the environment" (OPNAVINST 6250.4C, p.1).

Together with the principles of Early Detection and Rapid Response (National Invasive Species Council 2008), the goals of invasive species management include:

- preventing the introduction and spread of invasive species;
- early detection and rapid response to new populations of invasive species;
- controlling or eradicating existing invasive plant populations;
- regular monitoring to detect new populations, assess management efforts, and prevent the re-establishment of invasive plants;
- managing invasive plants and treatment efforts through adaptive management;
- providing for the restoration of native species and habitats that have been invaded;
- promoting public education on invasive species; and
- collaboration.

The Navy has existing management plans for invasive plants and other resources available. The Navy developed an EA to control common reed on a number of installations in the region, including NASO DNA (NAVFAC Atlantic 2002); and a Pesticide Compliance and Pest Management Plan (NAVFAC Atlantic 2003), which describes requirements, resources, responsibilities, and procedures for pest management throughout the region. Additional information on invasive species on NASO DNA is included in the 2006 INRMP for NASO DNA (NAVFAC Atlantic 2006) and the draft 2013/2014 updated INRMP (NAVFAC Atlantic 2014).

Other useful resources are listed in the Invasive Plant Species pamphlet developed for this Task Order (Appendix E).

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APPENDIX A

Additional Project Background and Stakeholder Survey Questionnaire

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Kick-off Meeting

The Project Kick-off Meeting was conducted on 13 July 2012 via conference call. The meeting was attended by the NTR, Mr. Emmett Carawan; the IR/NASO DNA Natural Resources Specialist, Ms. Michael Wright; Tetra Tech's Project Manager, Ms. Sarah Watts; and Deputy Project Manager, Mr. Brad Agius. The Task Order schedule, survey priorities, Installation access and protocols, GIS data, photography restrictions, potential stakeholders, and fieldwork were reviewed and discussed during the meeting.

Stakeholder Survey Questionnaire

Creation of the high-priority species list began with by identifying potential stakeholders – experts and organizations familiar with invasive species issues and management who could help refine the list of potential high-priority invasive floral species. At the recommendation of the Navy, Tetra Tech conducted a preliminary consultation with David Bishop, USFWS Regional Invasive Species Biologist at Back Bay National Wildlife Refuge. Mr. Bishop provided recommendations for stakeholders and input on the invasive species likely to be present at all of the four Installations. The stakeholders list was comprised of regulatory agencies such as U.S. Fish and Wildlife Service (USFWS), U.S. Department of Agriculture (USDA), Virginia Department of Game and Inland Fisheries (VDGIF) and Virginia Department of Conservation and Recreation (VDCR); private groups; and other experts. A preliminary stakeholder list was submitted to the IR and NTR on 3 August 2012 for review and comment. The stakeholder list was subsequently expanded and refined to include a total of 26 individuals from 21 Federal, state, and local regulatory agencies, private organizations, and individuals selected from a list of approximately 60 people or organizations that have expertise in invasive plant species (Table 1).

Table 1. Stakeholders and Experts Contacted for Task 1B of Task Order WE39.

Agency / Organization	Contact
Back Bay National Wildlife Refuge	David Bishop
Back Bay Restoration Foundation	Mary Tilton
Barney Environmental	Jason Barney
City of Virginia Beach	Clay Bernick, Environmental Manager
North Carolina Department of Agriculture	Rick Iverson
North Carolina Invasive Species Advisory Committee	Gene Cross, Division Director
North Carolina Wildlife Resources Commission	Shannon Deaton, Program Manager Chris Turner
Old Dominion University	Troy Savage
South Atlantic Landscape Conservation Cooperative	Ken McDermond
The Nature Conservancy	Judy Dunscomb, Chief Scientist
The Nature Conservancy, Southern Rivers Program	Brian van Eerden
USFWS Great Dismal Swamp National Wildlife Refuge	Chris Lowie, Refuge Manager Don Schwab, Wildlife Biologist
USFWS Mackay Island National Wildlife Refuge	Mike Hoff
USFWS Region 4 Field Office	John Hammond Dale Suiter
USFWS Region 5 Field Office	Cindy Schulz, Field Office Supervisor Kim Smith
Virginia Army National Guard-Camp Pendleton	Ken Oristaglio, Natural Resources Manager
Virginia Dare Soil and Water Conservation District	Roy Flanagan
Virginia Department of Conservation & Recreation	Kevin Heffernan
Virginia Department of Game and Inland Fisheries	Aaron Proctor Amy Ewing
Virginia Natural Heritage Program	Darren Loomis
Virginia Tech / NRCS	Bob Glennon

Following identification of the stakeholders, a preliminary list of invasive species was taken from the VDCR's Natural Heritage database list of *Invasive Alien Plant Species in Virginia* (VDCR 2009), and a list of 12 highly invasive species found in Virginia (VDCR 2010). (Note that non-invasive naturalized or weedy species, such as greenbrier [*Smilax* sp.] and buckthorn [*Rhamnus/Frangula* spp.] were excluded from consideration.) This list was refined by narrowing it to only those species known or likely to occur in the Coastal Plain where the four Installations are located, or which were ranked as highly or moderately invasive on the *Invasive Alien Plant Species in Virginia* list.

A written Stakeholder Survey Questionnaire (Figure 1) with four closed- and open-ended questions was sent via email in August and September 2012 to the 26 people on the stakeholder list (Table 1). The questionnaire asked the stakeholders what species were most likely to occur or become established at the Installations, which species posed the greatest risk to natural resources, and which species presented the greatest opportunity for being managed or controlled. The results of the stakeholder responses were summarized, and along with complete results, were submitted in a memorandum to the Navy on 18 September 2012.

Figure 1. Stakeholder Survey Questionnaire



Stakeholder Communication for Invasive Species Inventories

On behalf of the US Navy, Naval Facilities Engineering Command, Mid-Atlantic, Tetra Tech is seeking input on invasive plant species for four installations: Naval Air Station (NAS) Oceana and NAS Oceana Dam Neck Annex located in Virginia Beach, Virginia; Naval Auxiliary Landing Field (NALF) Fentress in Chesapeake, Virginia; and Naval Support Activity Hampton Roads (NSAHR) Northwest Annex located in Chesapeake, Virginia and Currituck County, North Carolina (Project Area). The Project Area is located in the Coastal Plain of southeastern Virginia and northeastern North Carolina and covers more than 13,000 acres. A large portion of the Project Area is forested, wetland, or undeveloped land managed for forest products, agriculture, and wildlife values.

We are seeking your help by asking four questions to refine the list of what invasive plant species are present or pose the greatest risk of becoming established, in order to prioritize efforts and determine what the greatest opportunities for managing invasive species are. You have been selected because of your expertise and/or local experience.

We have conducted an initial screening and developed a preliminary list of invasive floral species that may be present at the four installations based on the Virginia Department of Conservation and Recreation's Natural Heritage database list of Invasive Alien Plant Species in Virginia¹, and a list of 12 highly invasive species found in Virginia.ⁱⁱ Based on this screening, Tetra Tech developed the following preliminary list of invasive floral species for the four installations, on which we request your input.

Please return your responses to brian.rod@tetrattech.com no later than August 24, 2012.

Please feel free to contact me at 207.329.8882 if you have any questions.

Invasive Plant Species Presence and Risk

Please select the invasive plant species that are most likely to be present at one or more of the installations or which pose the greatest risk of becoming established.

- | | |
|--|--|
| <input type="checkbox"/> Alligator weed (<i>Alternanthera philoxeroides</i>) | <input type="checkbox"/> Japanese barberry (<i>Berberis thunbergii</i>) |
| <input type="checkbox"/> Aneilema (<i>Murdannia keisak</i>) | <input type="checkbox"/> Japanese honeysuckle (<i>Lonicera japonica</i>) |
| <input type="checkbox"/> Asiatic sand sedge (<i>Carex kobomugi</i>) | <input type="checkbox"/> Japanese hops (<i>Humulus japonicus</i>) |
| <input type="checkbox"/> Autumn olive (<i>Elaeagnus umbellata</i>) | <input type="checkbox"/> Japanese knotweed (<i>Polygonum cuspidatum</i>) |
| <input type="checkbox"/> Beach vitex (<i>Vitex rotundifolia</i>) | <input type="checkbox"/> Japanese stilt grass (<i>Microstegium vimineum</i>) |
| <input type="checkbox"/> Blunt-leaved privet (<i>Ligustrum obtusifolium</i>) | <input type="checkbox"/> Johnson-grass (<i>Sorghum halepense</i>) |
| <input type="checkbox"/> Brazilian water-weed (<i>Egeria densa</i>) | <input type="checkbox"/> Jointed grass (<i>Arthraxon hispidus</i>) |
| <input type="checkbox"/> Bristled knotweed (<i>Polygonum cespitosum</i>) | <input type="checkbox"/> Kudzu vine (<i>Pueraria montana</i>) |
| <input type="checkbox"/> Bull-thistle (<i>Cirsium vulgare</i>) | <input type="checkbox"/> Lesser celandine (<i>Ranunculus ficaria</i>) |
| <input type="checkbox"/> Canada bluegrass (<i>Poa compressa</i>) | <input type="checkbox"/> Mimosa (<i>Albizia julibrissin</i>) |
| <input type="checkbox"/> Canada thistle (<i>Cirsium arvense</i>) | <input type="checkbox"/> Moneywort (<i>Lysimachia nummularia</i>) |

Invasive Plant Species Presence and Risk

- | | |
|--|--|
| <input type="checkbox"/> China-berry (<i>Melia azedarach</i>) | <input type="checkbox"/> Mugwort (<i>Artemisia vulgaris</i>) |
| <input type="checkbox"/> Chinese privet (<i>Ligustrum sinense</i>) | <input type="checkbox"/> Multiflora rose (<i>Rosa multiflora</i>) |
| <input type="checkbox"/> Chinese wisteria (<i>Wisteria sinensis</i>) | <input type="checkbox"/> Musk thistle (<i>Carduus nutans</i>) |
| <input type="checkbox"/> Chinese yam (<i>Dioscorea oppositifolia</i>) | <input type="checkbox"/> Norway maple (<i>Acer platanoides</i>) |
| <input type="checkbox"/> Cogon grass (<i>Imperata cylindrica</i>) | <input type="checkbox"/> Oriental bittersweet (<i>Celastrus orbiculata</i>) |
| <input type="checkbox"/> Common chickweed (<i>Stellaria media</i>) | <input type="checkbox"/> Parrot feather (<i>Myriophyllum aquaticum</i>) |
| <input type="checkbox"/> Common cocklebur (<i>Xanthium strumarium</i>) | <input type="checkbox"/> Princess tree (<i>Paulownia tomentosa</i>) |
| <input type="checkbox"/> Common morning-glory (<i>Ipomoea purpurea</i>) | <input type="checkbox"/> Purple loosestrife (<i>Lythrum salicaria</i>) |
| <input type="checkbox"/> Common reed or Phragmites (<i>Phragmites australis</i>) | <input type="checkbox"/> Quack grass (<i>Agropyron repens</i>) |
| <input type="checkbox"/> Common teasel (<i>Dipsacus sylvestris</i>) | <input type="checkbox"/> Red sorrel (<i>Rumex acetosella</i>) |
| <input type="checkbox"/> English ivy (<i>Hedera helix</i>) | <input type="checkbox"/> Rough bluegrass (<i>Poa trivialis</i>) |
| <input type="checkbox"/> European water-milfoil (<i>Myriophyllum spicatum</i>) | <input type="checkbox"/> Sickle pod (<i>Cassia obtusifolia</i>) |
| <input type="checkbox"/> Fennel (<i>Foeniculum vulgare</i>) | <input type="checkbox"/> Spotted knapweed (<i>Centaurea biebersteinii</i>) |
| <input type="checkbox"/> Field-bindweed (<i>Convolvulus arvensis</i>) | <input type="checkbox"/> Tall fescue (<i>Festuca elatior</i> [<i>F. pratensis</i>]) |
| <input type="checkbox"/> Five-leaf akebia (<i>Akebia quinata</i>) | <input type="checkbox"/> Timothy (<i>Phleum pratense</i>) |
| <input type="checkbox"/> Giant foxtail (<i>Setaria faberi</i>) | <input type="checkbox"/> Tree-of-heaven (<i>Ailanthus altissima</i>) |
| <input type="checkbox"/> Giant reed (<i>Arundo donax</i>) | <input type="checkbox"/> Velvet-grass (<i>Holcus lanatus</i>) |
| <input type="checkbox"/> Gill-over-the-ground (<i>Glechoma hederacea</i>) | <input type="checkbox"/> White poplar (<i>Populus alba</i>) |
| <input type="checkbox"/> Golden bamboo (<i>Phyllostachys aurea</i>) | <input type="checkbox"/> Wild onion (<i>Allium vineale</i>) |
| <input type="checkbox"/> Hydrilla (<i>Hydrilla verticillata</i>) | <input type="checkbox"/> Wineberry (<i>Rubus phoenicolasius</i>) |
| <input type="checkbox"/> Ivy-leaved morning-glory (<i>Ipomoea hederacea</i>) | <input type="checkbox"/> Wintercreeper (<i>Euonymus fortunei</i>) |
| <input type="checkbox"/> Ivy-leaved speedwell (<i>Veronica hederifolia</i>) | <input type="checkbox"/> Yellow flag (<i>Iris pseudacorus</i>) |
| <input type="checkbox"/> Other: Click here to enter text. | |
| <input type="checkbox"/> Other: Click here to enter text. | |
| <input type="checkbox"/> Other: Click here to enter text. | |
| <input type="checkbox"/> Other: Click here to enter text. | |

Invasive Plant Species Management Opportunities

Please list invasive plant species that you think pose the greatest risk to natural resources.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Invasive Plant Species Management Opportunities

Please list invasive plant species that pose the greatest opportunity for managing or controlling invasive species.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Comments

Please feel free to add any comments or suggestions.

Respondent Information

Name: _____ Title: _____
Name Title

Agency or Organization: _____

Contact Information: _____ Phone: _____
Email Phone

Agency or Organization's Website: _____

Thank you. We greatly appreciate your help with this project.

¹ VDCR. 2009. Invasive Alien Plant Species of Virginia. Department of Conservation and Recreation, Division of Natural Heritage. http://www.dcr.virginia.gov/natural_heritage/documents/invlist.pdf, accessed 25 March 2012.

² VDCR. 2010. Invasive Species in Virginia. Virginia Department of Conservation and Recreation. www.dcr.virginia.gov/natural_heritage/vaisc/, accessed 25 March 2012.

Site Visit

The reconnaissance site visit was conducted at the four installations on 28–30 August 2012 by the IR/NAS Oceana Natural Resources Specialist, Ms. Michael Wright, and representatives from the Tetra Tech team (the Project Manager, Ms. Sarah Watts; Field Technician, Ms. Lindsey Staszak; and Mr. Dwight McKinney from Carolina Silvics, Inc. of Edenton, North Carolina, the subcontractor selected to conduct the invasive plant surveys). The NTR, Mr. Emmett Carawan, joined the participants during the third day of the site visit reconnaissance (30 August 2012).

The site visit reconnaissance finalized the list of high-priority invasive flora; and tested and refined the draft invasive plant survey methodology, field procedures, and health and safety policies that were later incorporated into the Work Plan. The Work Plan, approved by the IR and NTR, includes the invasive plant species survey methodology (summarized in Section 2.2), survey schedule, access protocols, and Health & Safety Plan for the field surveys.

APPENDIX B

Invasive Plant Species Survey Field Summary Data

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Invasive Species Inventory Survey for Naval Air Station Oceana, Dam Neck Annex

Plot Characteristics: Summary Plot Statistics, Patch Shape, Level of Infestation, and Spreading Vectors

Summary Plot Statistics	Number	Percentage
Total Number of Plots	240	
Number of Invasive Species at NASO DNA	16	
Number of High-priority Species at NASO DNA	6	
Number of Plots with High-priority Species	158	66
Number of Plots with Invasive Species Observed (including Non-priority Species)	163	68

Patch Shape	Number of Plots	Percentage
Point	2	1
Linear	6	4
Patch	154	94
Mix	1	1

Level of Infestation	Number of Plots	Percentage
New &/or Small Infestation	35	21
Moderate with >30% Desirable Species	90	55
Large-scale with <30% Desirable Species	37	23
Monoculture of Invasive Species	1	1

Spreading Vector	Number of Plots	Percentage
Road	55	34
Path	16	10
Parking Lot	6	4
Fenceline	5	3
Lake	5	3
Lawn	5	3
Pond	5	3
Canal	4	2
Range	4	2
Road/Ditch	2	1
Trail	2	1
Field	1	1
Fireline/Trail	1	1
Hedge Row	1	1
ORV path	1	1
Pipeline	1	1
Rifle Range/Path	1	1
Road/Building	1	1
Road/Stream	1	1
Road/Trail	1	1
Trail (Rec)	1	1
Trail/Obstacle Course	1	1
None	43	26

Habitat Type	Number of Plots	Percentage
Edge	107	66
Forest	36	22
Dune	11	7
Pond/Wetland	3	2
Forest/Marsh	2	1
Edge/Pond	1	1
Forest/Wetland	1	1
Hedge Row	1	1
Marsh	1	1

Invasive Species Inventory Survey for Naval Air Station Oceana, Dam Neck Annex

Number of Plots That Invasive Species Are Found In By Species

Common Name	Invasive Species Scientific Name	Code	Number of Plots Species Found In	Percentage
Alligator weed ¹	<i>Alternanthera philoxeroides</i>	ALTPHI	8	3
Autumn olive	<i>Elaeagnus umbellata</i>	ELEUMB	10	4
Border privet	<i>Ligustrum obtusifolium</i>	LIGOBT	2	1
Chinese lespedeza	<i>Lespedeza cuneata</i>	LESCUN	20	8
Chinese privet	<i>Ligustrum sinense</i>	LIGSIN	28	12
Common dayflower	<i>Commelina communis</i>	COMCOM	12	5
English ivy	<i>Hedera helix</i>	HEDHEL	6	3
Gill-over-the-ground	<i>Glechoma hederacea</i>	GLEHED	1	<1
Japanese honeysuckle	<i>Lonicera japonica</i>	LONJAP	113	47
Japanese stilt grass	<i>Microstegium vimineum</i>	MICVIM	92	38
Johnson-grass	<i>Sorghum halepense</i>	SORHAL	5	2
Multiflora rose	<i>Rosa multiflora</i>	ROSMUL	1	<1
Pampas grass	<i>Cortaderia selloana</i>	CORSEL	1	<1
Parrot feather milfoil	<i>Myriophyllum aquaticum</i>	MYRAQU	1	<1
Phragmites ²	<i>Phragmites australis</i>	PHRAUS	36	15
Thorny elaeagnus	<i>Elaeagnus pungens</i>	ELEPUN	8	3
None	None	NONE	77	32

¹ Highlighted species represent high-priority species.

² There are more populations of *Phragmites* than indicated by the number of plots in this table (see Figure 3 and Section 2.2.4). No plot point was recorded in stands of *Phragmites* greater than 5 meters in radius, which were mapped with GPS points.

Invasive Species Inventory Survey for Naval Air Station Oceana, Dam Neck Annex

Invasive Plant Species Abundance

Common Name	Invasive Species Scientific Name	Code	Abundance/Coverage						
			<1%	1-5%	6-25%	26-50%	51-75%	>75%	Total
Alligator weed	<i>Alternanthera philoxeroides</i>	ALTPHI	2	5	1				8
Autumn olive	<i>Elaeagnus umbellata</i>	ELEUMB	2	2	6				10
Border privet	<i>Ligustrum obtusifolium</i>	LIGOBT	1	1					2
Chinese lespedeza	<i>Lespedeza cuneata</i>	LESCUN	3	9	4	3	1		20
Chinese privet	<i>Ligustrum sinense</i>	LIGSIN	7	10	6	3	2		28
Common dayflower	<i>Commelina communis</i>	COMCOM	2	3	4	2	1		12
English ivy	<i>Hedera helix</i>	HEDHEL	2	2	1		1		6
Gill-over-the-ground	<i>Glechoma hederacea</i>	GLEHED			1				1
Japanese honeysuckle	<i>Lonicera japonica</i>	LONJAP	17	61	32	3			113
Japanese stilt grass	<i>Microstegium vimineum</i>	MICVIM	13	24	32	8	6	9	92
Johnson-grass	<i>Sorghum halepense</i>	SORHAL	2	2	1				5
Multiflora rose	<i>Rosa multiflora</i>	ROSMUL	1						1
Pampas grass	<i>Cortaderia selloana</i>	CORSEL			1				1
Parrot feather milfoil	<i>Myriophyllum aquaticum</i>	MYRAQU		1					1
Phragmites ¹	<i>Phragmites australis</i>	PHRAUS	4	17	9	5	1		36
Thorny elaeagnus	<i>Elaeagnus pungens</i>	ELEPUN	3	3	2				8
Total			59	140	100	24	12	9	344

¹ There are more populations of *Phragmites* than indicated by the number of plots in this table (see Figure 3 and Section 2.2.4).

No plot point was recorded in stands of *Phragmites* greater than 5 meters in radius, which were mapped with GPS points.

Invasive Species Inventory Survey for Naval Air Station Oceana, Dam Neck Annex

Invasive Plant Species Density

Invasive Species			Density						
Common Name	Scientific Name	Code	Single Plant	Scattered Plants	Scattered Dense Patches	Moderate	Majority	Monoculture	Total
Alligator weed	<i>Alternanthera philoxeroides</i>	ALTPHI	1	6	1				8
Autumn olive	<i>Elaeagnus umbellata</i>	ELEUMB	5	3	2				10
Blunt-leaved privet	<i>Ligustrum obtusifolium</i>	LIGOBT	1	1					2
Chinese lespedeza	<i>Lespedeza cuneata</i>	LESCUN	1	11	8				20
Chinese privet	<i>Ligustrum sinense</i>	LIGSIN	5	18	3	1	1		28
Common dayflower	<i>Commelina communis</i>	COMCOM		5	7				12
English ivy	<i>Hedera helix</i>	HEDHEL		5	1				6
Gill-over-the-ground	<i>Glechoma hederacea</i>	GLEHED			1				1
Japanese honeysuckle	<i>Lonicera japonica</i>	LONJAP		102	8	3			113
Japanese stilt grass	<i>Microstegium vimineum</i>	MICVIM		50	33		9		92
Johnson-grass	<i>Sorghum halepense</i>	SORHAL		3	2				5
Multiflora rose	<i>Rosa multiflora</i>	ROSMUL	1						1
Pampas grass	<i>Cortaderia selloana</i>	CORSEL			1				1
Parrot feather milfoil	<i>Myriophyllum aquaticum</i>	MYRAQU		1					1
Phragmites ¹	<i>Phragmites australis</i>	PHRAUS	1	28	6		1		36
Thorny elaeagnus	<i>Elaeagnus pungens</i>	ELEPUN	3	4	1				8
Total			18	237	74	4	11	0	344

¹ There are more populations of *Phragmites* than indicated by the number of plots in this table (see Figure 3 and Section 2.2.4).

No plot point was recorded in stands of *Phragmites* greater than 5 meters in radius, which were mapped with GPS points.

Invasive Species Inventory Survey for Naval Air Station Oceana, Dam Neck Annex

Field Summary Data

Plot	Invasive Species¹	Abundance/ Cover²	Density³	Level of Infestation⁴	Patch Shape⁵	Habitat	Spreading Vectors	Comments
DN001	LONJAP	3	D	B	D	Edge	Road	
	LIGSIN	2	A					
DN002	MICVIM	2	B	A	C	Edge	Lake	
DN003	MICVIM	4	C	B	C	Edge	Road	
	LONJAP	2	B					Picture 179, W
DN004	PHRAUS	2	B	A	C	Edge	Road	
DN005	COMCOM	1	B	A	C	Edge	Road	Commelina communis, Asiatic dayflower
	MICVIM	2	C					
DN006	LIGOBT	1	A	A	C	Edge	Road	
	LONJAP	3	B					
	MICVIM	1	B					
DN007	MICVIM	3	C	B	C	Edge	Road	
	LONJAP	2	B					
	LIGSIN	1	A					
DN008	LONJAP	2	B	B	C	Edge	Road	
	LIGSIN	1	A					
	MICVIM	3	C					
	ELEUMB	1	A					
DN009	MICVIM	1	B	A	C	Edge	Road	Near jogging trail
DN010	PHRAUS	3	B	B	B	Edge	Pond	
	ELEUMB	3	A					
	LONJAP	1	B					
DN011	PHRAUS	2	B	B	B	Edge	Pond	
	LONJAP	1	B					
	LIGSIN	1	A					
DN012	LONJAP	3	D	B	B	Edge	Pond	ALTPHI near plot
DN013	LONJAP	2	B	A	B	Edge	Pond	
DN014	MICVIM	2	B	B	C	Edge	Road	
	PHRAUS	2	B					
	LONJAP	2	B					

Plot	Invasive Species ¹	Abundance/Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
DN015	NONE							
DN016	LONJAP	3	B	B	B	Edge	Pond	
	ELEPUN	2	B					
DN017	NONE							
DN018	ELEUMB	2	B	B	C	Edge	Road/Stream	
	LIGSIN	2	B					
	LONJAP	2	B					
	MICVIM	1	B					
	ALTPHI	2	B					
DN019	PHRAUS	2	B	B	C	Edge	Road	LIGSIN also observed near plot
	MICVIM	2	B					
	LONJAP	1	B					
DN020	LONJAP	3	B	B	C	Edge	Road	
	ELEUMB	2	A					
	LIGSIN	2	B					
DN021	ALTPHI	3	C	B	C	Edge	Road/Ditch	
DN022	LIGSIN	2	B	B	C	Edge	Road	
	ELEPUN	3	B					
	LONJAP	2	B					
DN023	LIGSIN	4	E	C	C	Edge	Road	
	ELEUMB	3	B					
	LONJAP	2	B					
DN024	MICVIM	3	C	A	C	Forest	None	
	LONJAP	2	B					
DN025	MICVIM	3	C	B	C	Forest	None	
DN026	LONJAP	3	B	B	C	Edge	Road	
DN027	LONJAP	3	B	B	C	Edge	Road	
DN028	NONE							
DN029	NONE							
DN030	LONJAP	2	B	A	C	Dune	ORV path	
DN031	NONE							
DN032	NONE							

Plot	Invasive Species ¹	Abundance/ Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
DN033	PHRAUS	2	B	B	C	Edge	Road	
	MICVIM	1	B					
DN034	MICVIM	3	B	B	C	Edge	Road	
	LIGSIN	1	B					
	LONJAP	2	B					
DN035	MICVIM	6	E	C	C	Forest	None	
DN036	LONJAP	2	B	B	C	Forest	None	
	MICVIM	3	C					
	LIGSIN	1	B					
DN037	LONJAP	2	B	B	C	Edge	Road	
	MICVIM	2	C					
	ELEUMB	1	A					
DN038	LONJAP	3	B	B	C	Edge	Road	
	MICVIM	2	C					
DN039	NONE							
DN040	LONJAP	2	B	A	C	Forest	None	
	MICVIM	1	B					
DN041	LONJAP	1	B	A	C	Forest	None	
	MICVIM	1	B					
DN042	LONJAP	1	B	A	C	Edge	Road	
DN043	ALTPHI	1	A	A	A	Edge	Road/Ditch	
DN044	MICVIM	5	E	C	C	Edge	Road	
	LONJAP	2	B					
	LESCUN	2	B					Lespedeza cuneata, sericea lespedeza
	PHRAUS	1	B					
	SORHAL	1	B					
DN045	PHRAUS	2	B	B	C	Edge	Road	
	MICVIM	2	B					
DN046	MICVIM	2	B	B	C	Edge	Road	
	LONJAP	2	B					
	LESCUN	1	B					
DN047	LONJAP	2	B	B	C	Edge	Road	
	MICVIM	2	B					

Plot	Invasive Species ¹	Abundance/Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
	LESCUN	2	B					
DN048	PHRAUS	3	B	B	C	Forest	None	
DN049	NONE							
DN050	NONE							
DN051	NONE							
DN052	HEDHEL	3	B	C	C	Edge	Road	
	LIGSIN	4	B					
	LONJAP	2	B					
	MICVIM	1	B					
DN053	MICVIM	3	C	B	C	Forest	None	
	LONJAP	2	B					
	ROSMUL	1	A					
DN054	MICVIM	3	C	B	C	Forest	None	
	LONJAP	2	B					
	LIGSIN	2	B					
	ELEPUN	1	A					
DN055	HEDHEL	2	B	B	C	Edge	Road	
	ELEPUN	1	A					
	MICVIM	4	C					
	LIGSIN	2	B					
DN056	LONJAP	2	B	B	C	Edge	Road	
	MICVIM	2	B					
	LIGSIN	1	B					
DN057	LIGSIN	2	B	B	C	Edge	Road	
	MICVIM	3	C					
	LONJAP	2	B					
DN058	LIGSIN	3	C	C	C	Edge	Road	
	ELEPUN	3	C					
	LONJAP	2	B					
	MICVIM	3	C					
	HEDHEL	2	B					
DN059	LESCUN	5	C	C	C	Edge	Road	
DN060	LONJAP	2	B	B	C	Edge	Road	
	MICVIM	2	B					

Plot	Invasive Species ¹	Abundance/ Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
DN061	NONE							
DN062	LONJAP	1	B	A	C	Forest	Trail	
DN063	LONJAP	2	B	A	C	Edge	Trail/Obstacle Course	
	ELEPUN	1	A					
DN064	LONJAP	2	B	A	C	Forest	None	
DN065	LONJAP	1	B	A	C	Edge	Road	
DN066	NONE							
DN067	LONJAP	3	B	B	C	Dune	Trail	
DN068	PHRAUS	4	C	B	C	Pond/Wetland	None	
	ALTPHI	2	B					
DN069	COMCOM	4	C	B	C	Pond/Wetland	None	
	PHRAUS	2	B					
DN070	MYRAQU	2	B	C	C	Pond/Wetland	None	
	ALTPHI	2	B					
	PHRAUS	4	C					
DN071	LONJAP	2	B	A	C	Edge	Road	
	MICVIM	1	B					
DN072	LONJAP	2	B	B	C	Forest	None	
	MICVIM	4	B					
DN073	MICVIM	5	C	B	C	Forest	None	
	LONJAP	2	B					
DN074	NONE							
DN075	LONJAP	1	B	A	C	Forest	None	
DN076	MICVIM	3	C	B	C	Forest	None	
	LONJAP	2	B					
DN077	NONE							
DN078	PHRAUS	3	C	B	C	Edge	None	
DN079	LONJAP	1	B	A	C	Edge	Road	
DN080	LONJAP	2	B	A	C	Forest	Trail (Rec)	
DN081	LONJAP	1	B	A	C	Forest	None	

Plot	Invasive Species ¹	Abundance/Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
DN082	MICVIM	3	C	B	C	Edge	Road	
	LONJAP	2	B					
	LESCUN	1	A					
DN083	NONE							
DN084	PHRAUS	3	B	B	C	Forest/Wetland	None	
DN085	NONE							
DN086	PHRAUS	1	A	A	C	Edge	Road	
	MICVIM	2	B					
	LONJAP	1	B					
DN087	LESCUN	2	B	A	C	Edge	Road	
DN088	NONE							
DN089	NONE							
DN090	SORHAL	2	B	B	C	Dune	Parking Lot	
	LONJAP	2	B					
DN091	NONE							
DN092	NONE							
DN093	NONE							
DN094	ELEPUN	2	B	B	C	Dune	Road/Building	
DN095	NONE							
DN096	NONE							
DN097	SORHAL	2	C	A	C	Dune	Parking Lot	
DN098	ELEUMB	3	C	B	C	Dune	Parking Lot	Much Eleagnus between 97 & 98 along parking lot
DN099	NONE							
DN100	ELEUMB	3	C	B	C	Dune	None	
DN101	NONE							
DN102	LONJAP	2	B	A	C	Dune	None	
DN103	NONE							Picture of solidago-like plant
DN104	LONJAP	2	B	B	C	Dune	None	
DN105	NONE							
DN106	NONE							
DN107	NONE							

Plot	Invasive Species ¹	Abundance/ Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
DN108	NONE							
DN109	NONE							
DN110	NONE							
DN111	ELEPUN	2	B	B	C	Edge	Road/Trail	Many invasives/escapes along fence just south of this point
	LONJAP	3	B					
DN112	LONJAP	3	C	B	C	Edge	Road	
DN113	LONJAP	3	C	B	C	Edge	Road	
DN114	LONJAP	2	B	B	C	Edge	Road	
DN115	NONE							
DN116	LONJAP	2	B	B	C	Dune	None	
DN117	NONE							
DN118	LESCUN	2	B	B	C	Dune	Rifle Range/Path	Scattered PHRAUS on berm
	PHRAUS	1	B					
	SORHAL	1	B					
DN119	LONJAP	3	B	C	C	Edge	Range	
	SORHAL	3	C					
DN120	MICVIM	1	B	A	C	Edge	Path	
DN121	LONJAP	3	C	B	C	Edge	Range	
DN122	LONJAP	3	B	B	C	Edge	Range	
DN123	MICVIM	3	B	B	C	Edge	Range	
	LIGSIN	1	B					
	LONJAP	2	B					
	LIGOBT	2	B					
DN124	NONE							
DN125	MICVIM	4	C	C	C	Forest	Path	
	LIGSIN	3	B					
	COMCOM	3	C					
	LONJAP	2	B					
DN126	COMCOM	2	C	C	C	Edge	Road	
	LONJAP	2	B					
DN127	NONE							
DN128	NONE							

Plot	Invasive Species ¹	Abundance/Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
DN129	NONE							
DN130	NONE							
DN131	NONE							
DN132	NONE							
DN133	LONJAP	3	C	C	C	Edge	Path	
	LESCUN	3	C					
	MICVIM	1	B					
	HEDHEL	1	B					
	PHRAUS	2	B					
DN134	MICVIM	3	C	B	C	Edge	Path	
	LONJAP	2	B					
	LESCUN	2	B					
	COMCOM	2	B					
DN135	MICVIM	3	C	C	C	Edge	Path	
	LESCUN	3	C					
	PHRAUS	2	B					
	LONJAP	2	B					
DN136	NONE							
DN137	COMCOM	3	C	B	C	Marsh	Canal	Photo NW thru P.C., COMCOM mixed with other plants
	PHRAUS	2	B					
	MICVIM	1	B					
DN138	LESCUN	4	C	C	B	Hedge Row	Hedge Row	
	MICVIM	3	C					
	LONJAP	3	B					
	PHRAUS	2	B					
DN139	PHRAUS	2	B	B	C	Edge/Pond	None	
	LONJAP	2	B					
DN140	COMCOM	1	B	B	C	Forest	Canal	
	MICVIM	2	B					
DN141	PHRAUS	3	B	B	C	Forest	None	

Plot	Invasive Species ¹	Abundance/ Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
	COMCOM	3	B					
DN142	LESCUN	4	C	C	C	Edge	Path	
	MICVIM	2	B					
DN143	MICVIM	5	C	B	C	Edge	Path	
	LESCUN	2	B					
DN144	MICVIM	2	B	C	C	Edge	Path	
	LONJAP	3	B					
	LESCUN	4	C					
DN145	LONJAP	4	B	C	C	Edge	Path	
	MICVIM	3	B					
DN146	LONJAP	1	B	B	A	Forest	None	
DN147	NONE							
DN148	NONE							
DN149	NONE							
DN150	NONE							
DN151	MICVIM	4	C	B	C	Edge	Fireline/Tra 1	
	LONJAP	1	B					
DN152	NONE							
DN153	LONJAP	3	B	B	C	Edge	Path	
	MICVIM	1	B					
DN154	MICVIM	3	B	B	C	Edge	Path	
	LESCUN	2	B					
	LONJAP	2	B					
DN155	LONJAP	2	B	B	C	Edge	Path	
	MICVIM	2	B					
DN156	LIGSIN	3	B	C	C	Edge	Path	Photo of english ivy, old home site
	HEDHEL	5	C					
	MICVIM	3	B					
	LONJAP	3	B					
DN157	MICVIM	3	B	B	C	Edge	Path	
	LONJAP	3	B					
	LESCUN	2	B					

Plot	Invasive Species ¹	Abundance/ Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
DN158	MICVIM	3	C	B	C	Forest	None	
	LONJAP	2	B					
DN159	CORSEL	3	C	B	C	Forest	None	Photo of pampass grass looking W
	PHRAUS	3	B					
	LONJAP	3	B					
DN160	LONJAP	3	B	B	C	Edge	Road	
	MICVIM	2	B					
DN161	LONJAP	4	C	C	C	Edge	Field	
	MICVIM	4	C					
	LESCUN	3	C					
DN162	NONE							
DN163	MICVIM	6	C	C	C	Edge	Road	
	LIGSIN	3	A					
DN164	MICVIM	6	C	C	C	Edge	Road	
	LONJAP	2	B					
DN165	NONE							
DN166	PHRAUS	3	B	C	C	Forest/Marsh	None	
	COMCOM	4	C					
DN167	PHRAUS	2	B	B	C	Forest/Marsh	None	
	LONJAP	2	B					
	MICVIM	3	C					
DN168	PHRAUS	2	B	B	C	Edge	Lake	
DN169	MICVIM	1	B	A	C	Forest	None	
DN170	NONE							
DN171	NONE							
DN172	MICVIM	6	E	C	C	Edge	Road	
DN173	MICVIM	6	E	C	C	Forest	None	
DN174	MICVIM	4	C	B	C	Edge	Parking Lot	
	PHRAUS	2	B					
DN175	PHRAUS	2	B	B	C	Edge	Parking Lot	
	MICVIM	2	B					

Plot	Invasive Species ¹	Abundance/Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
DN176	COMCOM	5	C	C	C	Edge	Lake	
	ALTPHI	2	B					
	PHRAUS	3	B					
DN177	NONE							
DN178	NONE							
DN179	NONE							
DN180	NONE							
DN181	MICVIM	6	E	C	C	Forest	None	
DN182	MICVIM	6	E	C	C	Forest	None	
DN183	PHRAUS	4	C	C	C	Edge	Road	
	LONJAP	2	B					
DN184	MICVIM	3	C	B	C	Forest	Canal	
	LONJAP	2	B					
DN185	PHRAUS	2	B	B	C	Edge	Road	
	LONJAP	1	B					
DN186	NONE							
DN187	PHRAUS	1	B	B	C	Forest	None	
	MICVIM	3	C					
DN188	NONE							
DN189	NONE							
DN190	NONE							
DN191	MICVIM	5	C	C	C	Edge	Path	
	LONJAP	3	C					
DN192	LONJAP	2	B	B	C	Edge	Lawn	
	MICVIM	2	B					
DN193	ELEUMB	3	A	B	C	Edge	Lawn	
	LONJAP	2	B					
DN194	LIGSIN	2	B	A	C	Edge	Road	
DN195	ALTPHI	2	B	B	C	Edge	Path	
	LONJAP	3	B					
DN196	LONJAP	4	C	C	C	Edge	Road	
	MICVIM	3	B					
DN197	NONE							
DN198	NONE							

Plot	Invasive Species ¹	Abundance/ Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
DN199	NONE							
DN200	NONE							
DN201	LONJAP	2	B	A	C	Edge	Road	
DN202	NONE							
DN203	NONE							
DN204	LONJAP	2	B	B	C	Edge	Lawn	
	MICVIM	3	B					
DN205	COMCOM	2	B	B	C	Edge	Lake	
	ALTPHI	1	B					
DN206	LONJAP	1	B	A	C	Forest	None	
DN207	NONE							
DN208	MICRO	4	C	B	C	Forest	None	
DN209	MICVIM	3	B	B	C	Edge	Road	
	LONJAP	3	B					
	LESCUN	3	C					
DN210	LONJAP	3	B	B	C	Edge	Parking Lot	
	MICRO	3	B					
	LESCUN	1	B					
DN211	PHRAUS	4	C	C	C	Edge	Lawn	
	LONJAP	2	B					
DN212	COMCOM	3	C	B	C	Edge	Canal	
	PHRAUS	3	B					
	MICVIM	2	B					
DN213	ELEUMB	3	B	C	C	Edge	Lawn	
	LONJAP	3	B					
	LESCUN	2	B					
DN214	MICVIM	3	B	C	C	Edge	Road	
	LIGSIN	5	C					
	LONJAP	2	B					
DN215	NONE							
DN216	LONJAP	2	B	A	C	Edge	Lake	
DN217	MICVIM	3	B	C	C	Forest	None	
	LIGSIN	3	B					
	LONJAP	3	B					

Plot	Invasive Species ¹	Abundance/ Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
DN218	LIGSIN	5	C	C	C	Edge	Road	Photo looking SE showing privet thicket
	LONJAP	3	B					
	HEDHEL	1	B					
	MICVIM	2	B					
DN219	NONE							DNZ1 ON GPS, PHOTO LOOKING S
DN220	MICVIM	5	E	D	C	Edge	Pipeline	DNZ2 ON GPS
DN220	PHRAUS	5	E					Photo looking NW
DN221	NONE							DNZ3 on GPS, photo looking SW
DNA1	NONE							
DNA2	NONE							
DNA3	PHRAUS	4	C	B	C	Edge	Road	
	LONJAP	2	B					
DNA4	LONJAP	2	B	A	C	Edge	Road	
DNA5	LONJAP	3	C	C	C	Edge	Fenceline	
	LIGSIN	4	D					
	MICVIM	3	B					
DNA6	MICVIM	6	E	C	C	Edge	Fenceline	
	LIGSIN	2	B					
	GLEHED	3	C					
DNA7	MICVIM	6	E	C	C	Edge	Fenceline	
	LIGSIN	3	B					
	LONJAP	3	B					
DNA8	LONJAP	2	B	B	C	Edge	Fenceline	
	MICVIM	2	B					
DNA9	NONE							
DNA10	NONE							
DNA11	NONE							
DNA12	NONE							
DNA13	LONJAP	1	B	A	C	Forest	None	
DNA14	NONE							
DNA15	MICVIM	2	B	A	C	Forest	None	

Plot	Invasive Species ¹	Abundance/Cover ²	Density ³	Level of Infestation ⁴	Patch Shape ⁵	Habitat	Spreading Vectors	Comments
DNA16	MICVIM	5	B	B	C	Forest	None	
	LONJAP	1	D					
	LIGSIN	2	B					
DNA17	NONE							
DNA18	MICVIM	3	B	B	C	Forest	None	
DNA19	MICVIM	2	B					
	LONJAP	2	B	A	C	Edge	Fenceline	

¹ Species Codes

Code	Common Name	Scientific Name
AILALT	Tree-of-heaven	<i>Ailanthus altissima</i> ⁶
ALBJUL	Mimosa	<i>Albizia julibrissin</i>
ALTPHI	Alligator weed	<i>Alternanthera philoxeroides</i>
AMPBRE	Porcelain berry	<i>Ampelopsis brevipedunculata</i>
COMCOM	Common dayflower	<i>Commelina communis</i>
CORSEL	Pampas grass	<i>Cortaderia selloana</i>
ELEPUN	Thorny elaeagnus	<i>Elaeagnus pungens</i>
ELEUMB	Autumn olive	<i>Elaeagnus umbellata</i>
FESELA	Tall fescue	<i>Festuca elatior</i> [F. pratensis]
GLEHED	Gill-over-the-ground	<i>Glechoma hederacea</i>
HEDHEL	English ivy	<i>Hedera helix</i>
HUMJAP	Japanese hops	<i>Humulus japonicus</i>
LESBIC	Shrubby bushclover	<i>Lespedeza bicolor</i>
LESCUN	Chinese lespedeza	<i>Lespedeza cuneata</i>
LIGJAP	Japanese privet	<i>Ligustrum japonica</i>
LIGOBT	Border privet	<i>Ligustrum obtusifolium</i>
LIGSIN	Chinese privet	<i>Ligustrum sinense</i>
LIRMUS	Lily turf	<i>Liriope muscari</i>
LIRSPI	Creeping liriop	<i>Liriope spicata</i>
LONJAP	Japanese honeysuckle	<i>Lonicera japonica</i>
MAGGRA	Southern magnolia	<i>Magnolia grandiflora</i> L
MICRO ⁷	Japanese stilt grass	<i>Microstegium vimineum</i>
MICVIM	Japanese stilt grass	<i>Microstegium vimineum</i>

² Abundance/Coverage

1 <1%	A Single plant
2 1-5%	B Scattered plants
3 6-25%	C Scattered dense patches
4 26-50%	D Moderate
5 51-75%	E Majority
6 >75%	F Monoculture

³ Density

⁴ Level of Infestation

A New and/or small infestation	A Point
B Moderate with >30% desirable species	B Linear
C Large-scale with <30% desirable species	C Patch
D Monoculture	D Mix

⁵ Patch Shape

Code	Common Name	Scientific Name
MISSIN	Chinese silvergrass	<i>Miscanthus sinensis</i>
MORALB	White mulberry	<i>Morus alba</i>
MYRAQU	Parrot feather milfoil	<i>Myriophyllum aquaticum</i>
MYRSPI	European water-milfoil	<i>Myriophyllum spicatum</i>
PAUTOM	Princess tree	<i>Paulownia tomentosa</i>
PHRAUS	Phragmites	<i>Phragmites australis</i>
PHYAUR	Golden bamboo	<i>Phyllostachys aurea</i>
POPALB	White poplar	<i>Populus alba</i>
PUEMON	Kudzu vine	<i>Pueraria montana</i>
PYRCAL	Callery Pear	<i>Pyrus calleryana</i>
ROSMUL	Multiflora rose	<i>Rosa multiflora</i>
SORHAL	Johnson-grass	<i>Sorghum halepense</i>
VINMAJ	Periwinkle	<i>Vinca major</i>
VINMIN	Dwarf periwinkle	<i>Vinca minor</i>
VITROT	Beach vitex	<i>Vitex rotundifolia</i>
WISSIN	Chinese wisteria	<i>Wisteria sinensis</i>

⁶ Highlighted species represent high-priority species.

⁷ MICRO is presumed to be *Microstegium vimineum* (MICVIM).

APPENDIX C
Photographic Record

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**TETRA TECH, INC.
PHOTOGRAPHIC RECORD**

Client: NAVFAC Mid-Atlantic

Project: Invasive Species Inventory Survey for NASO DNA



Photo No.: 1

Date: 2012

Photographer: McKinney

Direction: West

Comments:

Plot DN003

Microstegium vimineum (Japanese stiltgrass) in the understory.



Photo No.: 2

Date: 2012

Photographer: McKinney

Direction: NA

Comments:

Plot DN070

Alternanthera philoxeroides
(alligator weed).

**TETRA TECH, INC.
PHOTOGRAPHIC RECORD**

Client: NAVFAC Mid-Atlantic

Project: Invasive Species Inventory Survey for NASO DNA



Photo No.: 3

Date: 2012

Photographer: McKinney

Direction: NA

Comments:

Dune vegetation.



Photo No.: 4

Date: 2012

Photographer: McKinney

Direction: NA

Comments:

Plot DN095

Dune vegetation.

**TETRA TECH, INC.
PHOTOGRAPHIC RECORD**

Client: NAVFAC Mid-Atlantic

Project: Invasive Species Inventory Survey for NASO DNA



Photo No.: 5

Date: 2012

Photographer: McKinney

Direction: Southeast

Comments:

Plot DN100

Eleagnus umbellata (autumn olive)
in secondary dunes.



Photo No.: 6

Date: 2012

Photographer: McKinney

Direction: Northwest

Comments:

Plot DN137

Commelina communis (Asiatic
dayflower).

**TETRA TECH, INC.
PHOTOGRAPHIC RECORD**

Client: NAVFAC Mid-Atlantic

Project: Invasive Species Inventory Survey for NASO DNA



Photo No.: 7

Date: 2012

Photographer: McKinney

Direction: East

Comments:

Plot DN142

Lespedeza cuneata (sericea lespedeza).



Photo No.: 8

Date: 2012

Photographer: McKinney

Direction: NA

Comments:

Plot DN156

Ligustrum obtusifolium (border privet) in bloom at an old homesite near a wildlife/hunting area.

**TETRA TECH, INC.
PHOTOGRAPHIC RECORD**

Client: NAVFAC Mid-Atlantic

Project: Invasive Species Inventory Survey for NASO DNA



Photo No.: 9

Date: 2012

Photographer: McKinney

Direction: NA

Comments:

Plot DN156

Hedera helix (English ivy)
overtaking a tree near an old home
site near a wildlife/hunting area.



Photo No.: 10

Date: 2012

Photographer: McKinney

Direction: NA

Comments:

Wildlife/hunting area adjacent south
of Dam Neck Road. This area has
significant edge habitat with many
areas densely populated by invasive
plants.

**TETRA TECH, INC.
PHOTOGRAPHIC RECORD**

Client: NAVFAC Mid-Atlantic

Project: Invasive Species Inventory Survey for NASO DNA



Photo No.: 11

Date: 2012

Photographer: McKinney

Direction: NA

Comments:

Wildlife/hunting area adjacent south of Dam Neck Road. This area has significant edge habitat with many areas densely populated by invasive plants.



Photo No.: 12

Date: 2012

Photographer: McKinney

Direction: West

Comments:

Plot DN159

Cortaderia selloana (pampass grass).

**TETRA TECH, INC.
PHOTOGRAPHIC RECORD**

Client: NAVFAC Mid-Atlantic

Project: Invasive Species Inventory Survey for NASO DNA



Photo No.: 13

Date: 2013

Photographer: McKinney

Direction: South

Comments:

Plot DNA1 (2013)

Typical area accessed by boat.

No invasive present.



Photo No.: 14

Date: 2013

Photographer: McKinney

Direction: Northwest

Comments:

Plot DNA3 (2013)

Phragmites australis (*Phragmites* or common reed) in area accessed by boat.

**TETRA TECH, INC.
PHOTOGRAPHIC RECORD**

Client: NAVFAC Mid-Atlantic

Project: Invasive Species Inventory Survey for NASO DNA



Photo No.: 15

Date: 2013

Photographer: McKinney

Direction: Southwest

Comments:

Plot DNA2 (2013)

Typical area accessed by boat. No
invasive species present.



Photo No.: 16

Date: 2013

Photographer: McKinney

Direction: NA

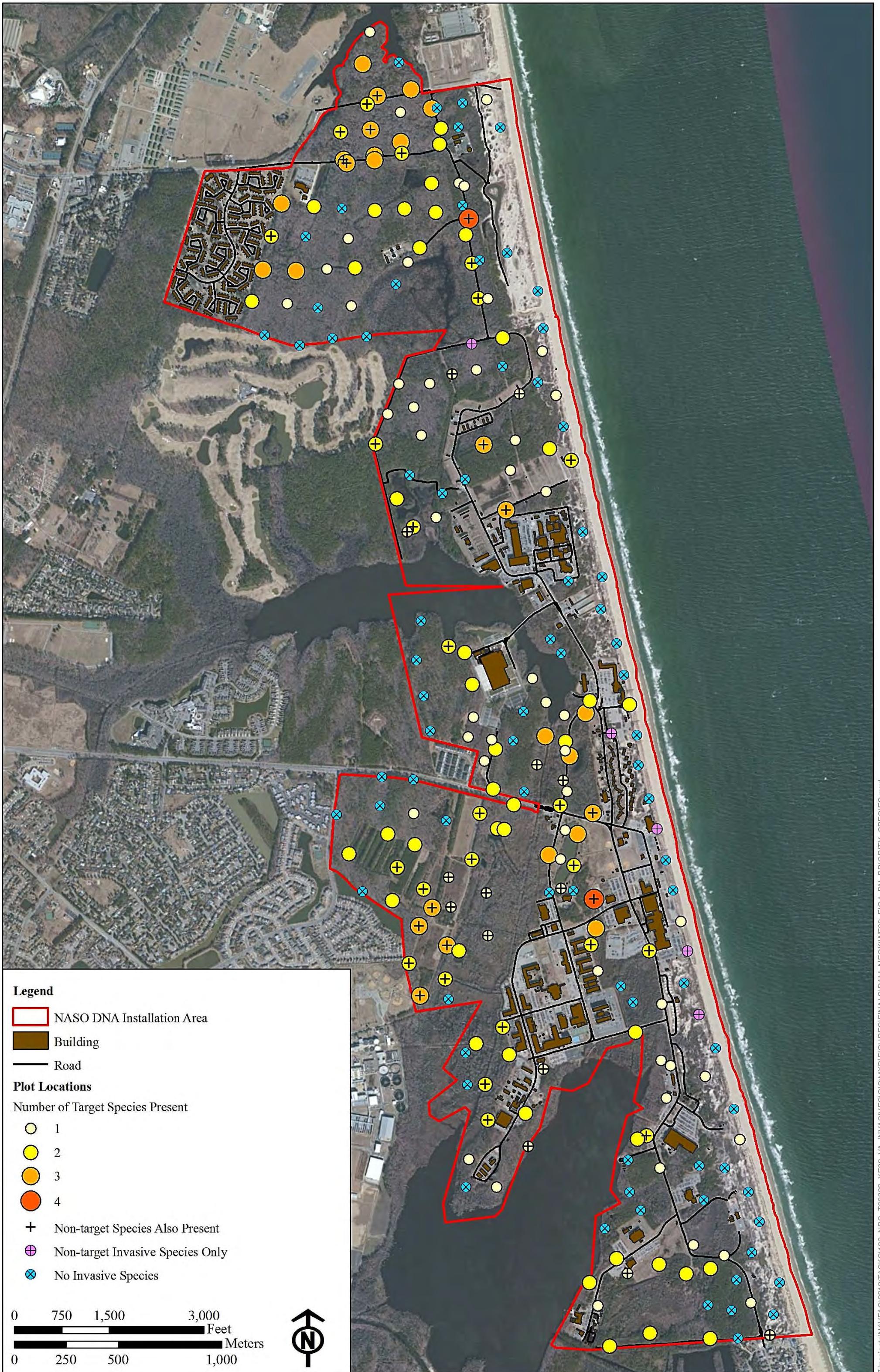
Comments:

Area accessed by water.

APPENDIX D

Distribution of Invasive Plant Species at NASO DNA

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Legend

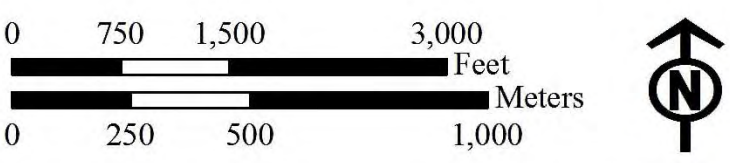
- NASO DNA Installation Area
- Building
- Road

Plot Locations

Number of Target Species Present

- 1
- 2
- 3
- 4

- + Non-target Species Also Present
- + Non-target Invasive Species Only
- x No Invasive Species



APPENDIX E

Invasive Plant Species Pamphlet





photo courtesy of Carolina Silvics

Kudzu vine (*Pueraria montana*)

additional resources for invasive plant species information

DoD Natural Resources, Invasive Species Management (www.dodinvases.org)

National Invasive Species Council (www.invasivespecies.gov)

USDA National Invasive Species Information Center (www.invasivespeciesinfo.gov/)

U.S. Fish and Wildlife Service (www.fws.gov/invasives/)

U.S. Forest Service (www.fs.fed.us/invasivespecies/index.shtml)

Virginia Department of Conservation and Recreation (www.dcr.virginia.gov/natural_heritage/vaisc/)

North American Invasive Species Network (www.naisn.org/generalinformation.html)



NAVFAC Mid-Atlantic
9742 Maryland Avenue
Norfolk, VA 23511

For more information, contact:

Naval Air Station Oceana
Department of Public Works
Environmental Program
953 Hornet Dr., Bldg. 820, Suite 206
Virginia Beach, VA 23460-2190
(757) 341-1700



invasive plant species

"...the homeland is vulnerable to a different type of asymmetric attack, a biological attack from invasive species."

— Col. Robert J. Pratt



Tree-of-heaven (*Ailanthus altissima*)

photo courtesy of L. Eiser

Common invasive plants at:

Naval Air Station Oceana

NASO Dam Neck Annex

Naval Auxiliary Landing Field Fentress

Naval Support Activity Hampton Roads
Northwest Annex (NSAHR NWA)

The purpose of this brochure is to provide a basic understanding of the most common invasive plants occurring at four Navy installations in the Hampton Roads region, the threats they pose, and what you can do to help control and prevent their spread.

what are invasive species?

Invasive species are plants, animals, or micro-organisms that are non-native and are likely to cause economic or environmental harm or harm to human health. They are often spread by wind, wildlife, and intentional or unintentional actions.

The Department of Defense and other Federal and state agencies have instituted policies and guidelines to prevent and control the introduction and spread of invasive species.

why are invasive plants a problem?

Invasive species can interfere with military operations and readiness, kill or shade out native plants, harm fish and wildlife and their habitats, and have negative economic impacts on crop yields and forest productivity. Furthermore, invasive species are a threat to availability of training areas, increase risk of wildfire, and can pose serious health and safety issues for people.

Economic losses and control costs have been estimated to exceed \$120 billion per year (Pimentel et al. 2005)

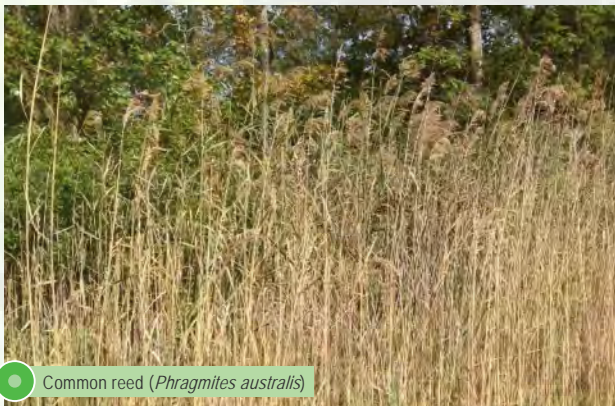


photo courtesy of Carolina Silvics

Invasive Plant Species Watch List

Invasive Plant Species	NAS Oceana	NASO DNA	NALF Fentress	NSAHR NWA
Alligator weed (<i>Alternanthera philoxeroides</i>)	■	■	■	■
Asian spiderwort (<i>Murdannia keisak</i>)	■			
Autumn olive (<i>Elaeagnus umbellata</i>)	■	■		■
Beach vitex (<i>Vitex rotundifolia</i>)				
Border privet (<i>Ligustrum obtusifolium</i>)	■	■		
Callery pear (<i>Pyrus calleryana</i>)	■		■	
Chinese lespedeza (<i>Lespedeza cuneata</i>)	■	■	■	■
Chinese privet (<i>Ligustrum sinense</i>)	■	■	■	■
Chinese silvergrass (<i>Miscanthus sinensis</i>)	■			
Chinese wisteria (<i>Wisteria sinensis</i>)	■		■	■
Common dayflower (<i>Commelina communis</i>)	■	■	■	■
Creeping liriope (<i>Liriope spicata</i>)	■			■
Dwarf periwinkle (<i>Vinca minor</i>)			■	
English ivy (<i>Hedera helix</i>)	■	■	■	■
European water-milfoil (<i>Myriophyllum spicatum</i>)				
Gill-over-the-ground (<i>Glechoma hederacea</i>)	■	■	■	
Golden bamboo (<i>Phyllostachys aurea</i>)			■	■
Japanese honeysuckle (<i>Lonicera japonica</i>)	■	■	■	■
Japanese hops (<i>Humulus japonicus</i>)	■			
Japanese privet (<i>Ligustrum japonica</i>)	■			
Japanese stilt grass (<i>Microstegium vimineum</i>)	■	■	■	■
Johnson-grass (<i>Sorghum halepense</i>)	■	■	■	■
Kudzu vine (<i>Pueraria montana</i>)	■			
Lily turf (<i>Liriope muscarum</i>)				■
Mimosa (<i>Albizia julibrissin</i>)	■		■	■
Multiflora rose (<i>Rosa multiflora</i>)	■	■	■	■
Pampas grass (<i>Cortaderia selloana</i>)		■		
Parrot feather milfoil (<i>Myriophyllum aquaticum</i>)	■	■		
Periwinkle (<i>Vinca major</i>)	■			
Phragmites (<i>Phragmites australis</i>)	■	■	■	■
Porcelain berry (<i>Ampelopsis brevipedunculata</i>)			■	■
Princess tree (<i>Paulownia tomentosa</i>)			■	
Shrubby bushclover (<i>Lespedeza bicolor</i>)	■			■
Tall fescue (<i>Festuca elatior</i> [<i>F. pratensis</i>])	■			
Thorny elaeagnus (<i>Elaeagnus pungens</i>)	■	■		
Tree-of-heaven (<i>Ailanthus altissima</i>)	■		■	
White mulberry (<i>Morus alba</i>)	■		■	
White poplar (<i>Populus alba</i>)	■			

Bold = High Priority Species

Additional resources for photos and detailed descriptions of these invasive plants are listed on the back of this brochure. Additional information on controlling invasive plants is available from Natural Resources Managers.



Chinese wisteria (*Wisteria sinensis*)

photo courtesy of K. Metcalf

what you can do about invasive plants

You can help stop invasive plants by identifying these species and taking actions to prevent their introduction and spread:

- Learn about the invasive species that are in your area and what is being done about them
- Be able to identify invasive plants
- Report new invasive species and infestations to the Natural Resources Manager
- Remove invasive plants from your property
- Plant non-invasive plants on your property
- Clean boats and trailers, off-road vehicles, boots, waders, and other pathways of spread to stop hitchhiking invasive species
- Use certified "weed-free" forage, firewood, hay, mulch, and soil
- Volunteer for organized efforts to remove invasive species from natural areas and support organizations that work with invasive species

Natural Resources Managers need your help to prevent and contain the spread of these invaders.

Early Detection and Rapid Response (EDRR) is critical to identify new areas of infestation, rapidly respond, and increase the chances of success.

The Department of Defense is a leader in natural resources management and controlling invasive species.

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Enclosure 6. DoD Coordinated Migratory Bird Survey

NAVFAC Atlantic Biological Resource Services

Contract: N62470-08-D-1008; Task Order: WE43

FINAL - July 2014



Department of Defense Coordinated Bird Monitoring

Avian Species List Study

Naval Air Station Oceana
Dam Neck Annex,
Virginia Beach, Virginia



Prepared for:
NAVFAC Atlantic
6506 Hampton Blvd.
Norfolk, VA 23508



Prepared by:
Tetra Tech, Inc.
1320 North Courthouse Road, Suite 600
Arlington, VA 22201



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- Appendix D – Checklist of Birds for NASO DNA

ACRONYMS AND ABBREVIATIONS

BAGEPA	Bald & Golden Eagle Protection Act
BBA	Breeding Bird Atlas
CBM	Center for Conservation Biology
DoD	Department of Defense
EO	Executive Order
ESA	Endangered Species Act
GIS	Geographic Information System
GPS	Global Positioning System
INRMP	Integrated Natural Resources Management Plan
MAPS	Monitoring Avian Productivity and Survivorship
MBTA	Migratory Bird Treaty Act
NASO DNA or Base/installation	Naval Air Station Oceana Dam Neck Annex
NAVFAC Mid- Atlantic	Naval Facilities Engineering Command Mid-Atlantic
Navy	United States Department of the Navy
NEPA	National Environmental Policy Act
Tetra Tech	Tetra Tech, Inc.
USFWS	US Fish and Wildlife Service

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1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) was contracted by the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command Mid-Atlantic (NAVFAC Mid-Atlantic) to conduct a Department of Defense (DoD) Coordinated Bird Monitoring study at Naval Air Station Oceana Dam Neck Annex (NASO DNA or Base/installation), Virginia Beach, Virginia. The Project tasks include: (1) planning, coordination, research, and site visit; (2) winter 2013 resident survey; (3) spring 2013 breeding survey; (4) summer 2013 resident survey; (5) fall 2013 migration survey; and (6) reporting including a draft and final report and installation avian species list. The project was designed to provide the Base with a better understanding of avian diversity at NASO DNA and establish protocols and recommendations for future monitoring. The report and data will aid in ensuring compliance with applicable DoD policies, instructions, and guidance.

1.1 BACKGROUND

NASO DNA provides a variety of habitats and open space for a wide range of avian species. These include several migratory as well as resident avian populations that provide important ecological services and are important indicators of ecosystem health. A large portion of avian species at NASO DNA are protected under the Migratory Bird Treaty Act (MBTA) and under Executive Order (EO) 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. Some species also have additional protection under the Endangered Species Act (ESA) and/or the Bald & Golden Eagle Protection Act (BAGEPA). It is the responsibilities of federal agencies, including the DoD, to protect migratory birds and support and contribute to the goals and efforts of regional migratory and game bird conservation programs.

Several comprehensive conservation plans for migratory birds have been developed for landbirds, shorebirds, and waterbirds in Virginia. Within the guidance of EO 13186 these plans provide the structure, conservation priorities, goals, and objectives for various avian species and their habitats at NASO DNA. Plans that are applicable to NASO DNA include:

- DoD Coordinated Bird Monitoring Plan
- Partners in Flight, North American Land Bird Conservation Plan
- Partners in Flight, Bird Conservation Plan for the South Atlantic Coastal Plain
- North American Waterfowl Management Plan
- US Shorebird Conservation Plan
- North American Waterbird Conservation Plan
- Virginia Bird Conservation Initiative
- Virginia Wildlife Action Plan
- South Atlantic Migratory Bird Initiative
- North American Bird Conservation Initiative

The DoD is subject to several regulations establishing responsibilities for monitoring migratory birds. The Sikes Act requires all military installations with significant natural resources to prepare and implement Integrated Natural Resources Management Plans (INRMPs) that guide conservation and long-term management of natural resources. The National Environmental Policy Act (NEPA) requires federal agencies to evaluate and disclose potential environmental impacts of proposed actions. This requires bird populations to be monitored and status established. In 2006, DoD signed an Memorandum of Understanding with the US Fish and

Wildlife Service (USFWS) under which DoD will identify and monitor migratory species that could be affected by military activities.

As a result of the MBTA and direction of EO 13186, the DoD established the Coordinated Bird Monitoring (CBM) plan to provide a comprehensive approach for assisting the DoD in fulfilling its responsibilities in regards to avian populations. The plan establishes goals and objectives for monitoring birds, describes the DoD's role in large-scale monitoring programs, provides guidelines on selection of field methods and data management, and identifies additional actions that would help DoD biologists.

1.2 PURPOSE AND OBJECTIVES

Purpose: NASO DNA is obligated to carry out programs for the conservation of migratory birds that may occur on Base properties. This project is part of the overall migratory bird conservation program at NASO DNA and is designed to help ensure ecosystems upon which the migratory birds depend are appropriately managed to support biodiversity and ecological integrity of the Base. Meeting these requirements along with providing a conservation management program supports the Navy mission of ensuring healthy lands for long-term use of installations for military training and readiness activities.

NASO DNA parcels provide important training areas for conducting military exercises. These lands simultaneously support habitat for flora and fauna, including birds. Effective management of the avian population begins with collecting baseline ecological data on the species occupying the Base as well as densities and seasonal use. This information can be incorporated into management plans that can be used by natural resource managers to provide a sustainable, multiple-use management strategy for migratory birds. Migratory bird surveys and breeding bird counts provide a strong, statistically valid framework for detecting trends in bird populations and assist managers in meeting their bird conservation goals. The primary purpose of the monitoring study was to contribute to the baseline bird data and develop a comprehensive bird species list, as well as provide the methods, protocols, and recommendations for future study.

Goal: Implement a DoD Coordinated Bird Monitoring study designed to contribute to the understanding of the avian communities at NASO DNA.

Objectives:

1. Establish point count, area search, and hawk watch survey locations;
2. Establish methods and protocols designed to facilitate future study;
3. Implement monitoring during fall migration, winter resident, spring breeding and summer resident seasons;
4. Summarize and report monitoring data;
5. Use monitoring, existing data, and expert analysis to develop a comprehensive list of birds of NASO DNA; and,
6. Develop recommendations based on results and observations.

2.0 MONITORING AREA

2.1 INSTALLATION SETTING AND LAND USE

NASO DNA is located in the southeastern portion of the City of Virginia Beach, Virginia (Figure 1). It encompasses 1,372 acres and is bounded by the VA Army National Guard – Camp Pendelton to the north, the Atlantic Ocean to the east, the community of Sandbridge to the south, and Virginia Beach to the west. Land use surrounding the Base includes industrial, commercial, residential, recreational, and agricultural though most of the agricultural lands are rapidly being converted to residential and recreational developments. Urban/developed is the most common land use on the Base. Most of the remaining landscapes on Base include beaches and dunes, and upland and wetland forests that are dominated by hardwood species or a mix of pine and hardwood.

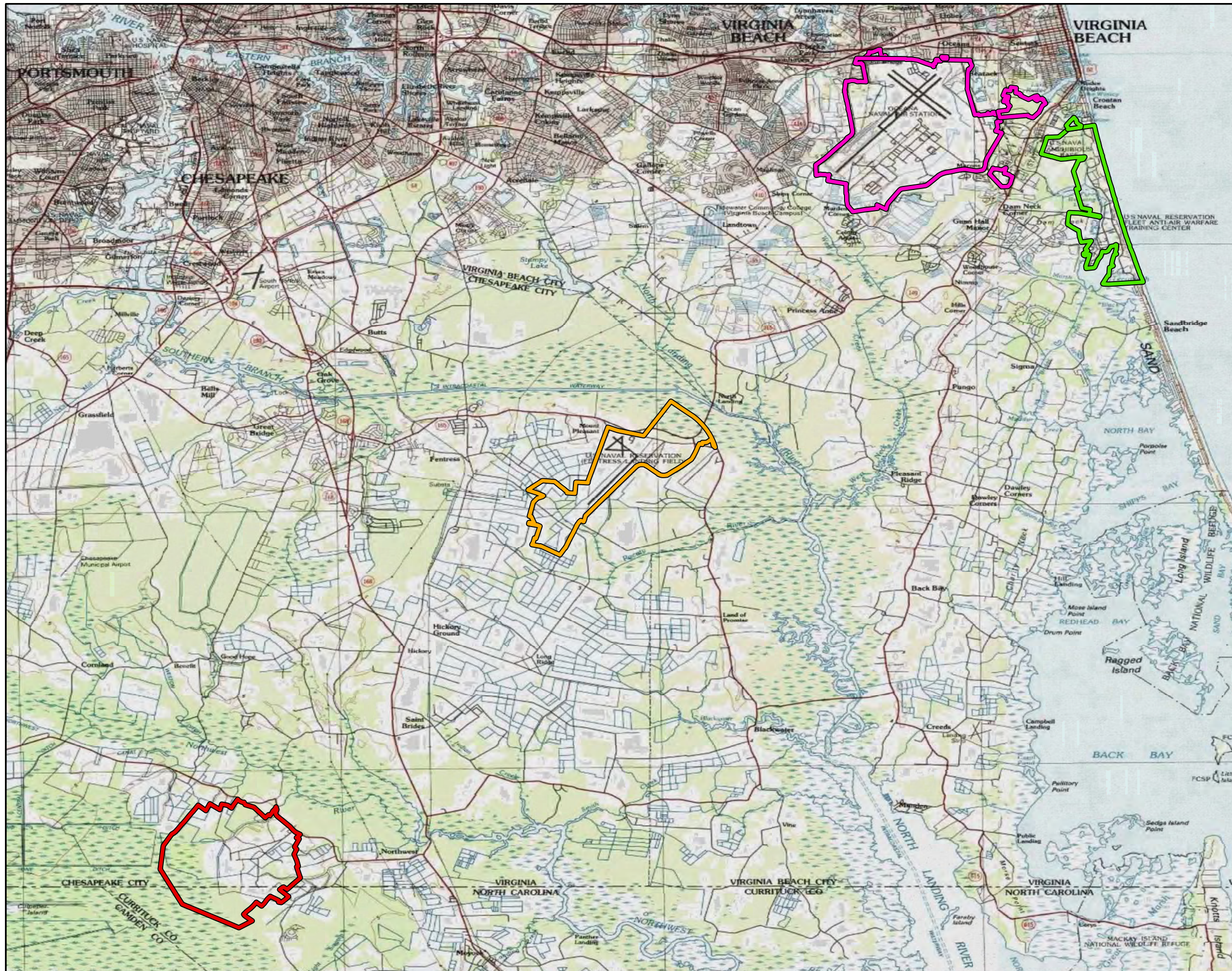
Due to the intense level of development in the region, NASO DNA and the other coastal military installations are extremely important to the region's ecology. These bases, along with First Landing State Park to the north and Back Bay National Wildlife Refuge to the south, support the few remaining tracts of undeveloped dune ecosystems along the Virginia coast. NASO DNA has nearly four continuous miles of primary and secondary coastal dune habitat and other habitat types important to avian species.

2.2 ECOLOGICAL COMMUNITY GROUPS

Several ecological community groups have been listed as occurring at NASO DNA. These communities provide potential forage and nesting habitat for a wide diversity of avian species, including species representative of nearly every classification order of birds. Detailed descriptions of these are provided within the Base's INRMP (US Navy 2014).

- Beach and Foredune
- Maritime Dune Woodlands
- Maritime Evergreen Forests
- Maritime Dune Grasslands
- Maritime Scrub
- Interdune Wetlands
- Hardwood Forests
- Mixed Forests
- Pine Forests (both managed and unmanaged)
- Early Successional Habitats

In addition to the above mentioned communities there are several other habitats noted for the Base. They include: open ocean, palustrine forest wetlands, palustrine scrub-shrub wetlands, palustrine emergent wetlands, lakes, ponds, streams, canals, drainage ditches, maintained open areas (lawns), and developed areas. The significant ecological community groups include maritime upland forest, maritime dune woodland, and interdunal pond.



Legend

- NAS Oceana Installation Area
- NASO DNA Installation Area
- NALF Fentress Installation Area
- NSAHR NWA Installation Area

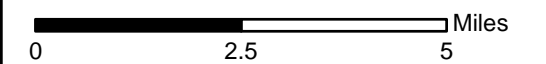
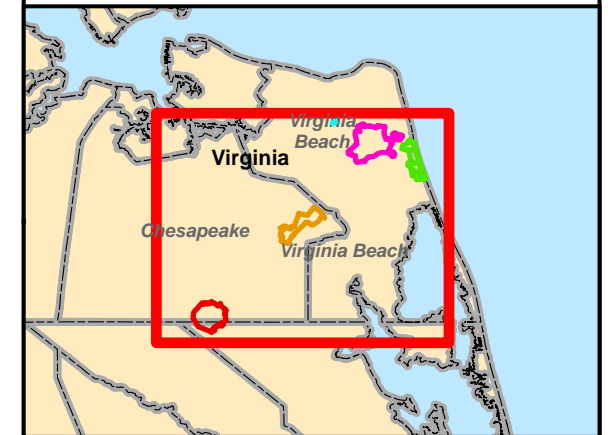


Figure 1. Overview of Project Area for Avian Species List Study at NASO DNA (2013).



Date:
04/2014

NAVY GIS LAYERS
 Aerial Background: Oceana_rgb_u3in_201108.sid
 Installation Boundary: oceana_installation_area

Coordinate System: North American Datum, 1983
 Universal Transverse Mercator, Zone 19, North, Meters

2.3 STUDY AREA

The Study Area includes the entirety of NASO DNA and a portion of Camp Pendleton, as well as near shore ocean areas as depicted in Figure 1. As a result of difficulty in accessing some areas of the facility due to security restrictions, military operations, and public use activities, not all areas were surveyed. However, the study area was defined as the entire Base as this effort ultimately is a compilation of a variety of sources to determine the bird species occurring at NASO DNA, including the formal surveys described within this report.

3.0 METHODS

The primary objective of the study was to develop a comprehensive bird species list for NASO DNA. To reach this objective, the DoD CBM plan recommends using a combination of expert analysis, existing data, and field survey (Bart 2005, Bart et al. 2012). Field survey can be implemented using a variety of methods including area searches, fixed-radius point counts, distance point counts, double observer, removal methods, species-specific survey (e.g., species of concern, hawk watch), and mark and recapture methods (Bart et al. 2012). For this study, field survey efforts included distance point counts, hawk watches, and area searches. The results of the monitoring were combined with expert analysis and existing information (e.g., eBird observation data, Breeding Bird Atlas [BBA] data, Monitoring Avian Productivity and Survivorship [MAPS] data, and NASO DNA INRMP) to develop a bird species list for NASO DNA. Specific methods are outlined in the following sections.

3.1 PRE-FIELD PLANNING

Desktop review of NASO DNA aerial, land cover, and soils maps combined with INRMP review, expert knowledge of “good birding” areas, conversations with Base biologist regarding management objectives, and on-the-ground site reconnaissance were used to establish survey locations. Point counts were set-up along routes designed to be surveyed in a single survey morning within a specified time frame. An initial site visit resulted in GPS located survey point count locations and survey polygons for area searches. Survey field maps and GPS locations were then provided to field teams for easy relocation and navigation in the field.

3.2 SURVEY PERIODS

To document annual bird use of the Base by a variety of family groups, the study involved four (4) survey periods occurring in the fall, winter, spring (or breeding) and summer seasons. In most cases surveys were replicated within these seasons to capture seasonal variability. The survey periods were defined as follows (with the understanding that some species do breed outside of the defined “breeding” period identified below):

Fall	September 1 – October 31
Winter	January 1 – January 31
Breeding	April 1 – May 31
Summer	June 1 – July 31

3.3 SURVEY PROTOCOLS

Distance Point Counts: A distance point count consists of standing at a predetermined location and recording bird observations, and distances to those observations, for a set period of time.

For this study the period of time was set at 5 minutes. The number of individual birds of each species, and distance to the observation (auditory or visual) was estimated and recorded on the Avian Survey Data Form (Appendix A). Distances were recorded to facilitate future analysis as this attribute can be important in estimating densities. Specific instructions on recording each observation and its attributes are provided within the data form instructions included in Appendix A. Diurnal counts were conducted between sunrise and four hours after sunrise (fall and winter), or between 30 minutes prior to and three and a half hours after sunrise (spring and summer). Nocturnal counts, which were associated with the May full moon, were all conducted beginning at least 1/2 hour after sunset up to one hour before sunrise. All nocturnal counts were conducted when the moon was above the horizon and skies were clear or mostly clear. Such weather conditions are conducive to increased levels of vocalizing by chuck-will's-widows, eastern whip-poor-wills, and owls, and may induce nighttime singing by diurnal species such as some sparrows, cuckoos, night-herons, and wrens. Nocturnal point counts included broadcast of owl calls at the end of each 5 minute count.

Upon arrival at point count location observers waited for 2 minutes before recording birds to allow birds to acclimate to the disturbance of the approach as well as the observers presence. Weather conditions were noted on each data form, however, surveys were not conducted during rain, under windy conditions (i.e., > 10 mph), or when hearing was significantly impaired due to installation activities (e.g., aircraft maneuvers). With the exception of nocturnal surveys (which included the use of owl broadcast calls) observers did not use sounds to attract birds to the point or induce calling. No "spishing", "squeaking", recorded calls, or any other methods that encourage birds to alter their behavior were used.

During the survey it was determined that 20, 5-minute points could typically be surveyed in a single morning. Most point counts were approximately 600 meters from the closest adjacent point count; however, a few were located closer than this. Point counts were established in a variety of habitats and soil types representative of the Base. During the nocturnal surveys, every other station (i.e. point) was sampled to avoid duplicate observations as nocturnal birds can be heard at greater distances due to loud vocalizations (i.e., owls, goatsuckers) and lower ambient noise levels at night.

Point counts were conducted throughout NASO DNA (Figure 2). Where possible, points were situated to capture several habitats and land uses within one point location in an effort to capture avian activity in a broad range of land uses, vegetative communities, soil types, and topographic locations. This approach ensured that habitats of virtually all birds on Base would be captured, and is intended to facilitate the evaluation of potential impacts of future management activities on avian populations. Ecological communities targeted with point counts included ocean; beach and dune; hardwood, conifer and mixed wood forest; grassland and old field; scrub shrub; freshwater, and to a much lesser extent brackish wetlands; lakes, ponds, canals and drainage ditches; maintained lawns and fields; and, developed areas.

The point counts were established in one group or route to facilitate survey organization. The route was designed to be finished within 3.5 hours after ½ hour before the published sunrise during the breeding season. The point count station locations and frequency of survey are provided in the results section.

Hawk Watches: Hawk watch points were established using local expert experience and in areas that provided the best views of migrating hawks (Figure 3). Hawk watch points were surveyed during the fall survey period only (September thru October). Points were surveyed multiple times for a 2 hour window between two and one-half and four and a half hours after sunrise. Observations were recorded on the Avian Survey Data Form (Appendix A). Weather conditions were noted on each data form; however surveys were not conducted during rain events. This type survey was not hampered by wind or loud installation activities.

Area Searches: Area searches were established by local expert experience and were located primarily in areas with unique habitats or over large, inaccessible areas such as water bodies or inundated wetlands. Ecological communities targeted by area searches included a relatively large freshwater marsh located on the northern section of the installation in the Lovett's Marsh area, a portion of the 261 acre Lake Tecumseh, and the dune/beach and near shore community along the Base (Figure 3). Area searches were conducted from single observation points or by meandering through habitat within defined polygons. Area search methods allow the observers more flexibility in surveying a variety of habitats, especially those near and over water. Visual and/or auditory observations were recorded on the Avian Survey Data Form (Appendix A). During each survey observations were made until no new species could be recorded for the area.

Most of the species searched for during the area searches are water birds, shorebirds, or birds that utilize open areas and dunes; thus area search surveys were not limited to the early morning, but were conducted at various times during the day. At least one breeding season area search event was scheduled between 30 minutes before the published sunrise and 3.5 hours after the published sunrise and utilized broadcast calls in an effort to target secretive marsh species. The area search locations and frequency of survey are provided in the results section.

Additional area searches were conducted in areas along the ocean shoreline of NASO DNA, including areas within firing range training areas (when access was permissible). These surveys differed from area searches in that they targeted shorebird and coastal species and were conducted for at least 4-hours in total survey time. Each survey was conducted anytime between published sunrise and sunset in a single day, but some were spread out over 2-days due to training area access issues. Surveyors meandered along the shoreline and used elevated areas for viewing the beach and near shore zones for target species. Observations were recorded on the Avian Survey Data Form (Attachment A).

Weather conditions were noted on each data form; however surveys were not conducted when it was raining. [This type survey was not hampered by wind or loud installation activities.] No "spishing", "squeaking", recorded calls, or any other methods that encourage birds to alter their behavior were used. However, the flushing of birds was allowed due to the nature of the survey.

Incidental Observations: Incidental observations were only recorded for sensitive species with the potential to occur at NASO DNA as listed in Table 1. Incidental observations were species observed out-side of the formal surveys; such as between point counts or while driving on Base. Incidental observations were recorded on the Avian Survey Data Form (Appendix A). In addition, all incidental observations were located using a hand-held GPS and the location recorded on the data form.

Table 1. Sensitive Species Watch List for Avian Species List Study at NASO DNA.

Scientific Name	Common Name	Federal Status	State Status
<i>Accipiter gentilis</i>	Northern goshawk	Species of Concern	Not Listed
<i>Aegolius acadicus</i>	Northern saw-whet owl	Not Listed	Special Concern
<i>Ammodramus caudacutus</i>	Saltmarsh sharp-tailed	Not Listed	Special Concern
<i>Ammodramus henslowii</i>	Henslow's sparrow	Not Listed	Threatened
<i>Ardea alba</i>	Great egret	Not Listed	Special Concern
<i>Asio otus</i>	Long-eared owl	Not Listed	Special Concern
<i>Bartramia longicauda</i>	Upland Sandpiper	Not Listed	Threatened
<i>Calidris canutus</i>	Red knot	Candidate	Not Listed
<i>Catharus guttatus</i>	Hermit thrush	Not Listed	Special Concern
<i>Certhia americana</i>	Brown creeper	Not Listed	Special Concern
<i>Charadrius melodus</i>	Piping Plover	Threatened	Threatened
<i>Charadrius wilsonia</i>	Wilson's Plover	Species of Concern	Endangered
<i>Circus cyaneus</i>	Northern harrier	Not Listed	Special Concern
<i>Cistothorus platensis</i>	Sedge wren	Not Listed	Special Concern
<i>Egretta caerulea</i>	Little blue heron	Not Listed	Special Concern
<i>Egretta tricolor</i>	Tricolored heron	Not Listed	Special Concern
<i>Empidonax alnorum</i>	Alder flycatcher	Not listed	Special Concern
<i>Empidonax flaviventris</i>	Yellow-bellied flycatcher	Not Listed	Special Concern
<i>Falco peregrinus</i>	American peregrine falcon	Not Listed	Threatened
<i>Gallinula galeata</i>	Common gallinule	Not Listed	Special Concern
<i>Gelochelidon nilotica</i>	Gull-billed Tern	Species of Concern	Threatened
<i>Geothlypis philadelphia</i>	Mourning warbler	Not Listed	Special Concern
<i>Haemorhous purpureus</i>	Purple finch	Not Listed	Special Concern
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Species of Concern	Not Listed
<i>Hydroprogne caspia</i>	Caspian tern	Not Listed	Special Concern
<i>Lanius ludovicianus migrans</i>	Migrant loggerhead shrike	Species of Concern	Not Listed
<i>Laterallus jamaicensis</i>	Black rail	Species of Concern	Endangered
<i>Limnothlypis swainsonii</i>	Swainson's warbler	Not Listed	Special Concern
<i>Loxia curvirostra</i>	Red crossbill	Not Listed	Special Concern
<i>Nyctanassa violacea</i>	Yellow-crowned night-heron	Not Listed	Special Concern
<i>Pelecanus occidentalis</i>	Brown pelican	Not Listed	Special Concern
<i>Peucaea aestivalis</i>	Bachman's Sparrow	Species of Concern	Threatened

<i>Picoides borealis</i>	Red-cockaded Woodpecker	Endangered	Endangered
<i>Plegadis falcinellus</i>	Glossy ibis	Not Listed	Special Concern
<i>Regulus satrapa</i>	Golden-crowned kinglet	Not Listed	Special Concern
<i>Setophaga cerulea</i>	Cerulean warbler	Species of Concern	Not Listed
<i>Setophaga kirtlandii</i>	Kirtland's warbler	Endangered	Endangered
<i>Setophaga magnolia</i>	Magnolia warbler	Not Listed	Special Concern
<i>Sitta canadensis</i>	Red-breasted nuthatch	Not Listed	Special Concern
<i>Spiza americana</i>	Dickcissel	Not Listed	Special Concern
<i>Sterna dougallii</i>	Roseate tern	Endangered	Endangered
<i>Sterna forsterii</i>	Forster's tern	Not Listed	Special Concern
<i>Sternula antillarum</i>	Least tern	Not Listed	Special Concern
<i>Thalasseus sandvicensis</i>	Sandwich tern	Not Listed	Special Concern
<i>Thryomanes bewickii</i>	Bewick's wren	Not Listed	Endangered
<i>Troglodytes hiemalis</i>	Winter wren	Not Listed	Special Concern
<i>Tyto alba</i>	Barn owl	Not Listed	Special Concern
<i>Vermivora bachmanii</i>	Bachman's warbler	Endangered	Endangered
<i>Vermivora chrysoptera</i>	Golden-winged warbler	Not Listed	Special Concern

3.4 EXPERT ANALYSIS

Principal Environmental Biologist, Stacie L. Grove, is a Professional Wetland Scientist, Certified Wildlife Biologist, and specialist in avian ecology and identification. Ms. Grove has spent her entire professional career focusing on bird-related research and assessments, and has conducted avian work from the east coast to west. Her expertise includes species-specific surveys for federal and state-listed birds at numerous locations throughout the United States, peregrine falcon reintroduction work for the US Fish and Wildlife Service, assessments of avian habitat use in coastal areas of New York and New Jersey for the US Army Corps of Engineers, as well as mist-netting and avian research to assess song bird and wading bird populations in Delaware, Maine, Massachusetts, and New Jersey for Manomet Center for Conservation Sciences (aka Manomet Bird Observatory). Ms. Grove has provided environmental services throughout the east coast and is very familiar with the Base's habitats and birds. She participated in all field survey events performed on the base, and was key in developing and reviewing the checklist of birds for NASO DNA as provided herein.

Biologist Benjamin Griffith has spent nearly all of his life immersed in the study of birds. Prior to college and continuing throughout his career he has participated in approximately 60 Christmas bird counts, as well as dozens of additional bird counts, censuses, and monitoring projects in 14 states. Mr. Griffith has served as a seasonal editor for a state ornithological journal, an executive board member for a chapter of New Hampshire Audubon, and has been a member of the New Hampshire bird records evaluation committee since 2010. This expertise proved invaluable to developing and reviewing the checklist of birds for NASO DNA.

3.5 CHECKLIST DEVELOPMENT

One of the objectives of the study was to develop a comprehensive checklist for the birds of NASO DNA (Appendix D). Five facets of data and review were used to develop the checklist and included:

- Direct observations recorded during this study;
- Virginia eBird data for Virginia Beach 2009-2013 (eBird 2013);
- Virginia BBA data (BBA Explorer 2014);
- The MAPS Program Annual Reports, 1989-2003 for the PEND (Camp Pendleton) Station (Michel et al. 2006), and
- Regional expert review and abundance category assignment.

Other avian data sets for the region were referenced as a cross check, including Virginia Breeding Bird Survey Data (VA BBS 2014) and Christmas Bird Count Data, but these provided less meaningful information; primarily because the geographic scope of the data was too large to make meaningful correlations to the Base, was not in a particularly useful format, or the species were sufficiently captured in the eBird data. The MAPS data was more project area specific with the monitoring station occurring on the northern parcel of NASO Dam Neck (formerly referred to as Camp Pendleton or South Virginia Beach Annex) and recorded from 1995-2002. The MAPS data also provided estimates of abundance to further assist with checklist development.

The checklist was designed after those developed for a variety of locations by the United States Geological Survey's (USGS's) Northern Prairie Wildlife Research Center and closely follows that of the 2007 checklist developed for Virginia (Rottenborn and Brinkley 2007). As

recommended by the USGS, *A Proposed Format for Local Bird Checklists* (Andrews et. al. 1992) was also used as a helpful guide. The checklist included the following USGS abundance categories and nesting annotation for the four survey periods listed in Section 3.2:

- a - abundant: common species that is very numerous
- c - common: certain to be seen in suitable habitat
- u - uncommon: present but not certain to be seen
- o - occasional: seen only a few times during a season
- r - rare: seen at intervals of 2 to 5 years
- x - extremely rare: species highly unlikely to occur
- * - breeds/nests on study area

The observations recorded for this study, the species lists downloaded from the eBird (eBird 2013) website, Virginia BBA data, and MAP results were evaluated and combined as appropriate to develop a list of birds likely to occur on NASO DNA properties. Species were included on the list if confirmed on the installation through 2012-2013 avian survey efforts, were documented within the same BBA atlas block, were reported on at least 2 eBird checklists for Virginia Beach within the past 5-years AND had a frequency of occurrence on eBird checklists of ≥ 0.15 percent (%) in at least one season (spring, summer, fall, winter) of the year. The combined list was then manually reviewed by Stacie Grove and Audubon Bird Record Committee Reviewer, Benjamin Griffith, and species were further added or eliminated based on an evaluation of eBird frequency data, habitat availability on the Base, and their local knowledge and expertise. Ms. Grove and Mr. Griffith also were responsible for evaluating eBird and Virginia BBA data to assign the seasonal abundance categories, and to note if particular species are known to breed in Virginia Beach. Seasonal abundance categories were assigned based primarily on eBird frequency data (e.g., percent of records submitted on which the species observed) as follows: a = 25%, c = 10%, u = 3%, o = 0.6%, r = 0.15%.

3.6 DATA STORAGE AND ANALYSIS

All observations were recorded on the Avian Survey Data Form (Appendix A). A Microsoft Access (Microsoft Inc., Redmond, WA) database was created to facilitate data entry, storage, and analysis. Data entry forms within the database mirrored the field form and contained pull down menus and quality control features to ensure accurate data entry. The database is also equipped with other quality control tools such as filters and range searches that allowed for user initiated data entry checks. The database was used to initiate analysis queries as needed to present the results herein. The database entry forms, quality controls, and queries were designed to allow for future use during similar studies.

Geospatial data was collected via handheld Garmin Global Positioning System (GPS) units (Garmin Inc., Olathe, KS) and stored within ArcGIS for incorporation into the installation's GIS Database. The GPS units used (GPSMAP 60CSx or Oregon Series) are not capable of submeter data collection, however, points were only collected with accuracies displayed on these GPS units that was less than 5 meters. Established point counts and area polygons, as well as recorded locations of sensitive species were converted to ArcGIS (ESRI Inc., Redlands, CA) shape files and submitted to the Base in accordance with all geospatial standards. All points and polygons were appropriately attributed with point labels and/or species name. Metadata (e.g., abstract, purpose, contacts) was also prepared for all appropriate fields for each ArcGIS shape file submittal.

4.0 RESULTS

4.1 DISTANCE POINT COUNT SURVEY

One distance point count route was established throughout ecological communities of the Base and named Route 1 (DNPC). A total of 20 points were surveyed during each replication of the route during the four survey periods, however, due to access issues, some of the replications had less than the 20 points surveyed. Tables 2 and 3 summarize the distance point count effort and Figure 2 depicts the locations of the point count stations. Table B1 in Appendix B provides the distance point count location data.

Approximately 1,439 observations were recorded during the point count surveys. A total of 122 species were recorded across all seasons (Table 4). The breeding survey recorded the most species at 89, followed by winter (62), fall (58), and then summer (50) (Table 4). The first replicate for all seasons combined recorded 96 species and the additional replicates added 26 species. During the breeding season the first replicate recorded 61 species and the remaining

Table 2. Distance Point Count, Area Search, and Hawk Watch Survey Effort Summary for Avian Species List Study at NASO DNA (2013).

Route/Location Name	Survey Replications (#)			
	Fall	Winter	Breeding	Summer
DISTANCE POINT COUNTS				
DNPC (20 points)	2	2	3(1)	1
AREA SEARCHES				
DNAS01	2	2	3	1
DNAS02	2	2	3	1
DNAS03	2	2	3	1
DNAS04 (1) – shorebird survey	1	0	3	1
DNAS04 (2) – shorebird survey	1	0	3	1
HAWK WATCH				
DNAHW	2	0	0	0

() = nocturnal survey

Table 3. Detailed Distance Point Count Survey Effort Summary for Avian Species List Study at NASO DNA (2013).

Route/Location Name	# Points Surveyed Per Replication			
	Fall	Winter	Breeding	Summer
DNPC (20 points)	18*, 20	17*, 19*	18*, 19*, 20, (2)	20
Total	18, 20	17, 19	18, 19, 20, (2)	20

Values represent number of points surveyed per replication.

() = nocturnal survey

*Points not surveyed due to access issues: Fall rep 1 – DNPC06 and DNPC20, Winter rep 1 DNPC06, DNPC09, and DNPC20, Winter rep 2 - DNPC06, Breeding rep 1 – DNPC06 and DNPC20, Breeding rep 2 – DNPC04.

Table 4. Distance Point Count, Area Search, and Hawk Watch Survey Species Totals for Avian Species List Study at NASO DNA (2013).

Route/Location Name	Fall	Winter	Breeding	Summer	All Seasons
DISTANCE POINT COUNT					
DNPC (20 points)	58	62	89	50	122
ALL DISTANCE POINT COUNT (20 points)	58	62	89	50	122
AREA SEARCH					
DNAS01	13	19	33	15	44
DNAS02	27	24	60	17	79
DNAS03	12	7	56	15	61
DNAS04 (1)	13	N/A	35	6	38
DNAS04 (2)	N/A	N/A	32	15	35
ALL AREA SEARCH	43	42	115	42	133
HAWK WATCH					
DNAHW	5	N/A	N/A	N/A	5
ALL HAWK WATCH	5				5
POINT, AREA, and HAWK SURVEYS COMBINED					
	72	74	133	66	159

replications added 28 species. Replication 3 during the breeding season consisted of only a nocturnal survey. The nocturnal survey recorded one species, the Eastern screech-owl. All breeding season point counts were surveyed between April 8 and May 24, 2013. Table C1 in Appendix C provides a list of species observed during the distance point count surveys, species are grouped by order.

4.2 AREA SEARCH SURVEY

Four area searches were conducted and included meandering surveys of the dune/beach and near shore community, and surveys of wetlands and lake/lakeshore habitats from observation points along the resources (Figure 3). In accordance with the pre-planning efforts, shorebird surveys were not conducted in the winter and hawk watch surveys were only conducted in the fall. These area searches and the frequency of survey are summarized in Table 2. Table B1 in Appendix B provides the center location data for each of the area searches.

Approximately 667 observations recorded 133 species during the area search surveys (Table 4). The breeding survey recorded the most species at 115, followed by fall (43), then winter and summer (both 42) (Table 4). The first replicate for all seasons recorded 84 species and the additional replicates added 31 species. During the breeding season the first replicate recorded 64 species and the remaining replications added 51 species. During the fall season the first replicate recorded 26 species and the remaining replications added 17 species. All breeding season areas searches were surveyed between April 8 and May 24, 2013. Table C1 in Appendix C provides a list of species observed during the area search surveys, species are grouped by order.

4.3 HAWK WATCH SURVEY

Hawk watches were performed during the fall season at one observation station over two replications (Table 2 and Figure 3). Table B1 in Appendix B provides the hawk watch station location data. Observation periods lasted for approximately 2 hours. The hawk watches recorded 21 observations of 5 species (Table 4). Of the 5 species, 3 were raptors (i.e., hawks, eagles, falcons, and vultures). The initial replication of the survey resulted in an observation of 4 species. Table C1 in Appendix C provides a list of species observed during the hawk watch surveys, species are grouped by order.

4.4 INCIDENTAL OBSERVATIONS

Throughout the study surveyors noted incidental observations of birds of special concern listed on Table 1. Four species were observed incidentally, and include (number of individuals): Bald Eagle (n=1), Forster's Tern (n=1), Golden-crowned Kinglet (n=1), and Red-breasted Nuthatch (n=1). These values represent only observations that occurred specifically as incidental observations; they do not include observations within regular surveys. All four of these species were also observed during the formal surveys.

4.5 OTHER NOTABLE OBSERVATIONS

Other notable observations included the presence of a potential heron rookery on the west shoreline of the marsh/pond (designated DNAS03) within DEVGRU (development group facilities in the northern portion of the Base), a radio-tagged bald eagle flying over the north end of the Base, and dozens of active osprey nests (located primarily on utility poles) throughout the Base. Also of interest, was the observation of a northern river otter (*Lontra canadensis*) within a pond adjacent to point count station DNPC14. Numerous dead seabirds were found on the beaches along the Base during early surveys in early April including nine common loons, six brown pelicans, and one northern gannet. Unusually high seabird mortality was noted at various locations along the east coast in March and April 2013.

4.6 TAXONOMIC SUMMARY

The 159 species observed during the 2013 monitoring effort represented 17 taxonomic orders (Table 5). Passeriformes (perching birds) was represented by the most species (n = 75) and the second most (n = 25) species was represented by Charadriiformes (plovers, sandpipers, and rails). Breeding and summer surveys noted the most number of passerines. Winter surveys were important to document the species richness of Anseriformes (ducks, geese, and swans).

Table 5. Number of Species by Taxonomic Order for Avian Species List Study at NASO DNA (2013).

Taxonomic Order	Order Description	Fall	Winter	Breeding	Summer	All
Anseriformes	Ducks, Geese, and Swans	6	19	12	1	22
Galliformes	Grouse, Quail, and Allies	0	0	0	0	0
Gaviiformes	Loons	1	2	2	0	2
Podicipediformes	Grebes	1	3	3	0	3
Suliformes	Frigatebirds, Boobies, Cormorants, Darters, and Allies	1	2	2	1	2
Pelecaniformes	Pelicans, Herons, Ibises, and Allies	2	3	6	4	7
Accipitriformes	Hawks, Kites, Eagles, and Allies	6	2	7	2	8
Falconiformes	Caracaras and Falcons	0	1	1	0	1
Gruiformes	Cranes and Rails	1	1	0	0	2
Charadriiformes	Plovers, Sandpipers, and Allies	12	5	22	13	25
Columbiformes	Pigeons and Doves	2	2	2	2	2
Cuculiformes	Cuckoos	0	0	1	1	1
Strigiformes	Owls	1	0	1	0	1
Caprimulgiformes	Nightjars	0	0	2	0	2
Apodiformes	Swifts and Hummingbirds	1	0	2	2	2
Coraciiformes	Kingfishers and Allies	1	0	0	0	1
Piciformes	Woodpeckers	6	5	6	4	7
Passeriformes	Perching Birds	35	37	66	38	75

4.7 SENSITIVE SPECIES SUMMARY

Of the 49 sensitive/watch list species listed in Table 1 as having the potential to occur at NASO DNA, 16 species were observed during this survey. Table 6 lists the species observed, the type of survey, number of individuals observed, and agency status.

Table 6. Sensitive Species Observations for Avian Species List Study at NASO DNA (2013).

Scientific Name	Common Name	Point Count	Area Search	Hawk Watch	Incidental	No. ¹	Federal Status	State Status
<i>Ardea alba</i>	Great Egret	✓	✓			6	Not Listed	Special Concern
<i>Catharus guttatus</i>	Hermit Thrush	✓				1	Not Listed	Special Concern
<i>Certhia americana</i>	Brown Creeper	✓	✓			2	Not Listed	Special Concern

Scientific Name	Common Name	Point Count	Area Search	Hawk Watch	Inci- dental	No. ¹	Federal Status	State Status
<i>Charadrius melodus</i>	Piping Plover		✓			2	Threatened	Threatened
<i>Egretta caerulea</i>	Little Blue Heron		✓			1	Not Listed	Special Concern
<i>Gallinula galeata</i>	Common Gallinule		✓			1	Not Listed	Special Concern
<i>Haemorphus purpureus</i>	Purple Finch	✓				5	Not Listed	Special Concern
<i>Haliaeetus leucocephalus</i>	Bald Eagle	✓	✓		✓	4	Species of Concern	Threatened
<i>Hydroprogne caspia</i>	Caspian Tern		✓			2	Not Listed	Special Concern
<i>Nyctanassa violacea</i>	Yellow-crowned Night-Heron	✓	✓			2	Not Listed	Special Concern
<i>Pelecanus occidentalis</i>	Brown Pelican	✓	✓			27	Not Listed	Special Concern
<i>Regulus satrapa</i>	Golden-crowned Kinglet	✓	✓		✓	6	Not Listed	Special Concern
<i>Sitta canadensis</i>	Red-breasted Nuthatch	✓			✓	2	Not Listed	Special Concern
<i>Sterna forsteri</i>	Forster's Tern		✓		✓	6	Not Listed	Special Concern
<i>Sternula antillarum</i>	Least Tern		✓			4	Not Listed	Special Concern
<i>Thalasseus sandvicensis</i>	Sandwich Tern		✓			3	Not Listed	Special Concern

¹Some may be duplicates due to replication of survey

4.8 CHECKLIST OF BIRDS

This study documented 159 species through direct visual or auditory observation. The greatest diversity was observed in the spring (breeding) with 133 species, and the fewest recorded during the summer with 66 species (Table 4). The list of 159 species was reviewed by Stacie Grove and Benjamin Griffith and compared to eBird and BBA data to further add species likely to occur at NASO DNA that were not observed during this effort or previous studies on the Base. Ms. Grove and Mr. Griffith also annotated each species with seasonal abundance categories and breeding status based on local knowledge and expertise. The final checklist, as presented in Table D1 in Appendix D, is comprised of 275 species, 63 of which are likely to breed at NASO DNA. Species are grouped by order within the checklist. Species that may breed in the region, but are unlikely to breed on the facility due to lack of suitable breeding habitat were not identified as potential breeding species. The species checklist is the first of its kind developed

for NASO DNA and is considered a working list that should be reviewed and updated at regular intervals (e.g., every 5 to 10 years).

5.0 DISCUSSION

Overall Effort

NASO DNA provides forest, beach, dune, freshwater, ocean, and wetland habitats and open space for a wide variety of avian species. This study represents the most concentrated effort to survey for and document the species richness of birds and their likelihood of occurrence at NASO DNA. Through a combination of field survey, information from other studies, and expert analysis, a list of 275 avian species was developed for the Base (Appendix D). The 2006 INRMP for NASO DNA reported 167 species observed during various bird surveys. In addition to the species list, estimates of seasonal abundance/occurrence and breeding status are provided. Of the 275 species listed, 63 are likely to breed at NASO DNA.

This study not only provides the foundation for the understanding of the existing environment as it relates to the avian community, it used DoD coordinate bird monitoring guidance to establish the methods and protocols to facilitate future monitoring. The combination of point count, area search, and hawk watch surveys across four seasons resulted in the observation of 159 species. Whereas, the implementation of just one method would have resulted in a significant decrease in species detections which would be further reduced if multiple seasons were not surveyed (Table 4). The variety of methods recommended by the guidance was important in capturing the diversity of species, as well as allowing for easy replication.

Overall, the breeding period survey, which also included the period of spring migration, provided the highest number of species (133). The winter and fall surveys were next with 74 and 72 species respectively, with the summer surveys the least at 66 species (Table 4). The difference in species numbers among survey periods demonstrates the importance of multiple surveys throughout the year in documenting the presence of a wide variety of species. The area search methods were found to be valuable to the study, capturing 11 more species than the point count surveys and several sensitive/rarer species not observed during other methods. This result is expected as the area search methods allow the observers more flexibility in surveying a variety of habitats, especially those near and over water.

As recommended within the DoD coordinated bird monitoring guidance, other studies and tools were used to further develop the Base's avian species list. The most valuable data sets included BBA and eBird data. eBird, a relatively new tool to the birding community, has revolutionized the way that the birding community reports and accesses information about birds. Launched in 2002 by the Cornell Lab of Ornithology and National Audubon Society, eBird provides rich data sources for basic information on bird abundance and distribution. eBird utilizes a real-time, easy to access and use web-based (and smart phone compatible) interface that allows birders to record bird observations. Many eBird portals are managed and maintained by local partner conservation organizations. In this way eBird targets specific audiences with the highest level of local birding expertise to encourage them to include their bird sightings in eBird. All data entered into eBird is checked by an automated data quality filter which was developed by regional avian experts. Unusual records that are flagged by the filters are then reviewed by local experts before submissions are included in the eBird database.

The BBA data for Virginia was collected by local birders between 1985 and 1989 and was also used to support the checklist. The atlas survey blocks are based on subdivisions of USGS 7.5 minute quadrangles and are especially useful in documenting breeding season avian observations within a relatively small geographic area. Although BBA surveys have not been performed in the area of the Base since the late 1980's, the robust data set (collected by thousands of reputable birders over several consecutive breeding seasons), provides a wealth of information on the birds that have been known to breed in the area, and would be expected to still utilize the area. These tools proved invaluable in developing the avian species lists for the Base and confirming accounts for the species.

The consultation with local birders and experts (as recommended within the DoD guidance), is an important phase to developing a comprehensive species list and proved invaluable to this process. Ms. Grove and a local reputable birder from the Virginia Beach Audobon Society participated in all surveys conducted on Base. In addition, her expertise and that of Audubon records committee member Benjamin Griffith, were integral in developing the Base-specific species list, evaluating eBird and BBA records, and providing seasonal use and abundance category estimates for all 275 species. The species checklist provided in Appendix D is the first of its kind developed for NASO DNA.

Given the overall species list of 275 species, and only 159 (58%) observed during the field surveys, it is important to note that despite the thorough effort, there are limitations of field surveys to capture a large number of species, particularly those that are rare or uncommon. Of the 116 species not observed during this study, 114 (99%) are considered to be rare (43%), occasional visitors (31%), or uncommon (25%) species at NASO DNA (Appendix D). Other factors such as the survey locations, seasonal variability in abundance, limitations in survey methods, and high public/military use of many of the habitat areas surveyed (i.e., training areas, beaches, lakes), will influence detectability of certain species. Further study is recommended to investigate the use of other types of survey methods, as well as expansion of survey areas and time in the field. Also species-specific surveys for sensitive species at risk would help focus conservation efforts.

The seasonal checklist provided in Appendix D is useful for providing a comprehensive list of birds that are likely or have the potential to occur on Base or in its near shore waters during certain times of the year. However it should be noted that the format does have its limitations, especially in coastal areas where migration is apparent almost every week of the year. The status for a given period (e.g. fall, winter, breeding, summer) is to be considered the average status for the season. There are many cases in which the status of a species at the beginning or end of a season may be very different from its average status during that season. Furthermore, migration may occur in short pulses within a season. A migrant that is listed as uncommon for a season may be very common for a short period within that season. Finally, many species (especially warblers) will pass over the Base during their annual spring and fall migrations between breeding and wintering grounds. They typically would not use areas of the Base during these migrations, but weather, stress, and food availability can cause birds to land in areas they normally would not use, and they may remain there for relatively long periods. Species that might otherwise not be expected in the area and therefore not include on the NASO DNA species list, may occur on Base from time to time under certain conditions.

It should also be stressed that many bird populations are in constant flux and some changes may have nothing to do with habitat. During most winters, razorbills occur primarily far to the north of Virginia. However, there was a major southward movement of razorbills during December of 2012 and January of 2013. Between 2008 and 2012, the high count of razorbill in eBird for Virginia was 27 (eBird 2014). During January of 2013 as many as 453 razorbills were reported to eBird in a single day, and the 2013 surveys captured some of these off the beaches of Dam Neck Annex. This "irruption" was recorded as far south as the Florida Keys and Louisiana. It is unclear what caused the irruption or if this event is likely to re-occur, but irruptive events such as these are not all that uncommon. Studies such as these will be valuable to monitoring such trends.

Bird occurrences are also subject to change in response to habitat changes, whether such habitat changes are anthropogenic or natural. For instance, the area surrounding point count stations 12, 13, and 14 of NASO DNA is actively managed through periodic mowing and tree harvesting to provide hunting opportunities. The area is comprised of approximately 100 foot wide strips of conifer and mixed wood forest which are bisected by 50 to 200 foot wide patches of old field habitat (some of which includes emergent wetland). Intact mature forest surrounds most of the managed area making this part of the largest tract of intact forest on Base and extending well to the north and south of the Base. Two species were encountered in the managed habitats and were not found elsewhere on the Base; eastern screech owl and eastern whip-poor-will. These species are considered rare, exemplifying how important a diversity of habitats and structure are to maintaining avian populations.

Bird behavior also plays an important part in the development of a species list. Secretive species with low-detectability such as marsh birds and nocturnal species often go undetected. Although field surveys did include efforts to detect marsh birds and nocturnal species, the secretive nature of these species typically requires a more intensive and focused effort than were including in this study. Of the fifteen species that are typically considered secretive and that could occur in the general vicinity of the Base (e.g., barn owl, barred owl, great horned owl, eastern screech owl, common nighthawk, Chuck-will's widow, eastern whip-poor-will, American bittern, least bittern, clapper rail, king rail, Virginia rail, Sora, and American woodcock), only three were encountered on the 2013 survey (Chuck-will's widow, eastern whip-poor-will, and eastern screech owl). The relatively small and fragmented habitats on Base may not be suitable as breeding habitat for some of these secretive, and also uncommon to rare, species. But many are known to occur in suitable habitats in the vicinity of the Base, and could potentially be found on NASO DNA. More intensive surveys for marsh birds and crepuscular/nocturnal species are recommended to target these species which are especially difficult to detect.

More focused surveys in other areas of the Base could also add to the understanding of the birdlife of NASO DNA. For example, two active great blue heron nest sites and several additional large stick nests were noted in large trees within an inaccessible area of a freshwater marsh on the DEVGRU site; suggesting that the area hosts a heron/egret rookery. This area was surveyed on several occasions, but security access restrictions and inaccessibility to most areas of the marsh limited the survey effort. Given the characteristics of the marsh, it is likely that the area would also provide habitat for secretive marsh species. In addition, a more focused survey of buildings and associated infrastructure would help to better understand use by osprey and other raptors. Several incidental observations of raptors on buildings were noted during the

survey effort. Several large stick nests (unknown species) and at least five active osprey nests were observed on utility poles on Base.

Finally, survey timing is also a factor for consideration in expanding knowledge of avian use of the Base, particularly in high use areas. Most, but not all, of the area searches along beaches were conducted during the day when beach use was high. Observations of people and dogs (most of which were off leash) were noted during nearly every survey event, regardless of the season. Portions of the firing range beach area were the exception. However, beach surveys were not performed there consistently due to access restrictions. Efforts to survey high use areas during periods of less activity (especially early morning hours) is recommended.

Point Counts

The locations of the point counts and established route appeared to provide adequate coverage for monitoring species occurrences, especially during the breeding season. The point count method relies heavily on vocalizations as the form of detection and during the breeding season the birds are most vocal and singing the song that is most identifiable to the species. The majority of birds within the listening area can be detected within the 5 minute point count, allowing the observer to quickly move on to another area. This method allows for the coverage of large areas within a short period of time. The point counts alone during the breeding season accounted for 89 species of 122 species detected by this method for all seasons (Table 4). The approach taken was necessary to make the effort comparable to other NAVFAC baseline bird studies, repeatable, and to provide as much base-wide coverage as possible to develop a baseline species list.

The replication of survey within a season was found to be important to detecting greater species numbers. For point counts, the breeding season count increased from 61 to 89 species after the initial replication and detected one nocturnal species undetected during the diurnal surveys. The fall period species count also increased from 44 to 58 after the initial replication. Replication of the survey was able to detect the variability of arrivals within a season and capture those birds who may not be calling during normal survey hours.

Breeding season surveys may include some winter birds and migrants and can lead to erroneous conclusions regarding the breeding status of the species. However, forgoing early spring surveys because of this is not recommended, since this problem can be accommodated with the incorporation of expert knowledge and replicate surveys into the study. The value of the early to mid-April first replication for the area and point count searches was important to developing the overall species lists.

Area Searches

A general purpose of most area searches was to complement the point count routes, especially in areas that were difficult to access and survey or likely to contain species that are generally difficult to detect during a typical point count survey window. Area searches were used to gain more information about the use of beaches, dunes and the near shore zone, marshes, and large water bodies such as Lake Tecumseh. As stated earlier, the area search methods were found to be valuable to the study, recording 11 more species than point count surveys. Area searches can be conducted over larger areas, survey a variety of habitats (especially those near and over water), surveyed for longer periods of time, and do not rely heavily on vocalization as the primary form of detection. These aspects were found to be most important during the non-

breeding seasons when vocalizations are reduced and direct observations are often needed to document presence. The incorporation of sea and water bird watch areas, walking routes located nearby coastal areas, and the general survey of habitats not captured by traditional point counts contributed to the greater number of species observed using this method. In general the areas searched surveyed in this study provided a good compliment of the habitats at NASO DNA, and no changes are recommended.

Hawk Watches

The primary purpose of the hawk watch was to provide information about the passage of daytime migrating raptor species, although other species such as swallows, woodpeckers, and blue jays were noted as well if not previously documented during other daily survey efforts (i.e., point counts and area searches). The hawk watch station recorded 3 raptor species. Each of these were also documented on either point counts, area searches, or incidentally during a given survey period. In general, the hawk watches did not add significant value to the survey effort. Surveys were too infrequent, not situated at ideal locations (the facility itself is not within a key raptor migration route), and surveys were not timed to specifically target known mass raptor movement events (which can vary in timing and duration annually). However, the survey did document movements of snow geese, which were not identified by any other survey method. The number of surveys and frequency were determined by the scope of work/budget. Fixed hawk points are generally used as a count method in key migratory pathways where large movements of migratory hawks are known to take place. Dam Neck does not occur within one of these key pathways. The point selected offered the best view/coverage available for this installation.

Sensitive Species

Sensitive species were not targeted using species-specific survey efforts. However, 16 were documented during point counts and area searches (Table 6). Five of the species were encountered in forest habitat, seven were documented on or above beach/dune/ocean habitat, and three were encountered in freshwater marsh or lakeshore marsh habitat. In addition, yellow-crowned night heron were observed in marsh habitat and on the beach. One of the bald eagle sightings in the north end of the Base was a juvenile wearing a radio tag. Preliminary discussions with staff from the Center for Conservation Biology (CCB) seem to indicate the bird is part of an ongoing CCB eagle study.

Several other species, considered rare for the NASO DNA area, were also identified during the survey. These species are not listed or species of special concern, but are typically very unlikely to be seen given the location and habitats of the Base. Species included broad-winged hawk, eastern screech-owl, Chuck-will's-widow, Eastern whip-poor-will, Acadian flycatcher, Kentucky warbler, scarlet tanager, and evening grosbeak.

Summary

NASO DNA is noteworthy for its coastal location between First Landing State Park to the north and Back Bay National Wildlife Refuge to the south; two of the few remaining tracts of undeveloped dune ecosystems along the Virginia coast. The Base is surrounded by development and in fact is fairly developed itself, yet offers a relatively rich diversity of habitats, including ocean; beach and dune; hardwood, conifer and mixed wood forest; grassland and old field; scrub shrub; freshwater, and to a much lesser extent brackish wetlands; lakes, ponds, canals and drainage ditches; maintained lawns and fields; and, developed areas.

Although this study and data from nearby areas have provided much needed information regarding the birdlife likely to be present on NASO DNA, there is certainly more to learn, particularly regarding rare species, listed species, and those with low detectability. These species are by their nature and limited numbers difficult to document without intensive and species-specific focused surveys.

NASO DNA is obligated to carry out programs for the conservation of migratory birds that may occur on installation properties. Information from this study can be used to contribute to management plans designed to provide sustainable, integrated management strategies for migratory birds in support of the Navy's mission of ensuring healthy lands for long-term use of installations for military training and readiness activities. The primary purpose of the monitoring study was to contribute to NASO DNA's baseline bird dataset and develop a comprehensive bird species list, as well as provide the methods and protocols for future study. In summary, we believe the project successfully implemented a DoD CBM study that met the project's stated purpose and goals (Section 1.2). Notable outcomes from the study include the following:

1. Over the course of four seasons, 2,237 observations of 159 species were recorded using DoD CBM plan recommended techniques and guidance.
2. 20 point count stations, 5 area search polygons, and 1 hawk watch location were established.
3. Nocturnal and shorebird surveys were conducted during the breeding season.
4. Results were combined with existing data and expert analysis to develop a comprehensive list of 275 birds of NASO DNA including seasonal abundance / occurrence estimates.
5. Recommendations for future studies are provided.

6.0 RECOMMENDATIONS

This study represents the first comprehensive effort to survey for and document the species richness of birds and their likelihood of occurrence at NASO DNA. During the planning phase, as well as during project implementation and analysis of results, positive outcomes were noted and data gaps and lessons learned were documented. Based on these activities the following recommendations are provided:

1. The DoD established Coordinated Bird Monitoring plan provided valuable guidance in regards to study design. Continue to consult the program's guidance in regards to the selection of field methods and data management to meet future goals and objectives.
2. Desktop and field reconnaissance performed by qualified ornithologists to establish survey locations was an important planning phase in meeting project objectives, and should be included in any future survey planning.
3. All point count, area search, and hawk watch points established for this study were found valuable in adding species to the overall count. Long-term monitoring at the Base, especially during the breeding season, will be important to monitor population trends.
4. If any point counts or area searches are added in future surveys, additional sites within the restricted access areas of the installation (DEVGRU and Marine Air Corps Station 24) should be investigated.

5. Future point counts and area searches should consider focusing on targeting species with low-detectability such as marsh birds and nocturnal species.
6. Future surveys of beaches and other high use areas should target times of least human activity.
7. Survey during the four seasons was found to be valuable, however if future surveys are to be limited, summer surveys were found to be the least informative adding no species to the 159 observed for the other three seasons. Winter surveys should focus on wintering waterfowl, winter migrants, and shorebirds and less on inland point count and areas searches.
8. Fall area searches provided great value to the study, observing 43 of the 72 species observed for this season. However, if a reduction in effort is necessary for future efforts, point counts could be performed in the spring with area searches performed (and possibly expanded) during the fall and winter seasons.
9. Replication of surveys within season was found to be important to capturing within season variability. Approximately 25% of the species would not have been detected without within season replication.
10. In terms of documenting passing migrants during the hawk watches, future surveys should be expanded to ensure multiple replications occur in late August, September, and late October, and are timed appropriately to cover peak migration movements.
11. Fall surveys did not begin until September 20, a late August or early September replication of the fall surveys should be considered to capture early fall migrants.
12. Nocturnal surveys should be expanded (multiple replicates) during the breeding season.
13. Owls tend to breed earlier than most other bird species. Nocturnal surveys to target owls should be conducted early in the breeding season (e.g., February - early April) and should continue with the use of broadcast calls.
14. Species-specific surveys should be considered and implemented as necessary to document key species of interest, to facilitate land use planning, and to meet management goals.
15. The data form and database developed for this project were found to facilitate data collection, entry, management, and analysis and should be utilized and modified as needed to accommodate future efforts.
16. Incorporation of previous studies and field efforts such as BBA and eBird data were valuable to contributing to the overall species list. eBird data should be assessed as needed to complement future studies on Base. Consideration should be given to including the data collected from this and future Base avian studies into eBird, particularly since the Base is not generally accessible to most birders for inclusion in the eBird data set.
17. The consultation with local birders and experts was important to all phases of the study, from planning to recommendations, and should be included in future studies and avian management planning.

18. It is recommended that this study be supported with continued monitoring efforts as well as additional species-specific, population, and habitat studies as needed to facilitate the development of science-based avian management plans and for use in NASO DNA land management decision making processes (e.g., NEPA).

7.0 LITERATURE CITED

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APPENDIX A
Avian Survey Data Form

AVIAN SURVEY DATA FORM INSTRUCTIONS

The following instructions provide specific details for filling out the data form to provide consistency in recording survey data.

- **One data sheet per 5 minute point**
- **One data sheet per hawk point (time will vary, no less than 2 hours)**
- **One data sheet per area search (time will vary)**
- **One data sheet per shorebird survey (time will vary)**
- **One data sheet per day for incidental observations made outside of any of the standardize surveys (point count, hawk, area searches)**

Header Information

Date: Month/day/year (e.g., 4/15/10).

Observer (circle one): First initial, last name (e.g., J. Smith).

Site Location (circle one): Identify the installation surveys were conducted on.

Survey Period (circle one): Winter=December 1–February 28; Breeding=March 1–May 31; Summer=June 1–August 31; Fall=September 1–November 30.

Replicate (circle one): Indicate which replicate of the survey period was performed.

Survey Type (circle one): Point, Hawk, Area, Incidental, Shorebird, or enter information in space provided for specialized surveys.

Calls Used (circle one): Indicate whether marsh bird, owl or no playback was used to elicit responses during the survey.

Route/Point: Record point ID, area search ID, hawk watch ID, shorebird ID, or location information.

Start and End Time: Record the start and end times for each survey. Record in military time (e.g., 0600 = 6 am, 1300 = 1 pm).

Temp.: Record as Fahrenheit.

Clouds (circle one): Cloudy, Mostly Cloudy, Partly Cloudy, Mostly Clear, Clear.

Precip: Rain, provide percent of time of survey it was precipitating (e.g. rain (80%)).

Wind: Use the Beaufort Wind Scale below and record the average Force rating number.

Other: Record other weather variables relevant to the survey effectiveness. For example, if weather conditions deteriorate during a survey causing the survey to be ended early.

Noise: H = noise affecting detections for > 50% of survey, M = affecting detections for 25 to 50% of survey, L = affecting detections for 1 to < 25% of survey, N = detections not affected by noise. Also, identify the primary source(s) of the noise.

Observation Information

Species: Alpha bird banding code (e.g., Cooper's hawk = COHA).

Time: Record the time the individual or group was **first** observed. No need to record time on point counts.

Number: Record the number of each species observed, estimate the number for large groups of birds or large flocks that may fly over for long periods.

Observation Type: Record these attributes for observation type: S=Singing, SP=Singing, pair observed, C=Calling, V=Visual, D=Drumming, G=Group, F=Fly Over. You can use a combination of these to describe the observation (VF= visual fly over).

Sex/Age: AF = Adult Female, AM=Adult Male, IM=Immature Male, IF=Immature Female, UF= Female Unknown age, UM=Male unknown age, I=Immature, sex unknown, UA=unknown adult, sex unknown, UK=Unknown, LF= Flock of mixed sexes and/or ages (e.g., 3 immature northern harriers observed, record I+I+I).

Distance (meters): Record category for the following estimated distances to the observation: 1= 0 to 50 2=50 to 100 3=100 to 150 4= > 150 5=Flyover.

Location: Only fill out for incidental observations recorded outside formal surveys and for sensitive species (list to be provided) sighted during non-point count surveys. Record using a GPS or estimate the lat and long for observations you cannot get to (i.e., long distance, water, or flyover observations).

GPSed (Y): Record "Y" to indicate "Yes" if a GPS point was recorded for this observation. A GPS location is to be taken for all ESA listed species, listed species of concern, and species of interest identified by NAVFAC. List will be provided prior to survey.

Notes: Use this space to record other relevant details not captured elsewhere on the data form. Other details may include behavioral notes, color band observations (recorded from top to bottom and from left to right), and documentation of any photos taken. Rare species observations can be described here as well. Use a blank sheet of paper if needed to add additional notes.

Field Book: Use your personal field log book to note/document all other noteworthy observations such as rare wildlife and logistical problems (copies will be requested).

Force	Beaufort Wind Scale			Name	Conditions on Land
	knots	km/h	mi/h		
0	< 1	< 2	< 1	Calm	Smoke rises vertically.
1	1-3	1-5	1-4	Light air	Smoke drifts and leaves rustle.
2	4-6	6-11	5-7	Light breeze	Wind felt on face.
3	7-10	12-19	8-11	Gentle breeze	Flags extended, leaves move.
4	11-16	20-29	12-18	Moderate breeze	Dust and small branches move.
5	17-21	30-39	19-24	Fresh breeze	Small trees begin to sway.
6	22-27	40-50	25-31	Strong breeze	Large branches move, wires whistle, umbrellas are difficult to control.
7	28-33	51-61	32-38	Near gale	Whole trees in motion, inconvenience in walking.
8	34-40	62-74	39-46	Gale	Difficult to walk against wind. Twigs and small branches blown off trees.
9	41-47	76-87	47-54	Strong gale	Minor structural damage may occur (shingles blown off roofs).
10	48-55	88-102	55-63	Storm	Trees uprooted, structural damage likely.
11	56-63	103-118	64-73	Violent storm	Widespread damage to structures.
12	64+	119+	74+	Hurricane	Severe structural damage to buildings, wide spread devastation.

APPENDIX B

Survey Locations

Table B1. Survey Locations for Avian Species List Study at NASO DNA (2013).

Survey Type	Route Name	Route Point	Longitude*	Latitude*
Area	DNAS	DNAS01	-75.949958	36.765498
Area	DNAS	DNAS02	-75.961503	36.768751
Area	DNAS	DNAS03	-75.968511	36.806512
Area (Shorebird)	DNAS	DNAS04 (1)	-75.953382	36.775309
Area (Shorebird)	DNAS	DNAS04 (2)	-75.962722	36.804273
Point	DNPC	DNPC01	-75.959815	36.790357
Point	DNPC	DNPC02	-75.959487	36.768328
Point	DNPC	DNPC03	-75.954477	36.766527
Point	DNPC	DNPC04	-75.953627	36.769752
Point	DNPC	DNPC05	-75.957965	36.760685
Point	DNPC	DNPC06	-75.970997	36.81208
Point	DNPC	DNPC07	-75.955556	36.776524
Point	DNPC	DNPC08	-75.962289	36.788672
Point	DNPC	DNPC09	-75.962274	36.785279
Point	DNPC	DNPC10	-75.961957	36.783
Point	DNPC	DNPC11	-75.966287	36.773102
Point	DNPC	DNPC12	-75.968327	36.778698
Point	DNPC	DNPC13	-75.972754	36.782529
Point	DNPC	DNPC14	-75.968897	36.783364
Point	DNPC	DNPC15	-75.964528	36.77809
Point	DNPC	DNPC16	-75.97249	36.815267
Point	DNPC	DNPC17	-75.961815	36.779932
Point	DNPC	DNPC18	-75.953916	36.761356
Point	DNPC	DNPC19	-75.955435	36.763559
Point	DNPC	DNPC20	-75.974282	36.812576
Hawk Watch	DNHW	DNHW	-75.953709	36.769749

*Coordinates represent center point of survey area/location.

APPENDIX C
2013 Survey Species List

Table C1. Distance Point Count, Area Search, and Hawk Watch Species List for Avian Species List Study at NASO DNA (2013).				
Scientific Name	Common Name	Distance Point Count	Area Search	Hawk Watch
Accipitriformes (Hawks, Kites, Eagles, and Allies)				
<i>Accipiter cooperii</i>	Cooper's Hawk	✓	✓	
<i>Accipiter striatus</i>	Sharp-shinned Hawk		✓	
<i>Buteo jamaicensis</i>	Red-tailed Hawk	✓		✓
<i>Buteo lineatus</i>	Red-shouldered Hawk	✓	✓	
<i>Buteo platypterus</i>	Broad-winged Hawk		✓	
<i>Cathartes aura</i>	Turkey Vulture	✓	✓	✓
<i>Haliaeetus leucocephalus</i>	Bald Eagle	✓	✓	
<i>Pandion haliaetus</i>	Osprey	✓	✓	✓
Anseriformes (Ducks, Geese, and Swans)				
<i>Aix sponsa</i>	Wood Duck	✓	✓	
<i>Anas acuta</i>	Northern Pintail		✓	
<i>Anas americana</i>	American Wigeon	✓		
<i>Anas clypeata</i>	Northern Shoveler	✓		
<i>Anas crecca</i>	Green-winged Teal	✓	✓	
<i>Anas discors</i>	Blue-winged Teal		✓	
<i>Anas platyrhynchos</i>	Mallard	✓	✓	
<i>Anas rubripes</i>	American Black Duck	✓	✓	
<i>Anas strepera</i>	Gadwall	✓	✓	
<i>Aythya affinis</i>	Lesser Scaup		✓	
<i>Aythya americana</i>	Redhead	✓	✓	
<i>Aythya collaris</i>	Ring-necked Duck	✓	✓	
<i>Aythya marila</i>	Greater Scaup	✓		
<i>Branta canadensis</i>	Canada Goose	✓	✓	
<i>Bucephala albeola</i>	Bufflehead		✓	
<i>Chen caerulescens</i>	Snow Goose			✓
<i>Clangula hyemalis</i>	Long-tailed Duck		✓	
<i>Lophodytes cucullatus</i>	Hooded Merganser	✓	✓	
<i>Melanitta americana</i>	Black Scoter		✓	
<i>Melanitta perspicillata</i>	Surf Scoter		✓	
<i>Mergus serrator</i>	Red-breasted Merganser	✓	✓	
<i>Oxyura jamaicensis</i>	Ruddy Duck	✓	✓	
Apodiformes (Swifts and Hummingbirds)				
<i>Archilochus colubris</i>	Ruby-throated Hummingbird	✓	✓	
<i>Chaetura pelagica</i>	Chimney Swift	✓	✓	
Caprimulgiformes (Nightjars)				
<i>Antrostomus carolinensis</i>	Chuck-will's-widow	✓		

Table C1. Distance Point Count, Area Search, and Hawk Watch Species List for Avian Species List Study at NASO DNA (2013).				
Scientific Name	Common Name	Distance Point Count	Area Search	Hawk Watch
<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	✓		
Charadriiformes (Plovers, Sandpipers, and Allies)				
<i>Actitis macularius</i>	Spotted Sandpiper		✓	
<i>Alca torda</i>	Razorbill		✓	
<i>Arenaria interpres</i>	Ruddy Turnstone		✓	
<i>Calidris alba</i>	Sanderling	✓	✓	
<i>Charadrius melodus</i>	Piping Plover		✓	
<i>Charadrius semipalmatus</i>	Semipalmated Plover		✓	
<i>Charadrius vociferus</i>	Killdeer	✓	✓	
<i>Chroicocephalus philadelphia</i>	Bonaparte's Gull	✓	✓	
<i>Gallinago delicata</i>	Wilson's Snipe	✓	✓	
<i>Hydroprogne caspia</i>	Caspian Tern		✓	
<i>Larus argentatus</i>	Herring Gull	✓	✓	
<i>Larus delawarensis</i>	Ring-billed Gull	✓	✓	
<i>Larus fuscus</i>	Lesser Black-backed Gull		✓	
<i>Larus marinus</i>	Great Black-backed Gull	✓	✓	
<i>Leucophaeus atricilla</i>	Laughing Gull	✓	✓	
<i>Numenius phaeopus</i>	Whimbrel		✓	
<i>Pluvialis squatarola</i>	Black-bellied Plover		✓	
<i>Rynchops niger</i>	Black Skimmer		✓	
<i>Sterna forsteri</i>	Forster's Tern		✓	
<i>Sterna hirundo</i>	Common Tern	✓	✓	
<i>Sternula antillarum</i>	Least Tern		✓	
<i>Thalasseus maximus</i>	Royal Tern	✓	✓	
<i>Thalasseus sandvicensis</i>	Sandwich Tern		✓	
<i>Tringa melanoleuca</i>	Greater Yellowlegs	✓	✓	
<i>Tringa semipalmata</i>	Willet		✓	
Columbiformes (Pigeons and Doves)				
<i>Columba livia</i>	Rock Pigeon		✓	
<i>Zenaida macroura</i>	Mourning Dove	✓	✓	
Coraciiformes (Kingfishers and Allies)				
<i>Megaceryle alcyon</i>	Belted Kingfisher	✓	✓	
Cuculiformes (Cuckoos)				
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	✓	✓	
Falconiformes (Caracaras and Falcons)				
<i>Falco sparverius</i>	American Kestrel	✓		
Gaviiformes (Loons)				

Table C1. Distance Point Count, Area Search, and Hawk Watch Species List for Avian Species List Study at NASO DNA (2013).				
Scientific Name	Common Name	Distance Point Count	Area Search	Hawk Watch
<i>Gavia immer</i>	Common Loon	✓	✓	
<i>Gavia stellata</i>	Red-throated Loon	✓	✓	
Gruiformes (Cranes and Rails)				
<i>Fulica americana</i>	American Coot	✓	✓	
<i>Gallinula galeata</i>	Common Gallinule		✓	
Passeriformes (Perching Birds)				
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	✓	✓	
<i>Baeolophus bicolor</i>	Tufted Titmouse	✓	✓	
<i>Bombycilla cedrorum</i>	Cedar Waxwing	✓	✓	
<i>Cardinalis cardinalis</i>	Northern Cardinal	✓	✓	
<i>Carpodacus mexicanus</i>	House Finch	✓	✓	
<i>Catharus bicknelli</i>	Bicknell's Thrush		✓	
<i>Catharus guttatus</i>	Hermit Thrush	✓		
<i>Certhia americana</i>	Brown Creeper	✓	✓	
<i>Coccothraustes vespertinus</i>	Evening Grosbeak	✓		
<i>Contopus virens</i>	Eastern Wood-Pewee	✓	✓	
<i>Corvus brachyrhynchos</i>	American Crow	✓	✓	
<i>Corvus ossifragus</i>	Fish Crow	✓	✓	
<i>Cyanocitta cristata</i>	Blue Jay	✓	✓	
<i>Dumetella carolinensis</i>	Gray Catbird	✓	✓	
<i>Empidonax vireescens</i>	Acadian Flycatcher	✓		
<i>Geothlypis formosa</i>	Kentucky Warbler	✓		
<i>Geothlypis trichas</i>	Common Yellowthroat	✓	✓	
<i>Haemorhous purpureus</i>	Purple Finch	✓		
<i>Helmitheros vermivorum</i>	Worm-eating Warbler		✓	
<i>Hirundo rustica</i>	Barn Swallow	✓	✓	
<i>Hylocichla mustelina</i>	Wood Thrush	✓		
<i>Icterus galbula</i>	Baltimore Oriole	✓		
<i>Junco hyemalis</i>	Dark-eyed Junco		✓	
<i>Melospiza georgiana</i>	Swamp Sparrow		✓	
<i>Melospiza melodia</i>	Song Sparrow	✓		
<i>Mimus polyglottos</i>	Northern Mockingbird	✓	✓	
<i>Mniotilta varia</i>	Black-and-white Warbler	✓		
<i>Molothrus ater</i>	Brown-headed Cowbird	✓	✓	
<i>Myiarchus crinitus</i>	Great Crested Flycatcher	✓	✓	
<i>Parkesia noveboracensis</i>	Northern Waterthrush	✓	✓	
<i>Passerculus sandwichensis</i>	Savannah Sparrow		✓	

Table C1. Distance Point Count, Area Search, and Hawk Watch Species List for Avian Species List Study at NASO DNA (2013).				
Scientific Name	Common Name	Distance Point Count	Area Search	Hawk Watch
<i>Passerina caerulea</i>	Blue Grosbeak	✓	✓	
<i>Passerina cyanea</i>	Indigo Bunting	✓	✓	
<i>Pipilo erythrophthalmus</i>	Eastern Towhee	✓	✓	
<i>Piranga olivacea</i>	Scarlet Tanager	✓		
<i>Piranga rubra</i>	Summer Tanager	✓		
<i>Poecile atricapillus</i>	Black-capped Chickadee	✓		
<i>Poecile carolinensis</i>	Carolina Chickadee	✓	✓	
<i>Polioptila caerulea</i>	Blue-gray Gnatcatcher	✓	✓	
<i>Progne subis</i>	Purple Martin	✓	✓	
<i>Protonotaria citrea</i>	Prothonotary Warbler	✓		
<i>Quiscalus quiscula</i>	Common Grackle	✓	✓	
<i>Regulus calendula</i>	Ruby-crowned Kinglet	✓		
<i>Regulus satrapa</i>	Golden-crowned Kinglet	✓	✓	
<i>Riparia riparia</i>	Bank Swallow	✓	✓	
<i>Sayornis phoebe</i>	Eastern Phoebe	✓	✓	
<i>Seiurus aurocapilla</i>	Ovenbird	✓	✓	
<i>Setophaga americana</i>	Northern Parula	✓	✓	
<i>Setophaga coronata</i>	Yellow-rumped Warbler	✓	✓	
<i>Setophaga discolor</i>	Prairie Warbler	✓	✓	
<i>Setophaga palmarum</i>	Palm Warbler	✓		
<i>Setophaga pinus</i>	Pine Warbler	✓	✓	
<i>Setophaga ruticilla</i>	American Redstart	✓	✓	
<i>Setophaga striata</i>	Blackpoll Warbler		✓	
<i>Sialia sialis</i>	Eastern Bluebird	✓	✓	
<i>Sitta canadensis</i>	Red-breasted Nuthatch	✓		
<i>Sitta pusilla</i>	Brown-headed Nuthatch	✓	✓	
<i>Spinus tristis</i>	American Goldfinch	✓	✓	
<i>Spizella passerina</i>	Chipping Sparrow	✓	✓	
<i>Spizella pusilla</i>	Field Sparrow	✓	✓	
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow	✓	✓	
<i>Sturnus vulgaris</i>	European Starling	✓	✓	
<i>Tachycineta bicolor</i>	Tree Swallow	✓	✓	✓
<i>Thryothorus ludovicianus</i>	Carolina Wren	✓	✓	
<i>Toxostoma rufum</i>	Brown Thrasher	✓	✓	
<i>Turdus migratorius</i>	American Robin	✓	✓	
<i>Tyrannus tyrannus</i>	Eastern Kingbird	✓	✓	
<i>Vireo griseus</i>	White-eyed Vireo	✓	✓	

Table C1. Distance Point Count, Area Search, and Hawk Watch Species List for Avian Species List Study at NASO DNA (2013).				
Scientific Name	Common Name	Distance Point Count	Area Search	Hawk Watch
<i>Vireo olivaceus</i>	Red-eyed Vireo	✓	✓	
<i>Vireo solitarius</i>	Blue-headed Vireo	✓		
<i>Zonotrichia albicollis</i>	White-throated Sparrow	✓	✓	
Pelicaniformes (Pelicans, Herons, Ibises, and Allies)				
<i>Ardea alba</i>	Great Egret	✓	✓	
<i>Ardea herodias</i>	Great Blue Heron	✓	✓	
<i>Butorides virescens</i>	Green Heron	✓	✓	
<i>Egretta caerulea</i>	Little Blue Heron		✓	
<i>Egretta thula</i>	Snowy Egret		✓	
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	✓	✓	
<i>Pelecanus occidentalis</i>	Brown Pelican	✓	✓	
Piciformes (Woodpeckers)				
<i>Colaptes a. auratus</i>	Northern (Yellow-shafted) Flicker	✓	✓	
<i>Dryocopus pileatus</i>	Pileated Woodpecker	✓	✓	
<i>Melanerpes carolinus</i>	Red-bellied Woodpecker	✓	✓	
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker		✓	
<i>Picoides pubescens</i>	Downy Woodpecker	✓	✓	
<i>Picoides villosus</i>	Hairy Woodpecker	✓	✓	
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	✓		
Podicipediformes (Grebes)				
<i>Podiceps auritus</i>	Horned Grebe		✓	
<i>Podiceps grisegena</i>	Red-necked Grebe	✓	✓	
<i>Podilymbus podiceps</i>	Pied-billed Grebe	✓	✓	
Strigiformes (Owls)				
<i>Megascops asio</i>	Eastern Screech-Owl	✓		
Suliformes (Frigatebirds, Boobies, Cormorants, Darters, and Allies)				
<i>Morus bassanus</i>	Northern Gannet	✓	✓	
<i>Phalacrocorax auritus</i>	Double-crested Cormorant	✓	✓	

APPENDIX D
Checklist of Birds for
NASO DNA

Table D1. Checklist of Birds for NASO DNA (rev. February 2014).

Scientific Name	Common Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb	Observed (✓)
Accipitriformes (Hawks, Kites, Eagles, and Allies)						
<i>Accipiter cooperii</i>	Cooper's Hawk	<u>u</u>	<u>u</u>	<u>u</u>	<u>u</u>	
<i>Accipiter striatus</i>	Sharp-shinned Hawk	<u>o</u>	<u>r</u>	<u>u</u>	<u>u</u>	
<i>Buteo jamaicensis</i>	Red-tailed Hawk	<u>u</u>	<u>u</u>	<u>u</u>	<u>u</u>	
<i>Buteo lineatus</i>	Red-shouldered Hawk	<u>o</u>	<u>o</u>	<u>o</u>	<u>o</u>	
<i>Buteo platypterus</i>	Broad-winged Hawk	<u>r</u>	<u>r</u>	<u>x</u>	<u>x</u>	
<i>Cathartes aura</i>	Turkey Vulture	<u>c</u>	<u>c</u>	<u>c</u>	<u>c</u>	
<i>Circus cyaneus</i>	Northern Harrier	<u>u</u>	<u>o</u>	<u>u</u>	<u>c</u>	
<i>Coragyps atratus</i>	Black Vulture	<u>u</u>	<u>u</u>	<u>u</u>	<u>u</u>	
<i>Haliaeetus leucocephalus</i>	Bald Eagle	<u>c</u>	<u>u</u>	<u>c</u>	<u>c</u>	
<i>Pandion haliaetus</i>	Osprey*	<u>a</u>	<u>a</u>	<u>c</u>	<u>u</u>	
Anseriformes (Ducks, Geese, and Swans)						
<i>Aix sponsa</i>	Wood Duck	<u>u</u>	<u>u</u>	<u>u</u>	<u>u</u>	
<i>Anas acuta</i>	Northern Pintail	<u>o</u>	<u>x</u>	<u>o</u>	<u>u</u>	
<i>Anas americana</i>	American Wigeon	<u>o</u>	<u>x</u>	<u>u</u>	<u>u</u>	
<i>Anas clypeata</i>	Northern Shoveler	<u>u</u>	<u>x</u>	<u>o</u>	<u>c</u>	
<i>Anas crecca</i>	Green-winged Teal	<u>u</u>	<u>r</u>	<u>o</u>	<u>u</u>	
<i>Anas discors</i>	Blue-winged Teal	<u>u</u>	<u>r</u>	<u>r</u>	<u>o</u>	
<i>Anas platyrhynchos</i>	Mallard	<u>a</u>	<u>c</u>	<u>c</u>	<u>c</u>	
<i>Anas rubripes</i>	American Black Duck	<u>u</u>	<u>o</u>	<u>u</u>	<u>u</u>	
<i>Anas strepera</i>	Gadwall	<u>u</u>	<u>x</u>	<u>u</u>	<u>c</u>	
<i>Aythya affinis</i>	Lesser Scaup	<u>u</u>	<u>x</u>	<u>o</u>	<u>u</u>	
<i>Aythya americana</i>	Redhead	<u>r</u>	<u>x</u>	<u>r</u>	<u>o</u>	
<i>Aythya collaris</i>	Ring-necked Duck	<u>o</u>	<u>x</u>	<u>o</u>	<u>u</u>	
<i>Aythya marila</i>	Greater Scaup	<u>u</u>	<u>x</u>	<u>o</u>	<u>u</u>	
<i>Aythya valisineria</i>	Canvasback	<u>r</u>	<u>x</u>	<u>r</u>	<u>o</u>	
<i>Branta bernicla</i>	Brant	<u>o</u>	<u>x</u>	<u>o</u>	<u>u</u>	
<i>Branta canadensis</i>	Canada Goose*	<u>a</u>	<u>c</u>	<u>c</u>	<u>c</u>	
<i>Bucephala albeola</i>	Bufflehead	<u>u</u>	<u>x</u>	<u>u</u>	<u>a</u>	
<i>Bucephala clangula</i>	Common Goldeneye	<u>r</u>	<u>x</u>	<u>x</u>	<u>o</u>	
<i>Chen caerulescens</i>	Snow Goose	<u>o</u>	<u>x</u>	<u>o</u>	<u>u</u>	
<i>Chen rossii</i>	Ross's Goose	<u>x</u>	<u>x</u>	<u>o</u>	<u>r</u>	
<i>Clangula hyemalis</i>	Long-tailed Duck	<u>u</u>	<u>x</u>	<u>o</u>	<u>c</u>	
<i>Cygnus columbianus</i>	Tundra Swan	<u>o</u>	<u>x</u>	<u>u</u>	<u>u</u>	
<i>Cygnus olor</i>	Mute Swan	<u>r</u>	<u>r</u>	<u>r</u>	<u>r</u>	
<i>Histrionicus histrionicus</i>	Harlequin Duck	<u>o</u>	<u>x</u>	<u>o</u>	<u>o</u>	

Scientific Name	Common Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb	Observed (✓)
<i>Lophodytes cucullatus</i>	Hooded Merganser	<u>u</u>	<u>r</u>	<u>u</u>	<u>c</u>	
<i>Melanitta americana</i>	Black Scoter	<u>u</u>	o	c	<u>c</u>	
<i>Melanitta fusca</i>	White-winged Scoter	o	x	o	u	
<i>Melanitta perspicillata</i>	Surf Scoter	<u>u</u>	x	u	c	
<i>Mergus merganser</i>	Common Merganser	r	x	x	o	
<i>Mergus serrator</i>	Red-breasted Merganser	<u>a</u>	o	o	<u>a</u>	
<i>Oxyura jamaicensis</i>	Ruddy Duck	<u>o</u>	r	<u>u</u>	<u>u</u>	
<i>Somateria mollissima</i>	Common Eider	o	x	r	o	
Apodiformes (Swifts and Hummingbirds)						
<i>Archilochus colubris</i>	Ruby-throated Hummingbird*	<u>u</u>	<u>c</u>	o	r	
<i>Chaetura pelagica</i>	Chimney Swift	<u>u</u>	<u>c</u>	<u>o</u>	x	
Caprimulgiformes (Nightjars)						
<i>Antrostomus carolinensis</i>	Chuck-will's-widow*	<u>r</u>	r	x	x	
<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	<u>r</u>	x	x	x	
<i>Chordeiles minor</i>	Common Nighthawk	r	r	r	x	
Charadriiformes (Plovers, Sandpipers, and Allies)						
<i>Actitis macularius</i>	Spotted Sandpiper	<u>u</u>	c	o	x	
<i>Alca torda</i>	Razorbill	r	x	x	<u>o</u>	
<i>Arenaria interpres</i>	Ruddy Turnstone	<u>c</u>	c	c	c	
<i>Calidris alba</i>	Sanderling	<u>c</u>	<u>c</u>	<u>c</u>	<u>c</u>	
<i>Calidris alpina</i>	Dunlin	u	r	o	u	
<i>Calidris bairdii</i>	Baird's Sandpiper	x	r	r	x	
<i>Calidris canutus</i>	Red Knot	o	o	r	r	
<i>Calidris fuscicollis</i>	White-rumped Sandpiper	r	r	r	x	
<i>Calidris himantopus</i>	Stilt Sandpiper	r	r	x	x	
<i>Calidris maritima</i>	Purple Sandpiper	c	r	u	c	
<i>Calidris mauri</i>	Western Sandpiper	x	o	r	r	
<i>Calidris melanotos</i>	Pectoral Sandpiper	o	o	r	x	
<i>Calidris minutilla</i>	Least Sandpiper	u	u	u	r	
<i>Calidris pusilla</i>	Semipalmated Sandpiper	u	u	o	x	
<i>Charadrius melodus</i>	Piping Plover	<u>o</u>	r	x	x	
<i>Charadrius semipalmatus</i>	Semipalmated Plover	<u>u</u>	u	u	x	
<i>Charadrius vociferus</i>	Killdeer*	<u>c</u>	<u>u</u>	u	u	
<i>Chlidonias niger</i>	Black Tern	r	u	o	x	
<i>Chroicocephalus philadelphia</i>	Bonaparte's Gull	<u>u</u>	r	u	<u>c</u>	
<i>Gallinago delicata</i>	Wilson's Snipe	<u>o</u>	r	u	u	

Scientific Name	Common Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb	Observed (✓)
<i>Gelochelidon nilotica</i>	Gull-billed Tern	o	o	r	x	
<i>Haematopus palliatus</i>	American Oystercatcher	u	u	u	o	
<i>Himantopus mexicanus</i>	Black-necked Stilt	o	r	r	x	
<i>Hydrocoloeus minutus</i>	Little Gull	r	x	x	r	
<i>Hydroprogne caspia</i>	Caspian Tern	u	<u>c</u>	<u>u</u>	x	
<i>Larus argentatus</i>	Herring Gull	<u>a</u>	<u>a</u>	<u>a</u>	<u>a</u>	
<i>Larus delawarensis</i>	Ring-billed Gull	<u>a</u>	<u>a</u>	<u>a</u>	<u>a</u>	
<i>Larus fuscus</i>	Lesser Black-backed Gull	u	<u>u</u>	<u>c</u>	<u>c</u>	
<i>Larus glaucoides</i>	Iceland Gull	r	x	r	r	
<i>Larus hyperboreus</i>	Glaucous Gull	r	x	x	r	
<i>Larus marinus</i>	Great Black-backed Gull	<u>a</u>	<u>a</u>	<u>a</u>	<u>a</u>	
<i>Leucophaeus atricilla</i>	Laughing Gull	<u>a</u>	<u>a</u>	<u>a</u>	<u>u</u>	
<i>Limnodromus griseus</i>	Short-billed Dowitcher	o	u	o	r	
<i>Limnodromus scolopaceus</i>	Long-billed Dowitcher	r	r	r	r	
<i>Limosa fedoa</i>	Marbled Godwit	r	r	x	x	
<i>Numenius phaeopus</i>	Whimbrel	<u>o</u>	o	r	x	
<i>Pluvialis dominica</i>	American Golden Plover	x	r	r	x	
<i>Pluvialis squatarola</i>	Black-bellied Plover	<u>u</u>	u	u	o	
<i>Rynchops niger</i>	Black Skimmer	<u>o</u>	u	u	r	
<i>Scolopax minor</i>	American Woodcock	r	x	r	r	
<i>Sterna forsteri</i>	Forster's Tern	<u>c</u>	<u>c</u>	<u>c</u>	<u>c</u>	
<i>Sterna hirundo</i>	Common Tern	<u>u</u>	<u>c</u>	u	x	
<i>Sternula antillarum</i>	Least Tern	<u>o</u>	<u>c</u>	<u>o</u>	x	
<i>Thalasseus maximus</i>	Royal Tern	<u>c</u>	<u>a</u>	<u>c</u>	r	
<i>Thalasseus sandvicensis</i>	Sandwich Tern	<u>o</u>	<u>c</u>	<u>u</u>	x	
<i>Tringa flavipes</i>	Lesser Yellowlegs	u	o	o	o	
<i>Tringa melanoleuca</i>	Greater Yellowlegs	<u>u</u>	u	<u>o</u>	o	
<i>Tringa semipalmata</i>	Willet	<u>u</u>	<u>c</u>	<u>u</u>	r	
<i>Tringa solitaria</i>	Solitary Sandpiper	o	o	o	x	
Columbiformes (Pigeons and Doves)						
<i>Columba livia</i>	Rock Pigeon*	<u>a</u>	<u>a</u>	<u>a</u>	<u>a</u>	
<i>Streptopelia decaocto</i>	Eurasian Collared-Dove	r	r	r	r	
<i>Zenaida macroura</i>	Mourning Dove*	<u>a</u>	<u>a</u>	<u>c</u>	<u>c</u>	
Coraciiformes (Kingfishers and Allies)						
<i>Megaceryle alcyon</i>	Belted Kingfisher	<u>c</u>	u	<u>c</u>	<u>c</u>	
Cuculiformes (Cuckoos)						
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo*	<u>o</u>	<u>u</u>	o	x	

Scientific Name	Common Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb	Observed (✓)
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	r	r	x	x	
Falconiformes (Caracaras and Falcons)						
<i>Falco columbarius</i>	Merlin	o	x	u	o	
<i>Falco peregrinus</i>	Peregrine Falcon	o	r	u	o	
<i>Falco sparverius</i>	American Kestrel	<u>u</u>	o	u	<u>u</u>	
Galliformes (Grouse, Quail, and Allies)						
<i>Colinus virginianus</i>	Northern Bobwhite*	o	u	r	r	
<i>Meleagris gallopavo</i>	Wild Turkey	<u>r</u>	<u>r</u>	r	r	
Gaviiformes (Loons)						
<i>Gavia immer</i>	Common Loon	<u>c</u>	o	<u>u</u>	<u>a</u>	
<i>Gavia pacifica</i>	Pacific Loon	o	x	x	r	
<i>Gavia stellata</i>	Red-throated Loon	<u>u</u>	x	u	<u>c</u>	
Gruiformes (Cranes and Rails)						
<i>Fulica americana</i>	American Coot	u	r	o	<u>u</u>	
<i>Gallinula galeata</i>	Common Gallinule	r	r	<u>r</u>	r	
<i>Porzana carolina</i>	Sora	r	r	r	r	
<i>Rallus elegans</i>	King Rail	u	u	o	o	
<i>Rallus limicola</i>	Virginia Rail	o	r	o	o	
<i>Rallus longirostris</i>	Clapper Rail	o	o	u	o	
Passeriformes (Perching Birds)						
<i>Agelaius phoeniceus</i>	Red-winged Blackbird*	<u>a</u>	c	c	<u>c</u>	
<i>Ammodramus caudacutus</i>	Saltmarsh Sparrow	r	r	o	r	
<i>Ammodramus leconteii</i>	Le Conte's Sparrow	x	x	r	r	
<i>Ammodramus maritimus</i>	Seaside Sparrow	o	o	o	r	
<i>Ammodramus nelsoni</i>	Nelson's Sparrow	r	x	r	r	
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	r	x	x	x	
<i>Anthus rubescens</i>	American Pipit	r	x	<u>o</u>	o	
<i>Baeolophus bicolor</i>	Tufted Titmouse*	<u>c</u>	<u>c</u>	<u>c</u>	<u>c</u>	
<i>Bombycilla cedrorum</i>	Cedar Waxwing*	<u>u</u>	<u>o</u>	o	<u>o</u>	
<i>Cardellina canadensis</i>	Canada Warbler	r	x	x	x	
<i>Cardellina pusilla</i>	Wilson's Warbler	r	x	x	x	
<i>Cardinalis cardinalis</i>	Northern Cardinal*	<u>a</u>	<u>a</u>	<u>c</u>	<u>a</u>	
<i>Catharus bicknelli</i>	Bicknell's Thrush	<u>r</u>	x	x	x	
<i>Catharus fuscescens</i>	Veery	o	x	r	x	
<i>Catharus guttatus</i>	Hermit Thrush	u	x	o	<u>o</u>	
<i>Catharus minimus</i>	Gray-cheeked Thrush	r	x	r	x	
<i>Catharus ustulatus</i>	Swainson's Thrush	r	x	x	x	

Scientific Name	Common Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb	Observed (✓)
<i>Certhia americana</i>	Brown Creeper	o	x	<u>o</u>	<u>u</u>	
<i>Chondestes grammacus</i>	Lark Sparrow	x	r	r	r	
<i>Cistothorus palustris</i>	Marsh Wren	u	o	o	u	
<i>Cistothorus platensis</i>	Sedge Wren	o	r	o	o	
<i>Coccothraustes vespertinus</i>	Evening Grosbeak	r	x	x	<u>r</u>	
<i>Contopus virens</i>	Eastern Wood-Pewee*	<u>o</u>	<u>u</u>	o	x	
<i>Corvus brachyrhynchos</i>	American Crow*	<u>a</u>	<u>a</u>	<u>c</u>	<u>c</u>	
<i>Corvus ossifragus</i>	Fish Crow*	<u>a</u>	<u>c</u>	<u>c</u>	<u>c</u>	
<i>Cyanocitta cristata</i>	Blue Jay*	<u>c</u>	<u>c</u>	<u>c</u>	<u>c</u>	
<i>Dolichonyx oryzivorus</i>	Bobolink	o	r	o	x	
<i>Dumetella carolinensis</i>	Gray Catbird*	<u>c</u>	<u>c</u>	<u>u</u>	<u>u</u>	
<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	x	r	r	x	
<i>Empidonax virens</i>	Acadian Flycatcher	<u>r</u>	r	x	x	
<i>Eremophila alpestris</i>	Horned Lark	r	x	r	r	
<i>Euphagus carolinus</i>	Rusty Blackbird	o	x	r	r	
<i>Geothlypis formosa</i>	Kentucky Warbler	<u>r</u>	r	x	x	
<i>Geothlypis trichas</i>	Common Yellowthroat*	<u>c</u>	<u>c</u>	<u>u</u>	o	
<i>Haemorhous mexicanus</i>	House Finch*	<u>c</u>	<u>c</u>	<u>u</u>	<u>c</u>	
<i>Haemorhous purpureus</i>	Purple Finch	<u>r</u>	<u>r</u>	r	<u>o</u>	
<i>Helmitheros vermivorum</i>	Worm-eating Warbler	<u>o</u>	x	x	x	
<i>Hirundo rustica</i>	Barn Swallow*	<u>c</u>	<u>c</u>	<u>o</u>	x	
<i>Hylocichla mustelina</i>	Wood Thrush	<u>o</u>	r	r	x	
<i>Icteria virens</i>	Yellow-breasted Chat	<u>u</u>	u	r	x	
<i>Icterus galbula</i>	Baltimore Oriole	o	o	<u>o</u>	r	
<i>Icterus spurius</i>	Orchard Oriole	o	u	r	x	
<i>Junco hyemalis</i>	Dark-eyed Junco	<u>u</u>	x	u	u	
<i>Lanius ludovicianus</i>	Loggerhead Shrike	r	x	r	r	
<i>Melospiza georgiana</i>	Swamp Sparrow	<u>u</u>	x	u	u	
<i>Melospiza lincolnii</i>	Lincoln's Sparrow	x	x	r	x	
<i>Melospiza melodia</i>	Song Sparrow*	<u>c</u>	<u>c</u>	<u>c</u>	<u>c</u>	
<i>Mimus polyglottos</i>	Northern Mockingbird*	<u>a</u>	<u>a</u>	<u>c</u>	<u>c</u>	
<i>Mniotilta varia</i>	Black-and-white Warbler	o	o	<u>o</u>	r	
<i>Molothrus ater</i>	Brown-headed Cowbird*	<u>c</u>	u	o	<u>u</u>	
<i>Myiarchus crinitus</i>	Great Crested Flycatcher*	<u>c</u>	<u>c</u>	r	x	
<i>Oreothlypis celata</i>	Orange-crowned Warbler	o	x	o	o	
<i>Oreothlypis peregrina</i>	Tennessee Warbler	r	x	r	x	
<i>Oreothlypis ruficapilla</i>	Nashville Warbler	r	x	r	x	
<i>Parkesia motacilla</i>	Louisiana Waterthrush	x	x	x	x	
<i>Parkesia noveboracensis</i>	Northern Waterthrush	<u>o</u>	r	r	x	

Scientific Name	Common Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb	Observed (✓)
<i>Passer domesticus</i>	House Sparrow*	u	<u>c</u>	<u>u</u>	<u>u</u>	
<i>Passerculus sandwichensis</i>	Savannah Sparrow	u	r	u	<u>u</u>	
<i>Passerella iliaca</i>	Fox Sparrow	r	x	r	<u>o</u>	
<i>Passerina caerulea</i>	Blue Grosbeak*	<u>u</u>	<u>c</u>	o	x	
<i>Passerina ciris</i>	Painted Bunting	r	x	x	r	
<i>Passerina cyanea</i>	Indigo Bunting*	<u>u</u>	<u>c</u>	o	x	
<i>Petrochelidon fulva</i>	Cave Swallow	x	x	r	r	
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	r	o	x	x	
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	r	r	r	x	
<i>Pipilo erythrophthalmus</i>	Eastern Towhee*	<u>c</u>	<u>c</u>	<u>u</u>	<u>u</u>	
<i>Piranga olivacea</i>	Scarlet Tanager	<u>r</u>	r	r	x	
<i>Piranga rubra</i>	Summer Tanager*	<u>o</u>	o	r	x	
<i>Plectrophenax nivalis</i>	Snow Bunting	x	x	o	r	
<i>Poecile carolinensis</i>	Carolina Chickadee*	<u>a</u>	<u>a</u>	<u>a</u>	<u>a</u>	
<i>Polioptila caerulea</i>	Blue-gray Gnatcatcher*	<u>c</u>	<u>u</u>	r	r	
<i>Poocetes gramineus</i>	Vesper Sparrow	r	x	x	x	
<i>Progne subis</i>	Purple Martin*	<u>u</u>	<u>a</u>	o	x	
<i>Protonotaria citrea</i>	Prothonotary Warbler	<u>u</u>	u	x	x	
<i>Quiscalus major</i>	Boat-tailed Grackle	c	c	u	c	
<i>Quiscalus quiscula</i>	Common Grackle*	<u>a</u>	<u>a</u>	<u>c</u>	<u>c</u>	
<i>Regulus calendula</i>	Ruby-crowned Kinglet	<u>u</u>	x	u	u	
<i>Regulus satrapa</i>	Golden-crowned Kinglet	<u>o</u>	x	<u>u</u>	<u>u</u>	
<i>Riparia riparia</i>	Bank Swallow*	<u>o</u>	<u>o</u>	r	x	
<i>Sayornis phoebe</i>	Eastern Phoebe*	<u>o</u>	o	<u>o</u>	o	
<i>Seiurus aurocapilla</i>	Ovenbird*	<u>u</u>	o	r	x	
<i>Setophaga americana</i>	Northern Parula	<u>u</u>	o	o	x	
<i>Setophaga caerulescens</i>	Black-throated Blue Warbler	o	r	o	x	
<i>Setophaga castanea</i>	Bay-breasted Warbler	r	x	x	x	
<i>Setophaga citrina</i>	Hooded Warbler	r	r	r	x	
<i>Setophaga coronata</i>	Yellow-rumped Warbler	<u>a</u>	x	<u>c</u>	<u>a</u>	
<i>Setophaga discolor</i>	Prairie Warbler*	<u>u</u>	u	o	x	
<i>Setophaga dominica</i>	Yellow-throated Warbler	o	r	r	r	
<i>Setophaga fusca</i>	Blackburnian Warbler	r	x	x	x	
<i>Setophaga magnolia</i>	Magnolia Warbler	o	x	o	x	
<i>Setophaga palmarum</i>	Palm Warbler	<u>o</u>	x	u	o	
<i>Setophaga pensylvanica</i>	Chestnut-sided Warbler	r	x	x	x	
<i>Setophaga petechia</i>	Yellow Warbler	<u>o</u>	o	o	x	
<i>Setophaga pinus</i>	Pine Warbler*	<u>c</u>	u	<u>u</u>	<u>u</u>	

Scientific Name	Common Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb	Observed (✓)
<i>Setophaga ruticilla</i>	American Redstart	<u>o</u>	o	<u>u</u>	x	
<i>Setophaga striata</i>	Blackpoll Warbler	<u>u</u>	r	o	x	
<i>Setophaga tigrina</i>	Cape May Warbler	r	x	o	x	
<i>Setophaga virens</i>	Black-throated Green Warbler	r	r	o	x	
<i>Sialia sialis</i>	Eastern Bluebird*	<u>u</u>	<u>u</u>	<u>u</u>	<u>u</u>	
<i>Sitta canadensis</i>	Red-breasted Nuthatch	<u>o</u>	x	u	<u>u</u>	
<i>Sitta carolinensis</i>	White-breasted Nuthatch	u	u	u	u	
<i>Sitta pusilla</i>	Brown-headed Nuthatch*	<u>c</u>	<u>u</u>	<u>u</u>	<u>u</u>	
<i>Spinus pinus</i>	Pine Siskin	r	x	r	o	
<i>Spinus tristis</i>	American Goldfinch*	<u>c</u>	<u>c</u>	<u>u</u>	<u>c</u>	
<i>Spizella arborea</i>	American Tree Sparrow	r	x	x	x	
<i>Spizella pallida</i>	Clay-colored Sparrow	x	x	r	x	
<i>Spizella passerina</i>	Chipping Sparrow*	<u>u</u>	<u>u</u>	<u>u</u>	<u>o</u>	
<i>Spizella pusilla</i>	Field Sparrow*	<u>u</u>	u	<u>o</u>	<u>o</u>	
<i>Stelgidopteryx serripennis</i>	N. Rough-winged Swallow*	<u>u</u>	<u>o</u>	r	x	
<i>Sturnella magna</i>	Eastern Meadowlark	u	o	o	o	
<i>Sturnus vulgaris</i>	European Starling*	c	c	c	c	
<i>Tachycineta bicolor</i>	Tree Swallow*	<u>c</u>	<u>u</u>	<u>c</u>	<u>u</u>	
<i>Thryothorus ludovicianus</i>	Carolina Wren*	<u>a</u>	<u>a</u>	<u>c</u>	<u>c</u>	
<i>Toxostoma rufum</i>	Brown Thrasher*	<u>c</u>	<u>c</u>	<u>u</u>	u	
<i>Troglodytes aedon</i>	House Wren	o	o	o	o	
<i>Troglodytes hiemalis</i>	Winter Wren	o	x	o	o	
<i>Turdus migratorius</i>	American Robin*	<u>a</u>	<u>a</u>	<u>c</u>	<u>c</u>	
<i>Tyrannus tyrannus</i>	Eastern Kingbird*	<u>u</u>	<u>c</u>	o	x	
<i>Vermivora cyanoptera</i>	Blue-Winged Warbler	x	r	r	x	
<i>Vireo flavifrons</i>	Yellow-throated Vireo	o	r	x	x	
<i>Vireo gilvus</i>	Warbling Vireo	r	r	x	x	
<i>Vireo griseus</i>	White-eyed Vireo*	<u>u</u>	<u>u</u>	<u>o</u>	x	
<i>Vireo olivaceus</i>	Red-eyed Vireo*	<u>u</u>	<u>u</u>	o	x	
<i>Vireo solitarius</i>	Blue-headed Vireo	<u>r</u>	x	r	o	
<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird	x	x	r	x	
<i>Zonotrichia albicollis</i>	White-throated Sparrow	<u>c</u>	x	<u>u</u>	<u>c</u>	
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow	r	x	r	r	
Pelicaniformes (Pelicans, Herons, Ibises, and Allies)						
<i>Ardea alba</i>	Great Egret*	<u>c</u>	a	<u>c</u>	<u>c</u>	
<i>Ardea herodias</i>	Great Blue Heron*	<u>a</u>	<u>a</u>	a	<u>a</u>	
<i>Botaurus lentiginosus</i>	American Bittern	o	r	o	u	

Scientific Name	Common Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb	Observed (✓)
<i>Bubulcus ibis</i>	Cattle Egret	o	u	r	r	
<i>Butorides virescens</i>	Green Heron*	<u>u</u>	<u>c</u>	o	x	
<i>Egretta caerulea</i>	Little Blue Heron	<u>o</u>	u	o	r	
<i>Egretta thula</i>	Snowy Egret	<u>u</u>	u	u	o	
<i>Egretta tricolor</i>	Tricolored Heron	o	u	o	o	
<i>Eudocimus albus</i>	White Ibis	o	u	o	o	
<i>Ixobrychus exilis</i>	Least Bittern	o	o	x	x	
<i>Nyctanassa violacea</i>	Yellow-crowned Night-Heron	o	<u>u</u>	u	x	
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	o	o	o	o	
<i>Pelecanus erythrorhynchos</i>	American White Pelican	x	r	x	r	
<i>Pelecanus occidentalis</i>	Brown Pelican	<u>a</u>	<u>a</u>	<u>a</u>	<u>a</u>	
<i>Plegadis falcinellus</i>	Glossy Ibis	u	u	o	r	
Piciformes (Woodpeckers)						
<i>Colaptes auratus</i>	Northern Flicker*	<u>c</u>	<u>u</u>	<u>c</u>	<u>c</u>	
<i>Dryocopus pileatus</i>	Pileated Woodpecker*	<u>c</u>	<u>u</u>	<u>u</u>	<u>u</u>	
<i>Melanerpes carolinus</i>	Red-bellied Woodpecker*	<u>c</u>	c	<u>c</u>	<u>c</u>	
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	<u>u</u>	u	u	o	
<i>Picoides pubescens</i>	Downy Woodpecker*	<u>c</u>	<u>c</u>	<u>c</u>	<u>c</u>	
<i>Picoides villosus</i>	Hairy Woodpecker*	<u>o</u>	<u>o</u>	<u>o</u>	<u>o</u>	
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	o	x	<u>o</u>	u	
Podicipediformes (Grebes)						
<i>Podiceps auritus</i>	Horned Grebe	<u>c</u>	x	o	<u>u</u>	
<i>Podiceps grisegena</i>	Red-necked Grebe	<u>o</u>	x	r	<u>o</u>	
<i>Podilymbus podiceps</i>	Pied-billed Grebe*	<u>c</u>	u	<u>u</u>	<u>c</u>	
Strigiformes (Owls)						
<i>Asio flammeus</i>	Short-eared Owl	x	x	r	r	
<i>Bubo virginianus</i>	Great Horned Owl	o	o	r	o	
<i>Megascops asio</i>	Eastern Screech-Owl*	<u>r</u>	r	<u>r</u>	r	
<i>Strix varia</i>	Barred Owl	r	r	r	r	
<i>Tyto alba</i>	Barn Owl	x	x	x	x	
Suliformes (Frigatebirds, Boobies, Cormorants, Darters, and Allies)						
<i>Anhinga anhinga</i>	Anhinga	r	o	r	r	
<i>Morus bassanus</i>	Northern Gannet	<u>c</u>	o	<u>c</u>	<u>a</u>	
<i>Phalacrocorax auritus</i>	Double-crested Cormorant	<u>a</u>	<u>a</u>	<u>a</u>	<u>a</u>	
<i>Phalacrocorax carbo</i>	Great Cormorant	o	x	o	u	

a - abundant: common species that is very numerous
c - common: certain to be seen in suitable habitat

u - uncommon: present but not certain to be seen

o - occasional: seen only a few times during a season

r - rare: seen at intervals of 2 to 5 years

x - extremely rare: species highly unlikely to occur

* - nests on study area

 - species observed during 2013 DoD coordinated bird monitoring survey

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Enclosure 7. Nest Box Data Sheet



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Wood Duck Box Maintenance Log DNA

Box No.	GPS coordinates		Date Placed	Date Maintained	Nesting Activity	Notes
	Latitude	Longitude				
WDD-01	no data	no data	no data	no data	no data	
WDD-02	36 46' 37.6314 "	75 58' 6.7794 "	2001	7-Mar-02	no	3 squirrels nesting; box needs renumbering
WDD-03	36 46' 36.4434 "	75 58' 5.628 "	2001	7-Mar-02	no	
WDD-04	36 46' 38.5314 "	75 58' 5.6634 "	2001	7-Mar-02	no	
WDD-05	36 46' 35.0754 "	75 58' 9.156 "	2001	7-Mar-02	no	owl nesting
WDD-06	36 46' 51.8154 "	75 58' 0.8394 "	2001	7-Mar-02	no	owl nesting with 2 eggs
WDD-07	36 46' 51.3474 "	75 58' 0.2274 "	2001	7-Mar-02	no	
WDD-08	36 46' 50.3034 "	75 58' 0.48 "	2001	7-Mar-02	no	
WDD-09	36 46' 53.148 "	75 57' 59.976 "	2001	7-Mar-02	no	
WDD-10	36 46' 52.752 "	75 57' 59.94 "	2001	7-Mar-02	no	
WDD-11	36 46' 52.4634 "	75 57' 59.5794 "	2001	7-Mar-02	yes	wood duck feathers and egg (last year's)
WDD-12	36 46' 52.9674 "	75 57' 59.436 "	2001	7-Mar-02	no	owl nesting
WDD-13	36 46' 53.184 "	75 57' 59.3994 "	2001	7-Mar-02	no	opossum nesting
WDD-14	36 46' 53.724 "	75 57' 59.508 "	2001	7-Mar-02	no	raccoon nesting
WDD-15	36 46' 53.724 "	75 57' 59.652 "	2001	7-Mar-02	no	squirrel nesting
WDD-16	36 46' 54.624 "	75 57' 59.832 "	2001	7-Mar-02	no	owl nesting
WDD-17	36 46' 55.092 "	75 57' 59.9034 "	2001	7-Mar-02	no	owl nesting
WDD-18	36 46' 58.332 "	75 58' 8.148 "	2001	7-Mar-02	no	squirrel nesting
WDD-19	36 46' 58.296 "	75 58' 7.7514 "	2001	7-Mar-02	no	dead frogs; probably an owl nesting; moved box closer to water
WDD-20	36 46' 59.052 "	75 58' 7.6434 "	2001	7-Mar-02	no	squirrel nesting
WDD-21	36 46' 59.268 "	75 58' 7.3194 "	2001	7-Mar-02	no	squirrel nesting
WDD-22	no data	no data	2002	NA		new box
WDD-23	no data	no data	2002	NA		new box
WDD-24	no data	no data	2002	NA		new box
WDD-25	no data	no data	2002	NA		new box
WDD-70	no data	no data	no data	no data	no data	
WDD-71	36 46' 59.7 "	75 58' 7.4274 "	no data	no data	no data	
WDD-72	36 46' 59.4114 "	75 58' 8.7234 "	no data	no data	no data	
WDD-73	36 46' 59.124 "	75 58' 8.2554 "	no data	no data	no data	
WDD-100	no data	no data	no data	no data	no data	

Bluebird Box Maintenance Log DNA

Box No.	GPS coordinates		Date Placed	Date Maintained	Nesting Activity	Notes
	Latatude	Longitude				
BB-01	no data	no data				
BB-02	36 46' 53.58 "	75 58' 7.3194 "		14-Mar-02	No	good condition; no predator guard
BB-03	36 46' 52.68 "	75 58' 7.5 "		14-Mar-02	No	good condition; no predator guard
BB-04	36 46' 51.0954 "	75 58' 8.004 "		14-Mar-02	No	good condition; no predator guard
BB-05	36 46' 50.412 "	75 58' 8.148 "		14-Mar-02	No	good condition; no predator guard
BB-06	36 46' 48.828 "	75 58' 8.6154 "		15-Mar-02	No	good condition; no predator guard
BB-07	36 46' 46.452 "	75 58' 9.3714 "		15-Mar-02	No	good condition; no predator guard
BB-08	36 46' 54.912 "	75 58' 13.368 "		15-Mar-02	No	good condition; no predator guard
BB-09	36 46' 43.068 "	75 58' 10.452 "		15-Mar-02	No	good condition; no predator guard
BB-10	36 46' 42.204 "	75 58' 7.356 "		15-Mar-02	No	good condition; no predator guard

Bat Box Maintenance Log DNA

Box No.	GPS coordinates		Date Placed	Date Maintained	Nesting Activity	Notes
	Latatude	Longitude				
Bat-01	36 46' 59.8794 "	75 58' 5.484 "		14-Mar-02	No	Good condition; no predator guard
Bat-02	36 46' 58.1874 "	75 58' 5.952 "		14-Mar-02	Yes	Good condition; no predator guard
Bat-03	36 46' 58.1154 "	75 58' 6.0234 "		15-Mar-02	No	Good condition; no predator guard
Bat-04	36 46' 55.74 "	75 58' 6.6354 "		15-Mar-02	No	Good condition; no predator guard
Bat-05	36 46' 54.9834 "	75 58' 6.924 "		15-Mar-02	Yes	Poor condition; no predator guard

Wood Duck Box Maintenance Log DNA

Box No.	GPS coordinates		Date Placed	Date Maintained	Nesting Activity	Notes
	Latatude	Longitude				
WDD-01	no data	no data	no data			
WDD-02	36 46' 37.6314 "	75 58' 6.7794 "	2001			
WDD-03	36 46' 36.4434 "	75 58' 5.628 "	2001			
WDD-04	36 46' 38.5314 "	75 58' 5.6634 "	2001			
WDD-05	36 46' 35.0754 "	75 58' 9.156 "	2001			
WDD-06	36 46' 51.8154 "	75 58' 0.8394 "	2001			
WDD-07	36 46' 51.3474 "	75 58' 0.2274 "	2001			
WDD-08	36 46' 50.3034 "	75 58' 0.48 "	2001			
WDD-09	36 46' 53.148 "	75 57' 59.976 "	2001			
WDD-10	36 46' 52.752 "	75 57' 59.94 "	2001			
WDD-11	36 46' 52.4634 "	75 57' 59.5794 "	2001			
WDD-12	36 46' 52.9674 "	75 57' 59.436 "	2001			
WDD-13	36 46' 53.184 "	75 57' 59.3994 "	2001			
WDD-14	36 46' 53.724 "	75 57' 59.508 "	2001			
WDD-15	36 46' 53.724 "	75 57' 59.652 "	2001			
WDD-16	36 46' 54.624 "	75 57' 59.832 "	2001			
WDD-17	36 46' 55.092 "	75 57' 59.9034 "	2001			
WDD-18	36 46' 58.332 "	75 58' 8.148 "	2001			
WDD-19	36 46' 58.296 "	75 58' 7.7514 "	2001			
WDD-20	36 46' 59.052 "	75 58' 7.6434 "	2001			
WDD-21	36 46' 59.268 "	75 58' 7.3194 "	2001			
WDD-22	no data	no data	2002			
WDD-23	no data	no data	2002			
WDD-24	no data	no data	2002			
WDD-25	no data	no data	2002			
WDD-70	no data	no data	no data			
WDD-71	36 46' 59.7 "	75 58' 7.4274 "	no data			
WDD-72	36 46' 59.4114 "	75 58' 8.7234 "	no data			
WDD-73	36 46' 59.124 "	75 58' 8.2554 "	no data			
WDD-100	no data	no data	no data			

Bluebird Box Maintenance Log DNA

Box No.	GPS coordinates		Date Placed	Date Maintained	Nesting Activity	Notes
	Latatude	Longitude				
BB-01	no data	no data				
BB-02	36 46' 53.58 "	75 58' 7.3194 "				
BB-03	36 46' 52.68 "	75 58' 7.5 "				
BB-04	36 46' 51.0954 "	75 58' 8.004 "				
BB-05	36 46' 50.412 "	75 58' 8.148 "				
BB-06	36 46' 48.828 "	75 58' 8.6154 "				
BB-07	36 46' 46.452 "	75 58' 9.3714 "				
BB-08	36 46' 54.912 "	75 58' 13.368 "				
BB-09	36 46' 43.068 "	75 58' 10.452 "				
BB-10	36 46' 42.204 "	75 58' 7.356 "				

Bat Box Maintenance Log DNA

Box No.	GPS coordinates		Date Placed	Date Maintained	Nesting Activity	Notes
	Latatude	Longitude				
Bat-01	36 46' 59.8794 "	75 58' 5.484 "				
Bat-02	36 46' 58.1874 "	75 58' 5.952 "				
Bat-03	36 46' 58.1154 "	75 58' 6.0234 "				
Bat-04	36 46' 55.74 "	75 58' 6.6354 "				
Bat-05	36 46' 54.9834 "	75 58' 6.924 "				

Wood Duck Box Maintenance Log DNA

Box No.	GPS coordinates		Date Placed	Date Maintained	Nesting Activity	Notes
	Latatude	Longitude				
WDD-01	no data	no data	no data			
WDD-02	36 46' 37.6314 "	75 58' 6.7794 "	2001			
WDD-03	36 46' 36.4434 "	75 58' 5.628 "	2001			
WDD-04	36 46' 38.5314 "	75 58' 5.6634 "	2001			
WDD-05	36 46' 35.0754 "	75 58' 9.156 "	2001			
WDD-06	36 46' 51.8154 "	75 58' 0.8394 "	2001			
WDD-07	36 46' 51.3474 "	75 58' 0.2274 "	2001			
WDD-08	36 46' 50.3034 "	75 58' 0.48 "	2001			
WDD-09	36 46' 53.148 "	75 57' 59.976 "	2001			
WDD-10	36 46' 52.752 "	75 57' 59.94 "	2001			
WDD-11	36 46' 52.4634 "	75 57' 59.5794 "	2001			
WDD-12	36 46' 52.9674 "	75 57' 59.436 "	2001			
WDD-13	36 46' 53.184 "	75 57' 59.3994 "	2001			
WDD-14	36 46' 53.724 "	75 57' 59.508 "	2001			
WDD-15	36 46' 53.724 "	75 57' 59.652 "	2001			
WDD-16	36 46' 54.624 "	75 57' 59.832 "	2001			
WDD-17	36 46' 55.092 "	75 57' 59.9034 "	2001			
WDD-18	36 46' 58.332 "	75 58' 8.148 "	2001			
WDD-19	36 46' 58.296 "	75 58' 7.7514 "	2001			
WDD-20	36 46' 59.052 "	75 58' 7.6434 "	2001			
WDD-21	36 46' 59.268 "	75 58' 7.3194 "	2001			
WDD-22	no data	no data	2002			
WDD-23	no data	no data	2002			
WDD-24	no data	no data	2002			
WDD-25	no data	no data	2002			
WDD-70	no data	no data	no data			
WDD-71	36 46' 59.7 "	75 58' 7.4274 "	no data			
WDD-72	36 46' 59.4114 "	75 58' 8.7234 "	no data			
WDD-73	36 46' 59.124 "	75 58' 8.2554 "	no data			
WDD-100	no data	no data	no data			

Bluebird Box Maintenance Log DNA

Box No.	GPS coordinates		Date Placed	Date Maintained	Nesting Activity	Notes
	Latatude	Longitude				
BB-01	no data	no data				
BB-02	36 46' 53.58 "	75 58' 7.3194 "				
BB-03	36 46' 52.68 "	75 58' 7.5 "				
BB-04	36 46' 51.0954 "	75 58' 8.004 "				
BB-05	36 46' 50.412 "	75 58' 8.148 "				
BB-06	36 46' 48.828 "	75 58' 8.6154 "				
BB-07	36 46' 46.452 "	75 58' 9.3714 "				
BB-08	36 46' 54.912 "	75 58' 13.368 "				
BB-09	36 46' 43.068 "	75 58' 10.452 "				
BB-10	36 46' 42.204 "	75 58' 7.356 "				

Bat Box Maintenance Log DNA

Box No.	GPS coordinates		Date Placed	Date Maintained	Nesting Activity	Notes
	Latatude	Longitude				
Bat-01	36 46' 59.8794 "	75 58' 5.484 "				
Bat-02	36 46' 58.1874 "	75 58' 5.952 "				
Bat-03	36 46' 58.1154 "	75 58' 6.0234 "				
Bat-04	36 46' 55.74 "	75 58' 6.6354 "				
Bat-05	36 46' 54.9834 "	75 58' 6.924 "				

Enclosure 8. Nuisance Wildlife Survey & Management Plan



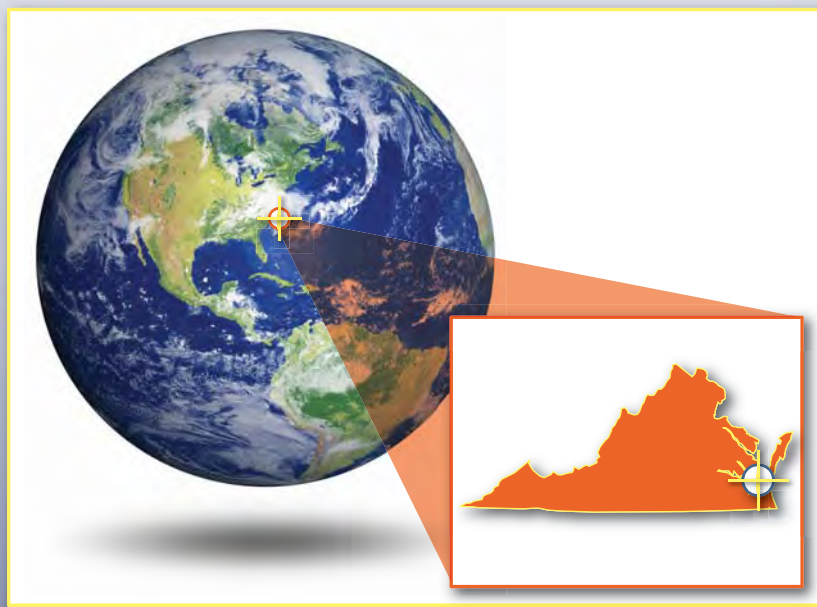
NAVFAC Atlantic Biological Resource Services

Contract: N62470-08-D-1008; Task Order: WE43

FINAL- August 2014



Nuisance Wildlife Survey: Coyote and Nutria



Naval Air Station
Oceana Dam
Neck Annex,
Virginia Beach,
Virginia



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Contract: N62470-08-D-1008; Task Order: WE43

Nuisance Wildlife Survey: Coyote and Nutria

Naval Air Station Oceana
Dam Neck Annex,
Virginia Beach, Virginia

Final – August 2014

Prepared for:

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Prepared by:

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
ac	acre(s)
cm	centimeter(s)
EO	Executive Order
ft	feet
GIS	Geographic Information System
GPS	Global Positioning System
ha	hectare(s)
in	inch(es)
INRMP	Integrated Natural Resources Management Plan
km	kilometer(s)
m	meter(s)
mi	mile(s)
NASO DNA	Naval Air Station Oceana Dam Neck Annex
NAVFAC Mid-Atlantic	Naval Facilities Engineering Command Mid-Atlantic
Navy	United States Department of the Navy
Tetra Tech	Tetra Tech, Inc.
U.S.	United States
USDA	U.S. Department of Agriculture
VDGIF	Virginia Department of Game and Inland Fisheries
VFWS	Virginia Fish and Wildlife Information Service

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1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) was contracted by the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command Mid-Atlantic (NAVFAC Mid-Atlantic) to conduct nuisance wildlife species surveys and develop a management plan for the control of these species at Naval Air Station Oceana Dam Neck Annex (NASO DNA) (Figure 1).

Virginia Department of Game and Inland Fisheries (VDGIF) lists the house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), black rat (*Rattus rattus*), coyote (*Canis latrans*), feral hog (*Sus scrofa*), nutria (*Myocastor coypus*), woodchuck (*Marmota monax*), European starling (*Sturnus vulgaris*), English (house) sparrow (*Passer domesticus*), and pigeon (rock dove) (*Columba livia*) as nuisance species (Virginia Administrative Code [VA Code] 4VAC15-20-160 and Code of Virginia §§ 29.1-100 and 29.1-501). VDGIF regulates the control and taking of nuisance species. In consultation with NAVFAC Mid-Atlantic and installation biologists, the primary nuisance wildlife species of interest/concern with a known presence at NASO DNA are the coyote and the nutria.

In addition to the nutria's listing as a nuisance species under the VA Code, the nutria is also considered to be a non-native invasive species by the U.S. Department of Agriculture (USDA) and its impacts on ecosystems and the human environment have led to establishment of the Federal Nutria Eradication and Control Act of 2003. Executive Orders (EO) 11987, *Exotic Organisms*, and EO 13112, *Invasive Species*, address the control of invasive, non-native species on federal facilities. EO 11987 specifically restricts the introduction of harmful exotic species into native ecosystems, whereas EO 13112 requires federal facilities, to the extent practicable and permitted by law, to perform the following activities:

- Prevent the introduction of invasive species;
- Detect and control invasive species;
- Accurately monitor invasive species populations;
- Provide for restoration of native species and habitats that have been invaded by invasive species;
- Promote public education on invasive species;
- Conduct research on invasive species to prevent their introduction and provide for environmentally sound control; and
- Prevent authorization, funding, or implementing actions that are likely to cause or promote the introduction or spread of invasive species.

To date there have been no formal surveys, inventories, or assessments conducted for the coyote or nutria at NASO DNA. Aside from general nuisance wildlife guidance provided within the installation's Integrated Natural Resources Management Plan (INRMP) (Navy 2014), coyote or nutria specific management plans designed for the installation do not exist. This report documents the first survey for coyote and nutria at NASO DNA.

1.1 PURPOSE, GOALS, AND OBJECTIVES

NASO DNA provides important training areas for military exercises. The control and management of threats, such as nuisance species, on those exercises is critical to the military mission. Managing NASO DNA to reduce the impacts to military training and natural

resources caused by nuisance species presents significant challenges. Nuisance species can have a negative impact on the integrity of installation ecosystems and directly impact military operations. Coyotes can present an airstrike hazard and may cause conflicts with humans and pets. Nutria may affect the natural hydrology of an area or damage hydrology management facilities on installations. Nutria are also known to be detrimental to wetland ecosystems, which may support endangered and native species. These negative impacts can result in a loss of biodiversity critical to supporting healthy lands that are essential for long-term use of installations for military training and readiness activities.

The goal of this study is to conduct surveys for coyote and nutria presence and distribution to provide baseline information at NASO DNA. The information gathered and presented in this study will be used to develop a management plan that presents management opportunities, alternatives, and recommendations designed to alleviate these potential negative impacts and pressures on military training while integrating ecosystem management.

The objectives are as follows:

1. Design and present detailed methods so studies can be repeated and results compared.
2. Inventory/study coyote density and present results.
3. Inventory/study nutria habitat and occupation and present results.
4. Discuss the results and provide recommendations for future study.



Legend

-  Dam Neck Annex
-  Road

Site Location

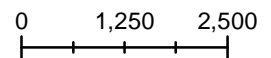
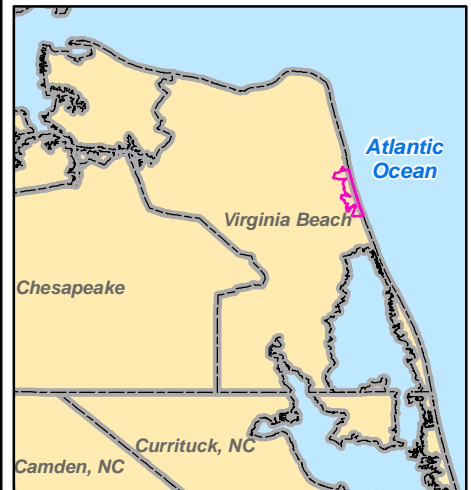


Figure 1. Site Location for Nuisance Species Study: Coyote and Nutria, NASO DNA, Virginia Beach, Virginia

Prepared By:



Date:

08/2014

Base Map: ESRI ArcGIS Online and data partners, including imagery from agencies supplied via the Content Sharing Program 2011.
Boundary from Navy 2013.

Coordinate System: UTM, NAD 83, Zone 18N

2.0 INSTALLATION SETTING AND LAND USE

NASO DNA is located in the southeastern portion of the City of Virginia Beach (see Figure 1) encompasses approximately 1,900 acres (ac) (769 hectares [ha]). Several other military installations including Joint Expeditionary Base Little Creek – Fort Story and NAS Oceana are also located in Virginia Beach. The surrounding land uses include industrial, commercial, residential, recreational, and agricultural. The mission of NASO DNA is to provide quality education and training in specified combat systems operation and maintenance, specialized skills training, training systems support to operational and systems commands, and to perform other functions and tasks as directed by higher authority. This installation description is taken from the INRMP (Navy 2014), which provides much more detailed information on the physical and biological resources.

2.1 CLIMATE

The temperature extremes at NASO DNA are moderated by the Atlantic Ocean. The average yearly temperature is 60 degrees Fahrenheit (°F) (16 degrees Celsius [°C]) (Table 1). The average winter temperature (December through February) is 42 °F (6 °C), and the average growing season temperature (March through November) is 66 °F (19 °C). January is the coldest month with an average low of 32.6 °F (0.3 °C), and July is the warmest month with an average high of 87.4 °F (30.8 °C). The average growing season (daily minimum temperatures higher than 32 °F [0 °C] for a light frost) lasts approximately 250 days from the middle of March to late November. The average annual precipitation is 45.7 inches (in) (116.1 centimeters [cm]). The average wind speed is 10 miles (mi) per hour (16 kilometers [km] per hour). During hurricane events (typically June through September) torrential rainfall may accompany winds greater than 75 mi per hour (121 km per hour).

Table 1. Weather Data Recorded at Norfolk Airport, 1946–2013.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temp. (°F)	48.9 (51.7)	51.0 (49.9)	58.3 (52.9)	68.2 (68.7)	75.9 (75.7)	83.6 (85.1)	87.4 (88.2)	85.6 (83.3)	80.0 (79.6)	70.3 (71.5)	61.4 (59.7)	52.4 (56.2)	68.6 (68.5)
Average Min. Temp. (°F)	32.6 (35.0)	33.5 (36.0)	40.2 (37.2)	48.5 (51.3)	57.6 (59.5)	66.2 (68.5)	70.9 (73.5)	70.1 (70.0)	64.8 (63.3)	53.6 (56.0)	43.8 (43.2)	35.7 (36.9)	51.5 (52.5)
Mean Average Temp. (°F)	40.8 (43.4)	42.3 (42.9)	49.3 (45.0)	58.4 (60.0)	66.8 (67.6)	74.9 (76.8)	79.2 (80.8)	77.9 (76.6)	72.4 (71.5)	62.0 (63.8)	52.6 (51.4)	44.1 (46.5)	60.1 (60.5)
Average Precip. (in.)	3.49 (2.76)	3.14 (4.80)	3.65 (2.50)	3.12 (3.21)	3.62 (4.15)	3.88 (2.62)	5.37 (8.19)	5.48 (5.04)	4.49 (0.93)	3.24 (4.13)	3.06 (2.57)	3.14 (4.75)	45.68 (45.65)

Source: Southeast Regional Climate Center 2013. 2013 data are in parenthesis. Source: http://weather-warehouse.com/WeatherHistory/PastWeatherData_NorfolkIntlArpt_Norfolk_VA_January.html

2.2 PHYSIOGRAPHY

NASO DNA is located in Virginia's outer Atlantic Coastal Plain physiographic province, which is defined by the Fall Line to the west and the North American Continental Shelf approximately 62 mi (100 km) offshore. The Fall Line is a low, east-facing escarpment that marks the boundary between hard metamorphic rocks of the Appalachian Piedmont to the west and the softer, sedimentary rocks that characterize the Coastal Plain. The Coastal Plain is a geologically young province that was formed by several cycles of sea level rising and lowering associated with glaciation events. This province is characterized by relatively flat topography that gently slopes towards the Atlantic Ocean.

2.3 TOPOGRAPHY

The topography of NASO DNA is nearly level, with elevations ranging between sea level and 20 feet (ft) (6 meters [m]) above mean sea level. The largest portion of the land lies in a low basin behind the primary and secondary dunes and has an elevation of less than 5 ft (2 m) above mean sea level.

2.4 SOILS

Approximately half of the soils on NASO DNA have severely constrains for development. These restrictive soils include the Newhan-Duckston-Corolla association of the beaches and dunes and the very poorly drained, flood-prone Backbay-Nawney association in the marshes and swamps. The hydric soils at NASO DNA are Acredale silt loam, Backbay mucky peat, Chapanoke silt loam, Duckston fine sand, Nawney silt loam, Nimmo loam, and Tomotley loam. Most (59 percent) of the soils at NASO DNA are hydric. The Munden and Tetotum soils are considered prime farmland if drained because of their wetness.

3.0 TARGET SPECIES DESCRIPTIONS

VDGIF designated coyote and nutria, as well as the house mouse, Norway rat, black rat, feral hog, woodchuck, European starling, English sparrow, and pigeon as nuisance species under VA Code 4VAC15-20-160. All have a known presence at NASO DNA, except for the feral hog. The coyote and the nutria were determined to have the greatest potential to negatively impact the military mission and were the focus of this study.

3.1 COYOTE

The coyote is native to North America and Virginia, with expansion into Virginia only occurring within the past 30 years after extirpation in the early 1900s. Populations in Virginia are now well established with coyotes reported from every county and city in the state (Mastro 2011).

Coyotes are sexually dimorphic with larger males (average 16.2 kg recorded for Virginia) than females (average 13.4 kg recorded for Virginia). Pelage is highly variable throughout its range, but usually the back and sides are a greyish color. The underbelly is typically whitish (Mastro 2011).

In most areas, long-term monogamous pair bonding and mating occurs in January and February. Birth occurs from March – April and litter size varies greatly with most reported averages ranging from three to four. Coyote den sites are found in steep banks, rock ledges, brush-covered slopes, thickets, hollow logs, and above-ground depressions, as well as out buildings, crawl spaces, and areas under porches and decks. Adults supply food until July and pups typically are able to forage independently by August. Young disperse in late fall to winter, and are capable of breeding in their first season (Mastro 2011).

Coyote home-range size is extremely variable and is influenced by habitat, geography, food availability, and season. The home range of coyotes may range from 1,000 to 25,000 ac. There is currently no published data on home-range sizes in the mid-Atlantic region (Mastro 2011).

The coyote is a habitat generalist and is known to occur and thrive in a wide variety of habitats. Being primarily nocturnal and secretive during the daytime hours, coyote habitats are typically associated with the presence of dense cover. Small mammals and deer make up the majority of their diet, although vegetation and fruits are often listed as food items. Coyotes are opportunistic feeders and will also take advantage of carrion, livestock, and pets (Mastro 2011).

As a nuisance species, the coyote may be taken at any time (except on Sunday by use of a gun, firearm or other weapon) without limit. The Navy obtains a Kill Permit from VDGIF to be able to take coyote on NASO DNA any day of the year due to human health and safety concerns. The coyote is primarily classified as a nuisance species because of economic impacts due to preying on domestic livestock, game animals, and pets (Code of Virginia, Title 29.1, Chapter 1, Article 2). Other factors such as a potential rabies vector and interaction with humans add to its nuisance status.

3.2 NUTRIA

Nutria is a large aquatic rodent, weighing up to 22 pounds. The fur is typically a reddish or greyish brown. The visible incisors are a vibrant yellow-orange, and the whiskers are thick and grey. The tail is not thickly furred and is mostly round in cross-section (D'Elia 1999). Nutria are

often confused with similar aquatic species, the muskrat (*Ondatra zibethicus*), North American beaver (*Castor canadensis*), and sometimes the northern river otter (*Lutra canadensis*).

The historical habitat of the nutria is southern South America. Fur farm escapees and intentional releases into the wild have allowed this species to populate the coastal regions of the United States. Local habitats include any slow water systems, including most perennial systems in Virginia. Areas that have high densities of emergent vegetation are preferred. They can be found in fresh and saline water systems (D'Elia, 1999).

Breeding occurs throughout the year. Litter size varies between two and 11; the gestation period is approximately four months. The young are precocial, leaving the nest or burrow and feeding on solids within one day of birth. Sexual maturity is reached at approximately six months. Nutria are known for platform and nest construction, usually several inches out of the water or in dense vegetation (VFWIS 2013b).

As a nuisance species, nutria can be trapped year round for eradication. The nutria is listed as a nuisance species primarily due to their non-native and invasive status. Due to the recent introduction of the species into the area, there are no evolved or adapted predators. Nutria often burrow into stream banks and destroy large areas of cropland and wetland vegetation. This loss of vegetation and increased erosion reduces critical habitat for many species, including sensitive plant species, shorebirds, and waterfowl (MDNR, n.d.).

4.0 SURVEY METHODS

The coyote survey was designed to obtain an index of coyote abundance, due to a wide-variety of habitats used and difficulty of direct observations. The nutria surveys inventoried and documented potential habitat and occupied habitat, due to the species specific habitat requirements. The NASO DNA game warden was consulted for survey recommendations. Both surveys were designed to be repeatable and therefore comparable if future surveys are conducted. In accordance with VDGIF regulations, Tetra Tech applied for and received a permit for visual surveys for coyote and nutria. A copy of the permit is provided in Appendix A.

4.1 COYOTE

The coyote is known for its wariness, cleverness, and secretive behaviors. Despite being relatively abundant throughout the United States, this nocturnal species is more often heard howling than seen. Without direct observation as a survey method, coyote abundance is typically assessed via indirect surveys focused on deriving an index of abundance (e.g., catch per unit effort). One common method used to survey predators is to establish a scent station baited with food or mating pheromone lures. The traditional scent station uses a track plate dusted with a substrate designed to document the tracks of the target animal(s).

The traditional scent station technique is highly susceptible to damage during weather events, sensitive to disturbance, requires multiple surveyor visitations, and tracks are often difficult to assess as the number of visitors and visitations is unknown. With the advent of remote sensing trail camera technology scent stations can be enhanced with noise- and flash-less infrared motion triggered cameras removing the inherent difficulties of working with track plates. The camera allows for reliability, less maintenance, wider range of coverage, recording of multiple visits, identification of unique visitors, and recording of non-target species.

The following sections outline methods used to implement NASO DNA's first formal coyote survey.

4.1.1 Site Selection

A biologist performed a desktop evaluation of available habitats at NASO DNA. This initial phase of the survey included review of aerial imagery of sufficient detail to depict roads; trails; paved areas; runways; and forested, shrub-shrub, pasture, and agricultural habitats. In addition, other Navy provided data layers such as aquatic resources, significant habitats, and restricted areas were used to further assess available habitats.

Preliminary placement of the scent station locations was based on aerial imagery assessments that were later field evaluated and finalized. Stations were placed at locations across the installations to provide a sampling within all regions north, south, east, and west. These preliminary locations focused on a variety of habitats, as coyote were expected to occur almost anywhere on the installation. Large wetland and inundated areas were avoided.

Eleven station locations were finalized during the field reconnaissance and camera scent station setup stage. During this phase, a biologist navigated to the preliminary scent station locations and reviewed their suitability. Potential for theft was also evaluated and the local area had to be free of any construction activities. Acceptable sites did not need to show field sign of coyote use and

were generally placed within 100 feet of the desktop location. The final station locations were located using a Trimble GeoXH Global Positioning Receiver (GPS). The final station locations are presented in Table 2 and Figure 2. Photos of all station setups are available in Appendix B.

Table 2. Final Camera Station Locations, NASO DNA, Virginia Beach, Virginia.

Camera	Longitude	Latitude
01	36.7698985	-75.9641673
02	36.7817807	-75.9725201
03	36.8075280	-75.9770006
04	36.7618514	-75.9603549
05	36.7675852	-75.9586543
06	36.8151689	-75.9737126
07	36.7702879	-75.9539036
08	36.7673013	-75.9541697
09	36.7626698	-75.9559900
10	36.7841500	-75.9631494
11	36.7785843	-75.9686882

4.1.2 Setup and Equipment

Camera selection was challenging due to the variety of brand and models available. After evaluation of features necessary for the study, the 2012 Moultrie M80-BLX was chosen to best fit the application (Appendix C). This model was selected due to the infrared “black flash” feature that animals are unable to see and the absence of the light-emitting diode for the camera to focus. Each camera was set to take a burst of four pictures when triggered, with a five second delay between triggers. Photo resolution was set to “high” and the motion freeze setting was on for maximum photo clarity. Eleven cameras were purchased to run a desired minimum of 10 stations (the 11th camera was installed in case of malfunction/theft). Stations were numbered consecutively and equipped with 16 gigabyte memory cards.





Although the cameras were purchased new for the study, they were placed in the field at an off-installation location to lessen the “new package” scent two months prior to deployment. At the installation locations, cameras were attached to a tree at a height of 4–5 ft. This height was used to take the camera out of the line of sight of the coyotes and help remove any potential camera scent from “nose level”. Cameras were then pointed slightly downward and focused on a scent station located 10–15 ft from the camera tree.

Both bait and lure (attractants) were used at each station. The type of attractants chosen was a result of conversations with experts at Kaatz Brothers Lures shop. The *Kellens Red Label Extreme Predator* bait was used due to its similarity with probable food sources of coyote in the area (i.e., muskrat). It is designed to attract all predators and omnivores, and is designed to withstand inclement weather (Kaatz Brothers Lures 2007a). The *Kaatz Brothers Karac Coyote Gland Lure* was chosen as a breeding season lure. This lure is designed to attract territorial males and females investigating a potential mate (Kaatz Brothers Lures 2007b). Approximately 1.5 tablespoons of lure and 1 tablespoon of bait was smeared over the target at each station.

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Legend

-  Dam Neck Annex
-  Coyote(s) Recorded
-  Coyote(s) Not Recorded
-  Road

Site Location

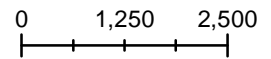


Figure 2. Coyote Camera Station Locations, NASO DNA, Virginia Beach, Virginia

Prepared By:



Date:

08/2014

Base Map: ESRI ArcGIS Online and data partners, including imagery from agencies supplied via the Content Sharing Program 2011.
Boundary from Navy 2013. Coyote data, TT 2013.

Coordinate System: UTM, NAD 83, Zone 18N

Based on the recommendation of bait and lure experts, a rock, log, stump or similar natural feature that “stood out” in the general vicinity was used for the scent station target. These types of natural features are often used for territorial and breeding marking posts by canine predators. Efforts were made to disturb the area as little as possible and each station was setup by a single field biologist.

Notes and photographs of the station and surrounding habitats were recorded. The presence of coyote sign in the general vicinity of the station was also noted, but field sign was not used to determine station location. The field biologist triggered the camera to ensure proper working order when the recording period started. Set-up of each station ranged from 15–25 minutes, excluding travel to the site. A typical station setup is depicted in Exhibit 1.

Exhibit 1. General Scent Station Setup



4.1.3 Sampling Period

The survey was scheduled to coincide with the coyote breeding season, which in Virginia occurs between January and February. Breeding season lures and baits are most effective during this time frame when the animals are on the move in search of mates and food sources are limited.

The cameras were deployed for six camera days (24-hour periods). The duration of survey would allow the scent of the lure to diffuse and the scent of the surveyor to dissipate. According to scent and lure experts, coyote visits were expected within six days as coyotes would likely have cycled through their homerange during this time frame. Additional discussions with these experts about re-baiting resulted in varied opinions and recommendations. It was decided that after three camera days a random sequence generator would choose five cameras to re-bait/re-lure. The other five were not visited or re-baited during the six days. Cameras were not checked during the re-baiting to minimized human scent distribution. Cameras were picked up after the sixth day (24-hour periods) and the memory card information was downloaded to a laptop computer.

4.2 NUTRIA

Similar to the coyote, the nutria is primarily a nocturnal species, which limits the effectiveness of direct observation surveys. However, unlike the coyote, nutria have specific habitat requisites; therefore, the nutria survey focused on mapping potential habitat and documenting occupancy. A better understanding of the level of available habitat as well as the variance in occupancy will allow managers to better control this species.

4.2.1 Desktop Evaluation

A biologist performed a desktop evaluation of available habitats at NASO DNA. Based on nutria habitat requisites, all emergent wetlands and non-forested streams were preliminarily identified as potential habitat. The initial phase of this survey included review of NASO DNA aerial imagery and other Navy provided data layers such as wetland areas, wetland classifications, streams, stream classifications, and significant habitats.

Tetra Tech used NASO DNA Geographic Information System (GIS) data layers from the most recent wetland delineation of all wetlands and streams performed in 2012 to facilitate the desktop mapping. GIS was used to buffer the mapped palustrine emergent wetlands (Cowardin et al. 1983) by 50 ft and all streams and ditches by 25 ft to create polygons of potential habitat. A draft potential habitat map was then created.

4.2.2 Local Expert Review

Tetra Tech consulted with local USDA nutria experts, Tim Linder and Taylor Austin, to further review the draft potential habitat map. All of the surface waters were considered habitat in the original desktop review for conducting the field survey, but after meeting with the USDA experts some of ditches and streams were deleted because there was no connection to other habitats or the quality was not considered by the experts as suitable. Areas not considered to be viable habitat by these experts were removed from the survey polygons and the draft map was modified and finalized for field survey. The interim map is not included in the report to avoid confusion with the final map of potential nutria habitat.

4.2.3 Field Survey

All potential habitats derived from the desktop and expert evaluations were field surveyed to: 1) confirm that the polygon accurately identified the area as potential habitat and the extents of the polygon were appropriately depicted, and 2) search for nutria and nutria field sign to assess occupancy. All potential habitats were searched by biologist walking throughout the areas for nutria sighting, track, den, run, path, scat, slide (Exhibit 2), and eat-out area. A sighting is an actual visual observation of a nutria. A track is a nutria footprint. A den is a cavity area dug into the side of the bank with a rounded opening where nutria could feasibly nest. A run is a path made from continual use, a linear corridor where vegetation was broken and smashed from repeated travel. A path is a travel lane through floating debris that is made from continual use, similar to a run but in water. Scat is diagnostic fecal droppings. A slide is a linear pattern indicating a "slide" from top of bank to a waterbody. A nutria eat-out is an area denuded of ground vegetation. All nutria field sign locations and general use area polygons were recorded with a Trimble GeoXH GPS. Field maps were also annotated with any adjustments to the potential habitat polygons. High quality nutria habitat at NASO DNA is depicted in Exhibit 3.

Exhibit 2. Common Nutria Run or Slide.



Exhibit 3. High Quality Nutria Habitat.



5.0 RESULTS

Field surveys for coyote and nutria were conducted between January 16 and February 15, 2013. The scope of the study was to collect baseline information on populations to identify needs for further, more in-depth surveys. This was considered the most cost-effective step towards identifying nuisance wildlife issues on the installation.

The weather was unseasonably cold and no significant precipitation occurred during the surveys. The data collected and reported are camera photographs, potential nutria habitat identified with assistance from USDA experts, and observations of nutria field sign (e.g., tracks). Field observations were recorded using photographs or annotated in the GIS.

5.1 COYOTE

Eleven remote camera scent stations were installed at NASO DNA on January 22 and allowed to record activity for six camera days (see Figure 2). Two additional cameras were deployed on January 23 and 24. Weather during the sampling period is provided in Table 3. Cameras were retrieved on January 28, 29, and 30. Four of the cameras (02, 06, 07, and 08) were placed with coyote tracks in the vicinity and one (11) had scat located adjacent. Only one area was found with tracks or scat, and four cameras were placed in the area (cameras 04, 05, 08, and 09). Seven cameras (02, 05, 06, 08, 09, 10, and 11) were re-baited after the third night. Two of the 11 cameras recorded at least a single coyote visit during the survey period. Two coyotes were caught on camera and the detection index was 0.035. A summary of the survey results is provided in Table 4. As presented in Table 5, other recorded species included raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), Virginia opossum (*Didelphus virginiana*) and white-tailed deer (*Odocoileus virginiana*). All coyote and some non-target species photographs (one per sequence) are presented in Appendix B.

Table 3. Coyote Camera Station Weather, NASO DNA, Virginia Beach, Virginia.

Day	High/Low (°F)	Precipitation (in)
01	33/21	0.00
02	36/25	0.01
03	30/19	0.00
04	33/21	0.00
05	37/27	0.00
06	52/28	0.02

Table 4. Coyote Camera Station Survey Detection Summary at NASO DNA, Virginia Beach, Virginia.

Camera	Field Sign ²	Active Dates	Photos Taken	Photo Sequences ³	Anthropogenic Sequences ³	Animal Sequences ³	Unknown Sequence ^{3,4}	Coyote Sequences ³	Coyote Night (No.) ⁵	Coyote Detection per Camera Night ⁶	Camera Night Detecting Coyote(s)
01	Absent	1/22 – 1/28	44	11	1	3	7	-	-	-	-
02 ¹	Absent	1/22 – 1/28	12	3	3	-	-	-	-	-	-
03	Absent	1/24 – 1/30	84	21	2	19	-	-	-	-	-
04	Absent	1/22 – 1/28	4	1	1	-	-	-	-	-	-
05 ¹	Absent	1/22 – 1/28	36	9	3	2	4	-	-	-	-
06 ¹	Absent	1/22 – 1/28	152	38	6	31	1	-	-	-	-
07	Absent	1/23 – 1/29	56	14	2	-	12	-	-	-	-
08 ¹	Tracks, scat	1/22 – 1/28	80	20	6	6	4	4	1 (1)	0.17	1
09 ¹	Tracks, scat	1/22 – 1/28	32	8	3	2	1	2	1 (1)	0.17	3
10 ¹	Absent	1/22 – 1/28	44	11	5	3	3	-	-	-	-
11 ¹	Absent	1/22 – 1/28	24	6	5	-	1	-	-	-	-
Total camera nights:											66
Coyotes per camera night index:											0.035

¹ Camera was re-baited after the third camera night.

² Coyote field sign observed in the vicinity of the camera station during station set-up and take down.

³ Camera set to take four photos upon trigger representing a sequence. Anthropogenic sequences represent human movements or vehicle/equipment operations that triggered photographs.

⁴ Unknown triggers may be caused by wind, falling branches, or animals outside of the camera capture area.

⁵ Number of camera nights with a single or multiple coyote detections, () estimated number of coyotes detected during the six nights.

⁶ Nights recording coyote(s) divided by the number of camera nights.

Table 5. Coyote Camera Station Survey Species Detection Summary at NASO DNA, Virginia Beach, Virginia.

Camera	Active	Coyote	Fox	Opossum	Deer	Raccoon
01	1/22 – 1/28	-	x	-	-	-
02	1/22 – 1/28	-	-	-	-	-
03	1/24 – 1/30	-	-	-	x	x
04	1/22 – 1/28	-	-	-	-	-
05	1/22 – 1/28	-	x	-	-	-
06	1/22 – 1/28	-	-	x	x	x
07	1/23 – 1/29	-	-	-	-	-
08	1/22 – 1/28	x	x	-	x	-
09	1/22 – 1/28	x	x	-	-	x
10	1/22 – 1/28	-	x	-	x	-
11	1/22 – 1/28	-	x	-	-	-

5.2 NUTRIA

With the aid of local experts, the draft potential habitat map was revised to identify those areas targeted for field survey. All of the surface waters on NASO DNA were initially considered potential nutria habitat, but after meeting with the USDA experts, some of ditches and streams were deleted because there was no connection to other habitats or the quality was not considered by the experts as suitable. Approximately 286 ac (115 ha) of habitat were field surveyed to verify its designation as potential habitat and investigate nutria occupancy. Using field results to further refine the draft map and create the final potential habitat map, it was determined that approximately 88 ac (25 ha) would be classified as potential nutria habitat at NASO DNA.

Figure 3 depicts potential nutria habitat as mapped in 2013. The majority of the potential habitat is in the form of slow moving, vegetated drainage ditches with perennial or intermittent flow. The drainage ditches are primarily comprised of palustrine emergent vegetation dominated by *Juncus*, *Cyperus*, *Carex*, *Scirpus*, *Polygonum*, and *Ludwigia*. Several pictures of typical nutria habitat at NASO DNA are provided in Appendix B.

Sightings (actual visual observation of nutria) were made at one location during the survey and some indirect evidence of nutria occupation was observed (Figure 3). A run was observed in the southwest corner of the installation; very hard ground prevented identification of tracks to confirm the species using the run. No other field signs of nutria occurrence were observed. No significant damage to vegetation or ditch/stream banks was observed.



Legend

-  Dam Neck Annex
-  2013 Potential Habitat (86 acres)
-  Run
-  Sighting
-  Road

Site Location

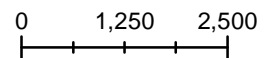


Figure 3. Nutria Study Potential Habitat and Occupancy Map, NASO DNA, Virginia Beach, Virginia

Prepared By:



Date:

08/2014

Base Map: ESRI ArcGIS Online and data partners, including imagery from agencies supplied via the Content Sharing Program 2011.
Boundary from Navy 2013.

Coordinate System: UTM, NAD 83, Zone 18N

6.0 DISCUSSION

NASO DNA provides habitats and open space for a wide variety of wildlife species, including nuisance species. Nuisance species can have a negative impact on the integrity of installation ecosystems and directly impact military operations. These negative impacts can result in a loss of biodiversity critical to supporting healthy lands and essential for long-term use of installations for military readiness. NASO DNA provides important training areas for military exercises and the control and management of threats, such as nuisance species, on those exercises could be critical to the military mission. Managing NASO DNA to reduce the impacts to military training and natural resources caused by nuisance species could present significant challenges.

This study represents the most concentrated effort to date to survey for and document nuisance wildlife species at NASO DNA. Through a combination of field survey and expert analysis, coyote and nutria were studied to gain baseline information regarding their abundance and distribution. Coyote and nutria were targeted from 10 nuisance species listed under VA Code 4VAC15-20-160 due to their likelihood to be present, potential to cause significant harm to installation ecosystems, and potential to interfere with the military mission. This study provides a foundation for the understanding of the existing environment as it relates to coyote and nutria, and an outline of the basic and established methods and protocols to facilitate future study and comparison. Permanent scent station locations were established in GIS for the camera station survey and resulted in a coyote/night index that can be used to analyze trends. The nutria study resulted in a potential habitat map documented in GIS and occupancy analysis that can also be compared to future replicated efforts.

The results of this study provide baseline information on the current understanding of the coyote and nutria at NASO DNA. The information gathered and presented under this study will be used to assist in the development of a management plan that presents management opportunities, alternatives, and recommendations designed to alleviate potential pressures on military training while integrating ecosystem management. The NASO DNA natural resources personnel may need to conduct future surveys to monitor the change in coyote and nutria presence, and take management actions as necessary to minimize adverse impacts to natural resources and the military mission.

6.1 COYOTE

6.1.1 Methods

The desktop analysis and expert consultation proved to be efficient and effective for selection of locations and methods to survey coyote presence and distribution. Documentation of the locations with GPS and GIS will facilitate replication of future surveys for comparisons to the baseline study. The wide distribution of sample locations at NASO DNA fulfilled the fundamental requirement of sampling—that the sampling sites should be representative of the study area (Rowcliffe et al. 2008). Atwood et al. (2004) found that coyotes in fragmented habitats used corridors (wooded ravines, ditches, etc.) effectively to travel between suburban and rural areas. It was also noted that coyotes were able to tolerate relatively high levels of human activity where substantial protective cover is available. These findings seem to be consistent with the habitats and human disturbances at NASO DNA.

Photographic rates from animal-triggered camera traps have been widely used as an index to abundance, density, or diversity (Hughson et al. 2010). Considerations in sampling include alteration of animal behavior from human activity, scent, and camera presence; assumption of equal detectability for animals; and sampling period. Using photographic rates as indices must be analyzed carefully because of the difficulty in resolving multiple photographs of a single animal, or group of animals, and variation in detectability. Selection of camera models is also an important consideration because the variability between models can range widely (Swann et al. 2004).

The survey was conducted in January – February to coincide with the coyote breeding season and because the expert consultations indicated that breeding season lures and baits are most effective during this time frame. Larrucea et al. (2007) found that camera surveys conducted in March–April and July–August had the greatest success of photo-captures for adults and juveniles, respectively. They concluded that cameras should be allowed to run 24 hours/day, and samples should be taken during every season of the year.

The addition of bait and lure attractants was expected to enhance the probability of recording coyote observations at NASO DNA. However, only two of the re-baited stations yielded coyote detections. The re-baited stations yielded more animal sequences than the other sites. Rebaiting may not be necessary during future studies.

Larrucea et al. (2007) found that scenting stations did not improve capture success in a coyote study using camera traps. They also found that unequal detectability of individuals can bias the data and that animal behavior is important to consider when using remote cameras. Alpha males avoided cameras more than juveniles and were underrepresented in the data; alpha males were never photographed at sites with human activity or on roads. Characteristics of camera locations, such as amount of human activity, being on roads versus trails, and habitat type, also influenced the number of photo-captures. Reduced photo-captures indicated that coyotes avoided cameras that were setup along narrow game trails.

6.1.2 Results

The NASO DNA study resulted in a coyote detection index of 0.035, which can be used for comparison to future studies to determine changes in the occurrence of coyotes. The cameras did not capture coyotes at close enough intervals to definitively say there is more than one coyote on NASO DNA. It is likely, however, that there are several, due to the distribution around the installation of successful scent stations. Although no coyotes were observed in the northern end of NASO DNA, it is likely that there are coyotes in that area. There are extensive connections to wooded areas and a golf course that could serve as travel corridors within the home range of a pack of coyotes. The data indicate that low numbers of coyote may be present at NASO DNA.

Using camera traps as a survey method was successful in revealing the presence of coyotes at NASO DNA and in providing an index of abundance based on frequency of occurrence (percent of camera nights recording coyotes). Given that this is the first time the study was implemented, comparisons or insights into abundance is limited. Surveys with camera traps can be combined with other techniques such as telemetry to estimate population density and understand how coyotes use habitats in relation to urban environments. However, specific study design is required to avoid bias and meet the assumptions required for statistical analysis. The following paragraphs describe studies that provide insight into the complexity of using camera traps to

study coyotes. Considerations for study design should be included in further studies of coyotes. Further studies could include increasing sample size and other criteria (i.e., surveying in March–April and July–August periods for photo-capture of adults and juveniles) required to use the data for abundance estimates.

A common method of estimating populations of elusive terrestrial mammals, such as the coyote, using camera-trap data is with capture–recapture analysis. This method relies on the recognition of individuals in the study population (Foster and Harmsen 2012). Rowcliffe et al. (2008) developed a method for density estimation using camera traps without the need for individual recognition. By modeling the process of contact between animals and cameras, Rowcliffe et al. (2008) estimated density from the trapping rate, the speed of movement of the target species, and the distance and angle at which the camera sensor detects the animal. However, the model assumes that animals move randomly and independently of one another, and that cameras are placed randomly.

Gipson and Kamler (2003) found that trap density and placement were critical factors in camera trap studies of coyotes because not accounting for different trap densities in core and peripheral areas could affect population density estimates and thus bias the results. Mackenzie et al. (2002) found that solely using frequency of occurrence as an index to abundance does not account for other variables critical to the estimation. Changes in the index may result from random variations or changes in detectability.

Stanley and Royle (2005) developed a Poisson distribution model that allows useful information to be extracted from indirect detection indices, such as the data obtained from use of scent stations, when the data are converted to binary form (i.e., station was visited/not visited over the sampling interval) and detectability of individuals is less than 1.0 (i.e., non-detection of a species at a site does not imply that the species is absent unless the probability of detection is 100 percent). A large number of stations (usually in excess of 100) is required and stations need to be checked at least five times to use their Poisson distribution model. Data can be used to estimate site occupancy, model factors influencing patterns of occupancy and abundance in space, and estimate abundance under certain circumstances.

6.2 NUTRIA

6.2.1 Methods

The desktop evaluation and local expert review and recommendations provided an efficient and effective method of identifying potential nutria habitat at NASO DNA. The potential habitat areas indicate where nutria are likely to occur, provide a basis for estimating population density potential, and may be used to direct future survey efforts. The strategic plan for nutria eradication in the Chesapeake Bay region is based on focusing efforts in designated nutria habitats (U.S. Fish and Wildlife Service 2012). Documentation of the potential habitat with GIS will facilitate future survey efforts.

Field surveys in the designated habitat areas proved to be successful in detecting nutria presence. The presence of nutria and their potential for harm are the basis for their eradication. One of the objectives for maintaining support in the Chesapeake Bay strategic plan for nutria eradication is to ensure that agency and partnering organizations are committed to the goal of nutria eradication (U.S. Fish and Wildlife Service 2012). Documentation of the locations with GIS where nutria

tracks and potential den sites occur will facilitate early detection and rapid response for eradication (Chesapeake Bay Nutria Working Group 2003).

6.2.2 Results

Analysis of aerial imagery, review by USDA local experts, and field survey identified at least 43 ac of potential nutria habitat at NASO DNA. There are other small areas that were considered quality habitat, but they are isolated which would prevent constant use by nutria. Most of these areas would connect to other quality habitat areas after a wet season, but would not be present for a long time. If the installation had a larger population, it is possible that nutria would be found in the isolated areas because individuals would be crowded out of the high quality habitat areas.

Observations of nutria and a run indicated that nutria occur in the designated habitat areas. However, the few observations indicate that the population density is probably at a low level.

Nutria was observed more than once at the southernmost reach of Lake Christine. They were followed to the forested area between Rifle Range Road and South Birdneck Road, where they were able to escape, possibly into a den at the edge of the narrow tributary. No denning activities or bank damage were obvious along the tributary into Lake Christine. Observations were recorded in the GIS geodatabase.

The central area of NASO DNA has potential for nutria infestation, due to the large wetland complexes and large bodies of water, including Lake Redwing. The golf course at the western end of Lake Redwing provides good habitat and food source for nutria, along with connectivity to other wetland complexes in the area. Successional wetland areas that lack open water (either lentic or lotic) and contain a significant woody components were not considered useful habitat for nutria.

As with most rodents, the nutria is a prolific breeder. Females are ready to breed again within a day or two following birth of a litter. In areas with plentiful food and low predation, adult females may produce three or more litters per year with an average of 15 young per female per year. Density estimates in Maryland were estimated to range between 1 and 6 nutria per ac. Nutria density has been estimated as high as 56 per ac (Baroch et al. 2002).

Based on the Maryland estimates given above and 88 ac classified as potential nutria habitat, the few nutria that occur at NASO DNA could increase to a population density of 88 to 528 individuals. However, it is not expected that the nutria population would increase to the higher estimate because NASO DNA has limited quality habitat, especially freshwater floating marsh habitat that nutria prefer (Baroch et al. 2002). The data indicate that low numbers of nutria may be present; future surveys in the designated habitat areas could be used to determine changes in the occurrence of nutria and level of potential habitat NASO DNA.

6.3 CONCLUSIONS

The primary purpose of this study was to provide baseline information on nuisance wildlife at NASO DNA, as well as to establish the methods and protocols for future study. In summary, we believe the project successfully implemented a baseline nuisance wildlife survey and met the project's stated goal and objectives (Section 1.1). Notable outcomes from the study include the following:

1. Two coyotes were caught on camera.

2. The coyote camera survey resulted in a detection index of 0.035.
3. NASO DNA has approximately 88 ac (25 ha) of nutria habitat.
4. Nutria were observed, as well as tracks and scat.
5. GPS and GIS documentation of methods and results will facilitate future replicated efforts.

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APPENDIX A
VDGIF Survey Permit



COMMONWEALTH of VIRGINIA

Douglas W. Domenech
Secretary of Natural Resources

Department of Game and Inland Fisheries

Robert W. Duncan
Executive Director

January 1, 2013

RE: New Permit and Reporting Requirements – Scientific Collection and Threatened & Endangered Species Permits

Dear Permit Holder:

Enclosed is your new permit and the standard conditions effective with the date of issue of your permit. Thank you for acquiring the proper permits to carry out your research and educational activities. We appreciate your cooperation. Please be sure **you AND all subpermittees** read your permit, especially any collections limitations and restrictions which are in addition to the standard conditions. Also read the standard conditions document and any other accompanying documentation thoroughly before commencing **any** field work. Remember that the permit, standard conditions, and other documentation (or a copy of them) **MUST** be with you at all times when you are in the field.

ALL requests for changes **MUST** be made using the Supplemental Amendment Form available for download at www.dgif.virginia.gov/forms and sent via email to collectionpermits@dgif.virginia.gov with as much lead time as possible. All changes must be approved by the permitting team (with the exception of requested deletions from the permit). If you are adding subpermittees, please remember that you **MUST** provide a resume for each person you wish to have added. **The standard conditions which accompany EVERY permit cannot be changed.**

As you know, we are continually trying to improve the permit process and better manage the wildlife resources of Virginia. This year, we are continuing to emphasize the need to coordinate with the Department prior to commencing any of your field work. **Please notify the Department via email at collectionpermits@dgif.virginia.gov, a minimum of 7 days prior to commencing field work and provide the following information: date(s) of field work, location(s) of field work, and species and numbers to be collected. You should also follow any additional contact instructions listed on your permit.**

Version 2013


To facilitate the compilation of data provided by you in your annual collection or salvage reports, you **MUST** submit your data on the customized Excel database program for use on Windows 2000 and later systems. **This Excel reporting application available for download from www.dgif.virginia.gov/permits/guide.asp.**

Enclosure (1) provides information regarding permit renewal, reporting and fee schedules.

Thank you again your cooperation! Your data is very important to VDGIF. This data will be entered into the Virginia Fish and Wildlife Information Service (VAFWIS) system of databases, which is available online to visitors and by subscription at <http://vafwis.org/fwis/>.

Please do not hesitate to contact myself or Shirl Dressler if you have questions or need assistance: (804) 367-6913 or collectionpermits@dgif.virginia.gov

Sincerely,



James E. Husband
Fish and Wildlife Information Service
Bureau of Wildlife Resources, Bureau Services

Enclosure

PERMIT RENEWAL, REPORTING, AND FEE SCHEDULE

The table below summarizes the permit period, renewal date, report date, and permit fee. I encourage you to send your renewal application and documentation by November 1 each year to ensure timely review and issuance by the Department permit team. Information and forms for permit renewal may be obtained from www.dgif.virginia.gov/forms.

Permit Type	Permit Period	Permit Duration	Permit Report Due Date	Permit Fee
Scientific Collection	Jan. 1-Dec. 31, or date approved through Dec. 31	2 years, or part thereof of first year, always expiring on Dec. 31	Annually by January 31	\$40, due with application
Wildlife Salvage	Jan. 1-Dec. 31, or date approved through Dec. 31	3 years, or part thereof of first year, always expiring on Dec. 31	Annually by January 31	\$60, due with application
Endangered & Threatened Species	Jan. 1-Dec. 31, or date approved through Dec. 31	1 year, or part thereof, always expiring on Dec. 31	Annually by January 31	\$20, due with application

REMINDER: Your report is due by January 31. You MUST use the Excel application available at www.dgif.virginia.gov/permits/guide.asp.



Virginia Department of Game and Inland Fisheries

4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104

(804) 367-1000 (V/TDD)

Under Authority of § 29.1-412, § 29.1-417, & § 29.1-418 of the Code of Virginia



Scientific Collection Permit

Permit Type: New

Fee Paid: \$40.00

VADGIF Permit No. 047039

Permittee: **Pat Green**
Address: **Tetra Tech, Inc.**
285 Ellicott Street
Buffalo, NY 14203

Office: (716) 849-9419
City/County:

Contract Species Surveys

Authorized Collection Methods: Visual Surveys
Authorized Waterbodies: N/A
Authorized Marking Techniques: N/A

Authorized Counties / Cities:
Chesapeake
Virginia Beach

Permittee **MUST** notify VDGIF a minimum of 7 days prior to each sampling event.
Notification must be made via email to: collectionpermits@dgif.virginia.gov

Report Due: 31 January 2014, 31 January 2015

ALL PERMIT REPORTS MUST CONTAIN COORDINATES; PERMITTEE CAN USE THE VIRGINIA FISH AND WILDLIFE INFORMATION SERVICE (VAFWIS) TO OBTAIN COORDINATES BY VISITING: [HTTP://VAFWIS.ORG/FWIS](http://vafwis.org/fwis)

STANDARD CONDITIONS ATTACHED APPLY TO THIS PERMIT.

Authorized Species:

Description

ID Number

Scientific Name

Coyote

Canis latrans

Nutria

Myocastor coypus

Annual Report Due End of Each Year

Authorized Sub-Permittees:

Staff , Tetra Tech, Inc.

Approved by:

Applicants may appeal permit decisions within 60 days of issuance. The appeal must be in writing to the Director, Department of Game and Inland Fisheries.

Title: **James E. Husband - Permits Manager**

Date: **12/13/2012**

20

Permit Effective

1/1/2013

through

12/31/2014

14



Virginia Department of Game and Inland Fisheries
4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-1000 (V/TDD) FAX (804) 367-9147



Under Authority of § 29.1-412, § 29.1-417, & § 29.1-418 of the Code of Virginia

Scientific Collection Permit -- Standard Conditions

- **This permit, or a copy, must be carried by the above named individuals during collection activities.**
- **The permittee is required to submit to this Department a report of all specimens collected under this permit by the report due date. Report form may be found at <http://www.dgif.virginia.gov/permits/guide.asp>. FAILURE TO RETURN THIS REPORT WILL RESULT IN NON-ISSUANCE OF FUTURE PERMITS. If no activity occurs under this permit, an email should be sent to collectionpermits@dgif.virginia.gov containing the following statement: No activity occurred under Permit #insert permitID during insert year (i.e. 2006). Permit reports are due by January 31.**
- Permittee MUST notify VDGIF within the seven (7) day period prior to EACH sampling event. Notification must be made via email to: collectionpermits@dgif.virginia.gov.)
- This permit does not support any activities outside of those associated with the application and proposal submitted to and approved by DGIF.
- No species currently listed by the U.S. Fish and Wildlife Service or the Virginia Department of Game and Inland Fisheries as threatened or endangered may be intentionally collected under this permit. If incidental *death or injury* of threatened or endangered species does occur, the permittee is required to notify this Department at collectionpermits@dgif.virginia.gov within twenty-four (24) hours of occurrence. The following information must be reported: collector, date, species, location (county, quad, waterbody, and latitude and longitude to nearest second), and number collected.
- If incidental *observation or collection and live release* of threatened or endangered species occurs, the permittee is required to notify this Department at collectionpermits@dgif.virginia.gov within seven (7) days, providing the same information as the above condition.
- If incidental *mortality or injury of specimens intended to be taken live* occurs, the permittee is required to notify this Department at collectionpermits@dgif.virginia.gov within 48 hours, providing the same information as the above conditions. In addition, the permittee must provide the cause of mortality or injury and steps that are being taken to address the problem.
- No species may be retained unless specifically authorized by this permit.
- Game birds/game mammals/game fish protected by State and/or Federal laws must be taken during authorized hunting and trapping seasons and under applicable daily and seasonal bag/number limits by properly licensed persons unless otherwise specifically authorized. A valid Virginia fishing license is required for each person collecting samples by hook-and-line.
- All traps must be marked with the name and address of the trapper or an identification number issued by the Department (Code of Virginia §29.1-521.7). Steel foothold traps, Conibear-style body gripping traps, and snares must be marked with a nonferrous metal tag bearing this information (Virginia Administrative Code 4 VAC 15-40-170).
- All traps must be checked at least once a day and all captured animals removed, except completely submerged body-gripping traps which must be checked at least once every 72 hours (Code of Virginia §29.1-521.9).
- The permittee is required to report any incidences of wildlife deaths or diseases observed during the course of collection activities. Reports should be made to: collectionpermits@dgif.virginia.gov within seven (7) days.
- This permit satisfies only the Department's requirement for collection permits and is issued with the understanding that no collections will be made on federal, state, or private property without the prior approval and necessary permits from the landowners involved. The permittee is responsible for obtaining any additional permits required for collection.
- Sampling gear, boats, or trailers which have been used in states harboring zebra mussels must be cleaned and prepared following accepted guidelines for removal of zebra mussels, prior to being used in Virginia.
- For safety reasons, it is recommended that all permittees display at least 100 square inches of solid blaze orange material at shoulder level within body reach and visible from 360 degrees, especially during hunting season.

APPENDIX B
Photographic Log

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: Nuisance Wildlife Survey
Dam Neck Annex



Photographer: P. Green
Date: 01/22/2013
Photo No.: 1
Direction: N
Comments: Camera 1 setup.



Photographer: P. Green
Date: 01/22/2013
Photo No.: 2
Direction: N
Comments: Camera 2 setup.

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: Nuisance Wildlife Survey
Dam Neck Annex



Photographer: P. Green
Date: 01/24/2013
Photo No.: 3
Direction: N
Comments: Camera 3 setup.



Photographer: P. Green
Date: 01/22/2013
Photo No.: 4
Direction: SE
Comments: Camera 4 setup.

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: Nuisance Wildlife Survey
Dam Neck Annex



Photographer: P. Green
Date: 01/22/2013
Photo No.: 5
Direction: W
Comments: Camera 5 setup.



Photographer: P. Green
Date: 01/22/2013
Photo No.: 6
Direction: NW
Comments: Camera 6 setup.

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: Nuisance Wildlife Survey
Dam Neck Annex



Photographer: P. Green
Date: 01/23/2013
Photo No.: 7
Direction: W
Comments: Camera 7 setup.



Photographer: P. Green
Date: 01/22/2013
Photo No.: 8
Direction: SW
Comments: Camera 8 setup.

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: Nuisance Wildlife Survey
Dam Neck Annex



Photographer: P. Green
Date: 01/22/2013
Photo No.: 9
Direction: S
Comments: Camera 9 setup.



Photographer: P. Green
Date: 01/22/2013
Photo No.: 10
Direction: NE
Comments: Camera 10 setup.

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: Nuisance Wildlife Survey
Dam Neck Annex



Photographer: P. Green
Date: 01/22/2013
Photo No.: 11
Direction: S
Comments: Camera 11 setup.



Photographer: P. Green
Date: 01/26/2013
Photo No.: 12
Direction: E
Comments: Red fox (*Vulpes vulpes*) captured on camera 08.

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: Nuisance Wildlife Survey
Dam Neck Annex



Photographer: P. Green
Date: 01/24/2013
Photo No.: 13
Direction: W
Comments: White tailed deer (*Odocoileus virginiana*) captured on camera 06.



Photographer: P. Green
Date: 01/29/2013
Photo No.: 14
Direction: E
Comments: Northern raccoon (*Procyon lotor*) captured on camera 03.

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: Nuisance Wildlife Survey
Dam Neck Annex



Photographer: P. Green
Date: 01/30/2013
Photo No.: 15
Direction: W

Comments: Virginia Opossum (*Didelphis virginiana*) captured after the survey window at camera 05.



Photographer: P. Green
Date: 01/22/2013
Photo No.: 16
Direction: E

Comments: Coyote (*Canis latrans*) captured at camera 08.

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: Nuisance Wildlife Survey
Dam Neck Annex



Photographer: P. Green
Date: 01/24/2013
Photo No.: 17
Direction: W
Comments: First coyote captured at camera 09.



Photographer: P. Green
Date: 01/29/2013
Photo No.: 18
Direction: E
Comments: Coyote captured at camera 09 after the survey window.

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: Nuisance Wildlife Survey
Dam Neck Annex



Photographer: P. Green
Date: 01/21/2013
Photo No.: 19
Direction: W

Comments: Typical coyote print on the station. This track was found near camera 09.



Photographer: P. Green
Date: 01/21/2013
Photo No.: 20
Direction: E

Comments: Nutria found at the north end of the installation just south of Lake Christine. Several others were identified at this location.

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: Nuisance Wildlife Survey
Dam Neck Annex



Photographer: P. Green
Date: 01/23/2013
Photo No.: 21
Direction: W

Comments: Some of the best available habitat on the installation. This is the northeast edge of Lake Tecumseh.

Company: U.S. Navy
Project: Nuisance Wildlife Survey
Dam Neck Annex



Photographer: P. Green
Date: 01/23/2013
Photo No.: 22
Direction: W

Comments: Run observed at the southwest corner of the installation.

THIS SPACE INTENTIONALLY LEFT BLANK

APPENDIX C
Scent Station Camera Information

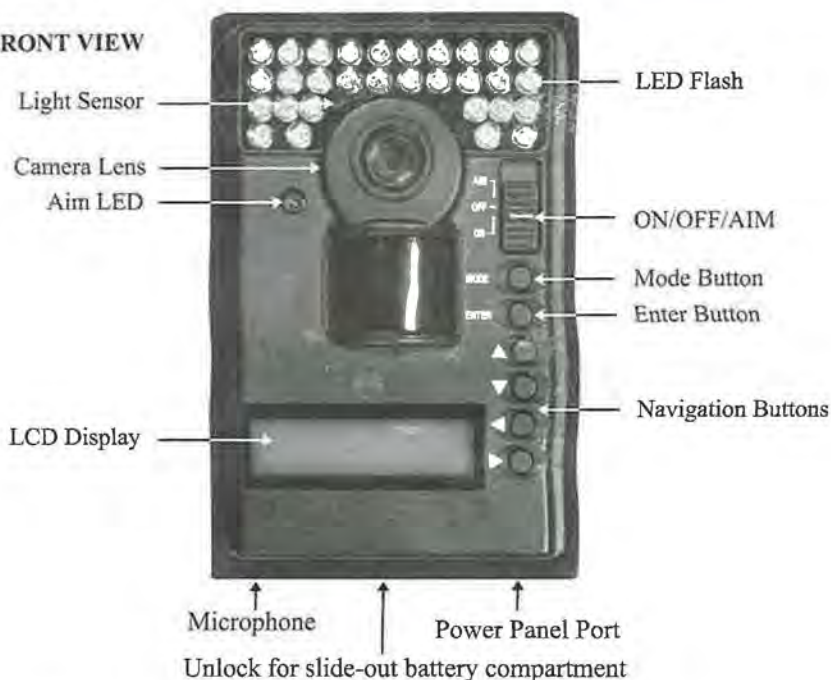


Instructions for M-80BLX GameSpy Digital Camera

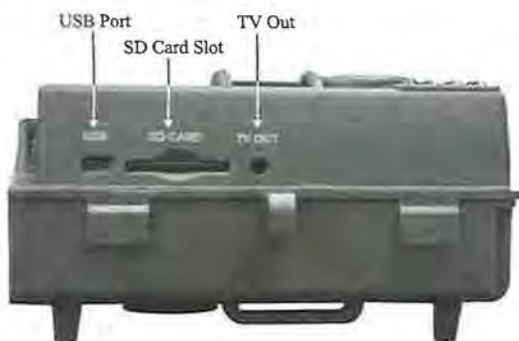
THANK YOU for your purchase of the M-80BLX GameSpy Digital Camera. Please read this booklet before using the unit. If you should have any questions about this product or any other Moultrie product, please contact us using the information on the back of this booklet. Please register your camera at www.moultriefeeders.com to activate your warranty.

I GAMESPY OVERVIEW

FRONT VIEW



SIDE VIEW



I GAMESPY OVERVIEW (cont.)

ON / OFF / AIM SWITCH

Used for turning On, turning Off, or Aiming the camera. When in AIM position the red LED light on the front of the camera will illuminate. To help find the center field of view for the camera, stand out in front of the camera and move left or right as you observe the AIM LED - as you walk away from direct center the LED light will be less bright. As you walk towards center the LED will appear brighter.

MODE BUTTON

The Mode Button selects Camera Setup or Main Screen. When camera mode is selected, the UP and DOWN buttons navigate through the menu options. The Mode Button is also used to wake-up the camera and turn on the display when the camera is in a power saving mode.

ENTER, UP/DOWN and LEFT/RIGHT BUTTONS

The ENTER button selects the item to be changed. The UP/DOWN and LEFT/RIGHT buttons are used to step through the menu options. Pressing the ENTER button again, selects the option indicated on the display. The ENTER button is also used to manually take a picture.

BATTERY COMPARTMENT

The Camera is powered by four(4) or eight(8) AA size alkaline or lithium batteries. Slide the Unlock switch to the right and grab the small handle under the switch to slide-out the battery compartment tray.

NOTE: It is recommended to use lithium batteries for best performance.

SD CARD SLOT

Accepts up to a 32GB SD Card for photo and video storage. Note: An SD Card must be installed for the camera to operate (sold separately).

USB PORT

Download still pictures and video onto your computer by connecting provided cable.

POWERPANEL PORT

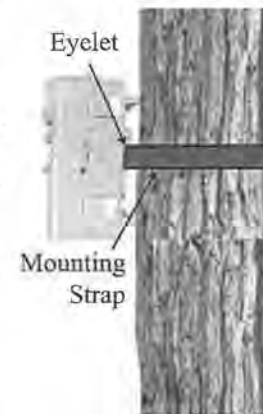
Accepts the Moultrie PowerPanel accessory (sold separately) only. Refer to www.moultriefeeders.com for more information.

TV OUT JACK

View still pictures and videos on your TV by connecting a 2.5mm video cable (sold separately).

II QUICK START INSTRUCTIONS

- 1 Slide the UNLOCK switch on the bottom of Camera and use the knob to pull the slide-out Battery Tray. Install four(4) or eight(8) AA size alkaline or lithium batteries with polarities as indicated in the Battery Tray. Re-install the Battery Tray.
- 2 Thread the provided Mounting Strap through the Eyelets on the back of the camera and secure to a tree or pole approximately 36" from the ground as shown.
- 3 Turn Camera on by sliding ON/OFF/AIM switch to the ON position.
- 4 Press the MODE button one time to get to the Camera Setup Menu. Set Time and Date by pressing ENTER, using UP/DOWN to adjust selected field, LEFT/RIGHT to move to the next field and ENTER when done.
- 5 Press MODE button until MENU SELECTION screen is displayed. Use the UP/DOWN buttons until the MAIN SCREEN option is highlighted yellow. Press ENTER.
- 6 Your Camera will now automatically take pictures whenever an animal is detected in range -based on the default settings below.



III DEFAULT SETTINGS

Capture Mode	TRAIL CAM (Still)
Photo Quality	HIGH
Photo Delay after each photo is taken	1 MIN
Motion Freeze	OFF
Multi Shot Count	OFF
Digital Zoom	NO ZOOM
Video Resolution	HIGH
Video Length	5 SEC
Video Audio	ON
Camera Name	MYCAMERA
Temperature	Fahrenheit
Info Strip printed on photos	ON
Plot Frequency	15 SECONDS
Plot Duration	3 HOUR
Default Setting	NO
Delete All?	NO

IV CAPTURE MODES

The GameSpy offers four capture modes as described below. The default capture mode is Trail Cam.

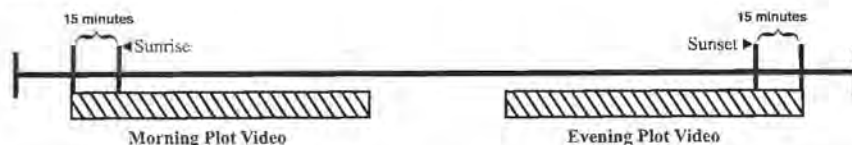
1 TRAIL CAM MODE

Still photos are taken when an animal is detected. The number of photos taken when an animal is detected is configurable in Settings. Photos are stored in the in the DCIM/100_MDGC folder on the SD card.

2 PLOT CAM MODE

The camera takes photos at a specified interval during the day and combines them together to create a Plot Video (*.MLT file) which can be viewed on the supplied Moultrie Plot Stalker software. The camera takes a Plot Video twice a day; once in the morning and once in the evening. The morning Plot Video begins 15 min before sunrise. The evening Plot Video ends 15 min after sunset. See chart below as a reference. The length of each Plot Video is determined by the Plot Duration setting in the camera menu. The camera will detect the correct sunrise and sunset times automatically and adjust itself accordingly. The Plot Videos are stored in :/PLOT folder on the SD card.

IMPORTANT: It will take the camera 24hrs to properly adjust to the correct sunrise and sunset times. As a default the camera will start the morning Plot Video at 5:45am and end the evening video at 6:15pm. To reset the sunrise and sunset times back to the default times, use the Default Settings option in the menu.



NOTE: The camera can still be triggered to take a photo under certain settings while in plot mode. Please see the "Plot Frequency" settings in the camera setup section.

3 HYBRID CAM MODE

Camera operates in Plot Cam mode during the day and Trail Cam Mode during the night. Thirty minutes after dusk the camera will enter the Trail Cam mode and take night photos when the PIR sensor is triggered.

4 VIDEO MODE

Camera records a video when an animal is detected by the motion sensor. During daylight hours the camera will record a video 5, 15 or 30 seconds in length. During night the camera will record a video with a maximum length of 10 seconds. The video length is configurable in SETTINGS.

V CAMERA SETUP

Setup Menu - The UP/DOWN buttons are used to navigate through the available setting choices. UP/DOWN moves to the next menu item, and ENTER selects the item to be changed. Additional menu choices are available by hitting the UP/DOWN button when either the first/last option is highlighted.

SETUP DATE/TIME
MM/DD/YY HH:MMAM

Date/Time - Set Date /Time - on the SETUP DATE/TIME screen, use the UP/DOWN buttons to modify the month. Press LEFT/RIGHT buttons to move to the next field. Press the ENTER button again to save your selections. The Time and Date is retained between battery changes. Time is not automatically adjusted for daylight savings.

CAPTURE MODE
TRAIL CAM

Capture Mode - (default Trail Cam) Press the UP/DOWN buttons to highlight the desired mode. Press the ENTER button to save the mode and return to the Camera Setup Menu. There are four capture mode settings -TRAIL CAM, PLOT CAM, HYBRID CAM or VIDEO. Refer to the CAPTURE MODE section of this manual for details.

PHOTO QUALITY
HIGH

Photo Quality - (default High) -The higher the quality of the photo/image the more memory it consumes. However, higher quality images have higher resolution which results in clearer images -especially when zooming in. There are four photo/image quality settings -ENHANCED, HIGH, MEDIUM, and LOW. Press the UP/DOWN buttons to highlight the desired setting. Press the ENTER button to save the setting and return to the Camera Setup Menu. Refer to SPECIFICATIONS section of this document for details on number of images stored based on Photo Quality.

V CAMERA SETUP (cont.)

PHOTO DELAY
1 MIN

Photo Delay - (default 1 minute) -The photo delay determines the number of minutes between pictures when an animal is detected and remains in range. To change the delay time, press the UP/DOWN buttons to highlight the desired setting. Press the ENTER button to save the setting and return to the Camera Setup Menu. Additional menu choices are available by hitting the UP/DOWN button when the first/last option is highlighted. Photo Delays can be set to 5, 15 and 30 seconds, 1, 5, 10, 30 and 60 minutes.

MOTION FREEZE
OFF

Motion Freeze - (default OFF) - This feature maximizes the image clarity during night photos. When this feature is on the camera will use a maximum exposure time of 1/20sec for the night photos. Other adjustments are made to increase the brightness and clarity of the photo. When this feature is turned off the camera will use a maximum exposure time of 1/8sec for the night photos.

MULTI SHOT
OFF

Multi-Shot - (default OFF) - When the Game Spy Camera is configured for TRAIL in the capture mode screen, the camera can take 2 shot standard or 3 Shot standard, 2 Shot Fast, 3 Shot Fast, and 4 Shot Fast each time an animal is detected. There is an approximate 3-4 second delay between pictures when the 2 shot standard or 3 Shot standard setting is selected. When the 2 Shot Fast, 3 Shot Fast, and 4 Shot setting is selected, the camera will take the selected amount of photos within 1-2 seconds. To choose the desired setting press the ENTER button to enter the Multi Shot settings. Press UP or DOWN to select the desired number of photos. Then press ENTER again to return to the camera setup menu.

V CAMERA SETUP (cont.)

VIDEO RESOLUTION
HIGH

Video Resolution - (default High) -Video resolution can be set to LOW or HIGH. The higher the quality of the video, the more memory it consumes. However, higher quality videos have higher resolution.

Low: 352 x 192 @ 24fps High: 720 x 400 @ 24fps
Press the UP/DOWN buttons to highlight the desired setting. Press the ENTER button to save the setting and return to the Camera Setup Menu.

VIDEO LENGTH
5 SEC

Video Length- (default 5 seconds) -When the Game Spy Camera is configured for VIDEO in the Capture Mode screen, the camera will record video for a designated amount of time each time an animal is detected. To change the amount of time recorded, press the UP/DOWN buttons to highlight the desired setting. Press the ENTER button to save the setting and return to the Camera Setup Menu. The maximum video length for a nighttime IR video is 10 seconds.

VIDEO AUDIO
ON

Video Audio - (default On) - This option allows the user to turn the audio during video recording ON or OFF. When selected and the Game Spy Camera is configured for VIDEO in the Capture Mode screen; the camera will record audio along with the video each time an animal is detected. Press the LEFT/RIGHT buttons to highlight the desired setting. Press the ENTER button to save the setting and return to the Camera Setup Menu.

CAMERA NAME
MYCAMERA

Camera Name - (default MYCAMERA) The Camera Name is imprinted on the photos and provides a point of reference when multiple cameras are used. To change the Camera Name, use the LEFT/RIGHT buttons to highlight the character to be modified. Press the UP/DOWN button to select the desired character (A to Z, 0 to 9, dash or space). Press LEFT/RIGHT to move to the next character. Press the ENTER button to save the new camera name and return to the Camera Setup Menu.

V CAMERA SETUP (cont.)

IR TEST
OFF

IR Test- (default Off) When IR Test is ON and the PIR sensor detects motion, the red LED on the front of the camera will come on for 2 sec and then shut off.

TEMPERATURE
FAHRENHEIT

Temperature - (default Fahrenheit) - The temperature is imprinted on each photo and can be in degrees Fahrenheit or Celsius. To change the temperature units, press the UP/DOWN buttons to highlight the desired setting. Press the ENTER button to save the setting and return to the Camera Setup Menu.

INFO STRIP
ON

Info Strip - (default On) -When the Info Strip is turned ON, the information strip, as described in the Advanced Setup section of this manual, is imprinted on the photos. The Temperature, Moon phase, Date, Time, Camera Name, & Moultrie logo are imprinted on the bottom of each picture. When the Info Strip is turned OFF, the photo contains no information strip. To change the Info Strip setting, press the LEFT/RIGHT buttons to highlight the desired setting. Press the ENTER button to save the setting and return to the Camera Setup Menu.

PLOT FREQUENCY
15 SECONDS

Plot Frequency - (default 15 seconds) - Used to set the time frequency between each photo in plot mode. To change the plot frequency, press the UP/DOWN buttons to highlight the desired setting. Press the ENTER button to save the setting and return to the Camera Setup Menu. Plot frequency can be set to 5, 10, 15, 30, 60 seconds or 2 or 5 minutes.

NOTE: Increasing the Plot Frequency will decrease the battery life of the camera. It is recommended to use lithium batteries for taking plot videos.

NOTE: When the Plot Frequency is set to 60 seconds, 2 minutes or 5 minutes, the cameras motion sensor can still be activated in between photos. When this occurs, a photo will be taken and added to the plot video.

V CAMERA SETUP (cont.)

PLOT DURATION
3 HOURS

Plot Duration - (default 3 hours) - Plot Duration is used to limit the time periods that the camera will be active. To change the plot duration, press the UP/DOWN buttons to highlight the desired setting. Press the ENTER button to save the setting and return to the Camera Setup Menu.

Plot duration can be set to All Day, 1, 2, 3, or 4 hours.

- All Day - Plot cam takes photos all day
- 1 Hour - Plot cam takes photos for 1 hour twice a day.
- 2 Hour - Plot cam takes photos for 2 hours twice a day.
- 3 Hour - Plot cam takes photos for 3 hours twice a day.
- 4 Hour - Plot cam takes photos for 4 hours twice a day.

NOTE: Increasing the Plot Duration will decrease the battery life of the camera. It is recommended to use lithium batteries for taking plot videos.

BATTERY LIFE
67 DAYS

Battery Life- This feature provides an **estimated** battery life of the camera. The battery life is expressed as "**### Days**". Pressing the MODE button will return to the Camera Setup menu.

NOTE: The number of days shown is based on using 8 AA alkaline batteries with 5 day and 5 night photos per day. Actual battery life will vary depending on type of battery, weather conditions and camera usage. It is recommended to use lithium batteries for best performance.

DEFAULT SETTINGS
NO

Default Settings - (default No) -To restore all the settings back to the factory default, press the LEFT/RIGHT buttons to highlight the YES setting. Press the ENTER button to restore the default settings and return to the Camera Setup Menu.

DELETE ALL?
NO

Delete All Photos - (default No) - To remove all content on the SD card, press the LEFT/RIGHT buttons to highlight the YES setting. Press the ENTER button to erase photos and return to the Camera Setup Menu.

VI ADVANCED INFORMATION

1 VIEWING PICTURES ON COMPUTER VIA USB

1. Plug provided USB cable into the USB port on your Windows 7/Vista/XP computer.
2. Plug other end of USB cable into the camera's USB port.
3. To access JPG pictures and AVI movie files, navigate to "My Computer" and double click the "Moultrie CAM" drive. Picture files will be stored in the DCIM/100_MDGC directory; video files are located in the DCIM directory.
4. To exit USB mode, follow Windows' instructions for properly disconnecting a removable drive and then unplug.

2 VIEWING PICTURES - TV OUT

1. To enter TV Out Mode, turn on the camera and place in the SETUP mode.
2. Plug RCA jack from TV Adapter Cable (sold separately) into a VIDEO IN port on a TV or VCR.
3. Plug other end of TV Adapter Cable into the TV Out Jack. Pictures are now presented on the TV.
4. To view pictures use the RIGHT or LEFT button to sequence to the next/previous captured picture or video clip. The camera's menu display shows the picture number being viewed.
5. To delete current picture or video, press the DOWN button.
6. To exit TV mode, unplug the TV Adapter Cable from the TV Out Jack and TV or VCR.

FCC Statements

FC Moultrie Products, LLC
MFH-DGS-M80BLX

NOTE: Changes or Modifications not expressly approved by the party responsible could void the user's authority to operate this device.

The device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER AUTHORITY TO OPERATE THE EQUIPMENT.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

VI ADVANCED INFORMATION (cont.)

3 INFORMATION ON PICTURE

The info strip below will appear at the bottom of the photo/video:



Moon Phase

The icons for the moon phase are as follows:



VII GAMESPY CAMERA SPECIFICATIONS

Photo Quality	
LOW	744 x 416
MEDIUM	1480 x 832 (1.3MP)
HIGH	2368 x 1328 (3.2 MP)
ENHANCED	2984 x 1680 (5.0 MP)
Video Quality	
HIGH	720 x 400 @ 24fps
LOW	352 x 192 @ 24fps
Approximate photos stored 1GB SD card	
LOW	10000
MEDIUM	2500
HIGH	1100
ENHANCED	700
Approximate video time stored 1GB SD card	
HIGH	25min
LOW	80min
Optional SD Memory Card	32 GB Max
Optical Field of View	55 degrees
Batteries	Alkaline AA-cells
Approximate Detection Range	45 +/-5 feet

A PLOTSTALKER SOFTWARE INTRO

INTRODUCTION

In time-lapse photography a series of still photos are taken at regular time intervals. The PlotStalker Software allows you to load the time lapse file that was captured from your Moultrie Game Camera and scroll backward and forward through your photos, single step, search for activity in a designated area, and save the files.



SYSTEM REQUIREMENTS

- Computer: Intel® Pentium® 4 or AMD Athlon® 64 processor or above; 1GB RAM minimum; 100 MB hard disk space minimum.
- Operating System: Microsoft® Windows® 32 bit - XP with Service Pack 2 or later; Windows Vista® Home Premium, Business, Ultimate, or Enterprise with Service Pack 1; or Windows 7

SOFTWARE INSTALLATION

- Insert the PlotStalker CD into your computer and follow on-screen instructions.

LOADING PLOT FILES

- 1 Using standard Microsoft utilities (ex. File Explorer – My Computer), copy the PlotFiles (extension is .MLT) from the PLOT directory on the SD card to the hard disk drive in your computer. Note the location stored on the hard disk drive.
- 2 Open the PlotStalker software application from the Windows Start Button menu. Once in the PlotStalker software, click on the File Button
- 3 Browse to the location in which you have saved the Plot file(s) (.MLT) in step 1 above, select the file of interest and click Open.



BEGIN/END

Goes to the first or last photo in the Plot File.



FRAME BY FRAME SEARCH

Individually step forward or backward through each photo.



REWIND/PAUSE/PLAY

Play photos in sequence, pause, or play the photos in reverse order. These functions simulate a video and are useful for manually searching changes in the photos. When a sequence is being played, press fast-forward or fast-rewind multiple times to increase speed. (1x-5x)



B PLOTSTALKER ACTIVITY SEARCH

ACTIVITY SEARCH

The Search Feature will scan through your photos and automatically look for changes in regions that you identify in Setup.



In search mode, the PlotStalker software scans through the .mlt photo file, stops on a photo when changes are found in your identified region, and then highlights the changes in blue. You can click anywhere in the video viewing area to remove the blue highlights.

ACTIVITY SEARCH SETUP

Click the Settings button to activate the Region and Sensitivity settings for the Activity Search



DEFINE SEARCH REGION

Provides the ability to search for changes in the photo in a specific region rather than the entire photo.



- 1 Click on the Set Motion Search Area Button.
- 2 Use the mouse to select and drag the red outline around the area you want to search for movement. This allows you to focus on a very precise area if required.
- 3 Click OK button on the Settings Popup window to confirm your settings and exit the menu.

SENSITIVITY

- 1 Set to High, Medium or Low - This sets the level of pixel change the program will detect. Note; a pixel change will occur with a color, intensity, lighting or movement so this setting is critical to obtain the desired results.

DEFAULT SETTINGS

- 1 Click on Default button to return to the default values for Search Area and Sensitivity settings

C PLOTSTALKER SAVE FILE

SAVING FILES OVERVIEW

Use the Save File features of the PlotStalker software to create a single photo, reduce the overall size of the .mlt file, exclude unwanted photos in the front, or create a video that can be viewed using a standard media player.

EXPORTING AN IMAGE/PHOTO

- 1 On the main screen, choose a starting image/photo (frame) by using the scroll bar on the bottom of the display or the frame-by-frame search feature.
- 2 Press the SAVE button
- 3 Select the Current Image (*.jpg) radio button
- 4 Press Change... to enter the directory and filename to save the image
- 5 Press Export to save the file

EXPORTING MLT FILE

- 1 Select the appropriate 50, 100, or 200 images video clip radio button. This will create a MLT format file from the starting frame plus the next 50, 100, or 200 frames.
- 2 Select the Change button to select the desired location to save the export file.
- 3 Enter the directory and filename to save the file
- 4 Select the Export button to save the file. These files are viewable with Plot Stalker Software.

EXPORTING WMV FILE

- 1 Select the appropriate 50, 100, or 200 images video clip radio button. This will create a .wmv format file of the starting frame plus the next 50, 100, or 200 frames.
 - 2 Select the Change button to select the desired location to save the export file.
 - 3 Enter the directory and filename to save the file
 - 4 Select the Export button to save the file. The program will convert the images to video based on the chosen settings. The .wmv file can be viewed using a standard media player.
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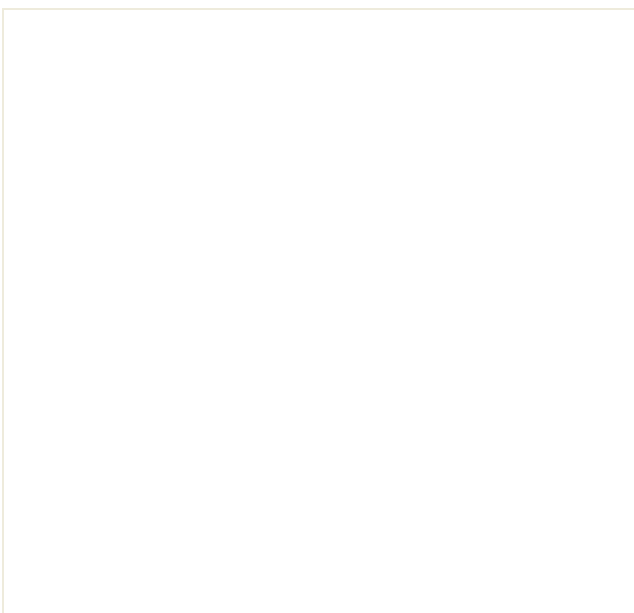
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Moultrie® Game Spy® M-80 Black Mini 5.0 Megapixel Digital Game Camera



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Product Color:
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Size:
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Megapixel:
5

Quantity:

1877991

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Description

- No visible LED light for ultimate concealment
- Night range up to 50 ft.
- 5 MP resolution camera
- Infrared triggered game camera, hybrid time-lapse plot camera, plot camera by day/infrared camera by night
- 16:9 widescreen images and videos provide a wider field of view than other cameras
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Overall Rating: 5 out of 5

Great Cam, April 13, 2013

By [TDMBear](#) from Midwest [\(read all my reviews\)](#)

Advantages: Ease of use, Quality

Reviewer Images
(click to see full-size image)

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Primos® TRUTH Cam 35 3.0 Megapixel...
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Moultrie® Game Spy® M-880...
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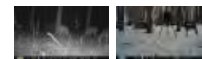


Moultrie® A-5 Low Glow 5 Megapixel...

- Temperature, moon phase, time, date, and camera ID stamp
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The Moultrie® Game Spy® M-80 Black Mini 5.0 Megapixel Digital Game Camera lets you choose from three operational modes: Black Flash infrared triggered game camera, Plot Stalker hybrid time-lapse plot camera capturing images at preset intervals plus triggered by game, or Plot camera by day/infrared camera by night! With 5.0 MP resolution and a 16:9 widescreen, the Game Spy M-80 Black Mini features a night range up to 50 ft. with a picture delay of 5/15/30 seconds, 1-60 minutes and has a battery life calculator and video with sound. New FastFire Continuous Shooting Mode captures up to 3 pictures per second with temperature, moon phase, time, date, and camera ID stamp indicators. The M-80 Black Mini accepts up to 32 GB SD card (not included) and has an external power port for optional Moultrie PowerPanel®. Uses four or eight AA batteries (not included). Includes USB cable, mounting strap, and Plot Stalker software CD. Up to 1-year battery life. Dimensions: 5" x 3.75" x 3". Color: Black.

Manufacturer model #: MFH-DGS-M80-BLX.



"I have had this out camera out since Christmas over a feeder and takes around 1,000 pictures a week. The batteries are just now starting to run low. Picture quality is great in my opinion and easy to use."

What do you usually hunt? Deer

How many times a year do you hunt on average? 11+

Would you recommend this product as a gift? Yes

Was this review helpful to you? [Yes](#) [No](#) (Report Inappropriate Review)

Share this Review: [f](#) [t](#) [p](#)

Overall Rating: ★★☆☆☆ 1 out of 5

Many Problems, March 10, 2013

By [Badcam](#) [D](#) ([read all my reviews](#))

Advantages: there are nonewhen it doesn't work

Disadvantages: Performance, Quality, Durability

"I purchased two of the Moultrie M80's a year ago. Both of them stopped taking pictures within days of one another. After two calls to Moultrie(I was on hold for ever) I got a hold of someone that fixed the problem. They do not take good pictures in the dark if something moves. The pictures are very blurry.Now one of them have stopped taking picture again and will not even turn on. I emailed Moultrie,but as of 3/9/2013 knowone has made any attempt to contact me about the problem. I will never buy another Moultrie product."

What do you usually hunt? Deer

How many times a year do you hunt on average? 11+

Would you recommend this product as a gift? No

Was this review helpful to you? [Yes](#) [No](#) (Report Inappropriate Review)

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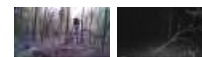
Overall Rating: ★★★★★ 4 out of 5

Pretty good Camera, December 3, 2012

By [Plogan11](#) from Northeast texas [D](#) ([read all my reviews](#))

Reviewer Images

(click to see full-size image)



Advantages: Ease of use, Performs well

"This is my first game camera so I dont have too much to compare it too. What I have noticed is that it dose not always take pictures. I have sat in my stand several mornings watching the doe play around my feeder. They show up like clockwork every morning. When I check the card I find that there will only be a couple of pics if any at all, so I wonder what im missing out on when I'm not there. The day pictures are impressive, but the night pictures are usually dark and often times very blurry. I do like the black flash feature and the deer never noticed the camera. There is also the night/day transition period where all the pictures look like there is a fresh blanket of snow on everything. Overall its not a bad camera for a first purchase."

What do you usually hunt? Deer

How many times a year do you hunt on average? 11+

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Would you recommend this product as a gift? [Yes](#)

Was this review helpful to you? [Yes](#) [No](#) (Report Inappropriate Review)

Share this Review: [f](#) [t](#) [p](#)

Overall Rating: ★★★★★ 4 out of 5

Satisfied, October 28, 2012

By [jzfrans](#) [\(read all my reviews\)](#)

Advantages: Ease of use, Durability, Value for money, Quality

Disadvantages: trigger speed

"The only thing lacking is the trigger speed. The night pictures have a great flash range and limited blurring. Takes good day pics as well. I've been pleasantly surprised with the past moultries I've had, I've never had any issues."

Was this review helpful to you? [Yes](#) [No](#) (Report Inappropriate Review)

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Moultrie® Game Spy® M-100...
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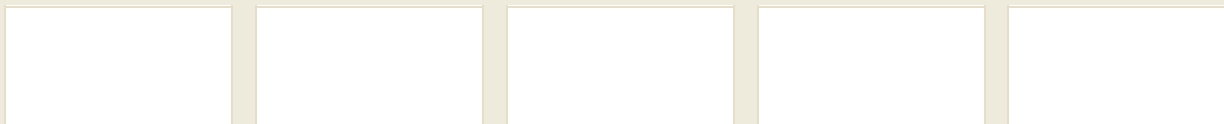


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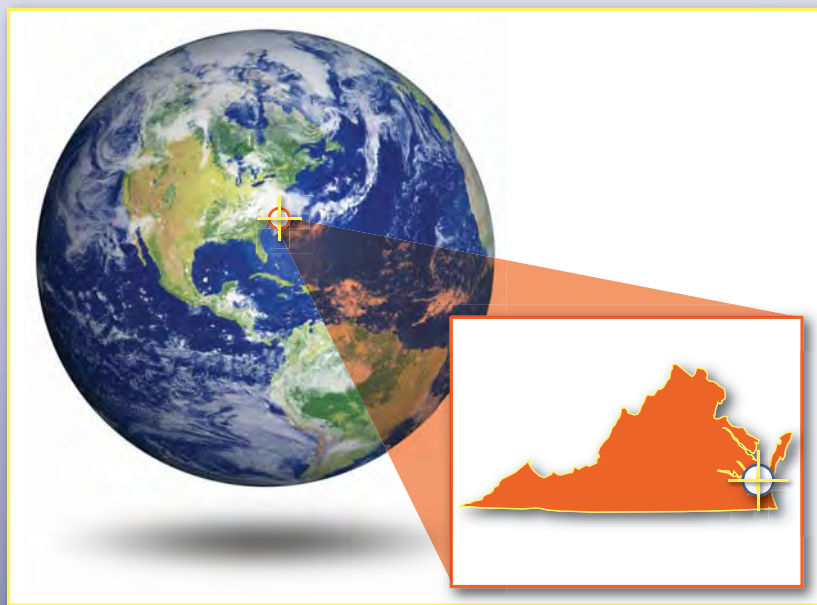
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Contract: N62470-08-D-1008; Task Order: WE43

FINAL- August 2014



Nuisance Wildlife Management Plan, Version 1



Naval Air Station
Oceana
Dam Neck Annex
Virginia Beach,
Virginia



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NAVFAC Atlantic Biological Resource Services

Contract: N62470-08-D-1008; Task Order: WE43

Nuisance Wildlife Management Plan, Version 1

Naval Air Station Oceana
Dam Neck Annex,
Virginia Beach, Virginia

Final – August 2014

Prepared for:

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- Appendix B – Nuisance Wildlife Factsheets

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
ac	acre(s)
EO	Executive Order
ERL	environmental readiness level
EV	Environmental
ha	hectare(s)
INRMP	Integrated Natural Resources Management Plan
MIDLANT	Mid-Atlantic
NAS	Naval Air Station
NASO DNA	Naval Air Station Oceana Dam Neck Annex
NAVFAC	Naval Facilities Engineering Command
NRM	Natural Resource Manager
OPNAVINST	Operational Navy Instruction
U.S.	United States
U.S.C.	U.S. Code
USDA-APHIS-WS	U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services Division
VAC	Virginia Administrative Code
VDGIF	Virginia Department of Game and Inland Fisheries
VFWIS	Virginia Fish and Wildlife Information Service

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1.0 INTRODUCTION

The U.S. Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic prepared this nuisance wildlife management plan for Naval Air Station Oceana Dam Neck Annex (NASO DNA) (Figure 1). The term nuisance wildlife includes species that adversely affect the well-being of domestic animals, other wildlife, property, or human health and safety. The Virginia Administrative Code (Title 4VAC15-20-160) lists the house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), black rat (*Rattus rattus*), coyote (*Canis latrans*), feral hog (*Sus scrofa*), nutria (*Myocastor coypus*), woodchuck (*Marmota monax*), European starling (*Sturnus vulgaris*), English sparrow (*Passer domesticus*), and pigeon (*Columba livia*) as nuisance species. All of these species are known to or have the potential to occur on NASO DNA. This plan is designed to address nuisance wildlife on NASO DNA and is designated as Version 1 to indicate that it is a living document to be updated as required to address changing conditions and new information as it becomes available.

Although all of these species occur or have the potential to occur at NASO DNA, coordination with installation personnel and local experts identified the coyote and nutria as the primary nuisance wildlife species of interest/concern at the time of this plan. Of the listed nuisance wildlife species, the occurrence of coyote and nutria was considered to have the greatest potential for adverse effects on NASO DNA. As a result of this determination, field surveys were initiated to gain baseline information on the occurrence of these two species and their potential habitats. The results of those surveys (Navy 2014) are used herein to develop the guidance and recommendation for monitoring and control.

1.1 PURPOSE

The purpose of this management plan is to prevent nuisance wildlife from adversely affecting the military mission and operations on NASO DNA. This plan identifies and focuses management efforts and provides management guidelines for control of nuisance wildlife. This plan is recommended for implementation under the overarching guidance of NASO DNA's Integrated Natural Resources Management Plan (INRMP) (Navy 2013).

1.2 GOALS AND OBJECTIVES

To effectively implement this management plan and evaluate its success, measurable goals and objectives must be identified. The goals include (1) informing installation personnel of the nuisance wildlife conditions and (2) minimizing nuisance wildlife concerns on NASO DNA. The objectives include (1) disseminating information on the occurrence and abundance of nuisance wildlife and (2) implementing management actions to prevent nuisance wildlife from becoming a threat to NASO DNA military mission and operations. Measures of success include the dissemination of fact sheets on nuisance wildlife and the number of nuisance complaints received. Implementation of this plan requires the cooperation of the installation commander and key persons within the chain of command affecting natural resources management.

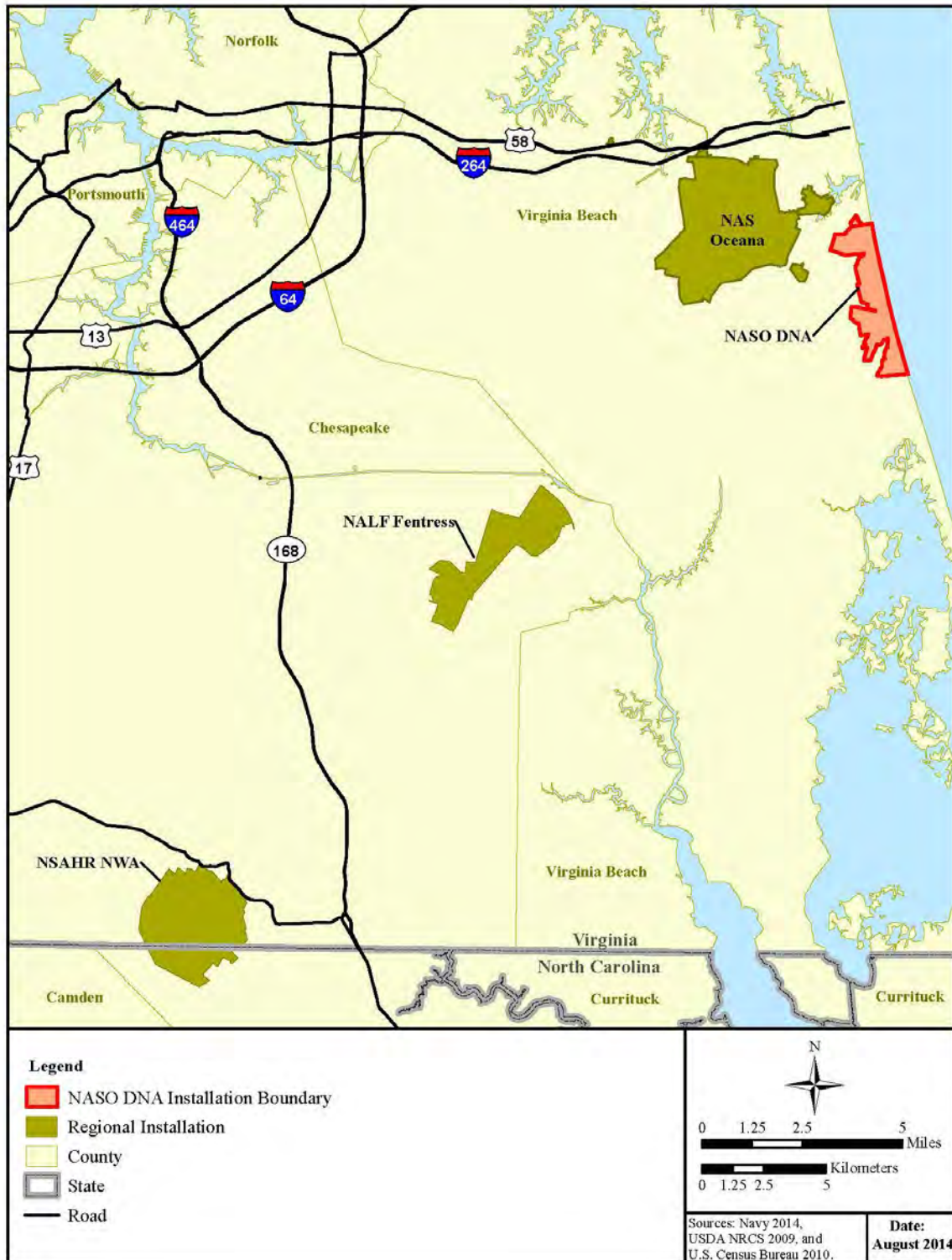


Figure 1. General Location of NASO DNA.

1.3 NATURAL RESOURCES OVERVIEW

Natural resources management on NASO DNA is part of a region-wide Navy natural resources program that is overseen by the mid-Atlantic regional natural resources program manager. The Natural Resources Manager (NRM), stationed at Naval Air Station (NAS) Oceana, supervises natural resources management activities on NASO DNA. Program administration includes 13 management issues and concerns.

- Coastal Zone Protection
- Wetlands and Water Quality Protection
- Environmental Restoration Program
- Oil and Hazardous Substances
- Threatened and Endangered Species Protection
- Marine Resources Protection
- Habitat Conservation and Restoration
- Shade Tree and Urban Forest Management
- Forest Management
- Fish and Wildlife Management
- Outdoor Recreation and Environmental Awareness
- Integrated Pest Management
- Cultural Resources Management.

Three management units are recognized for planning of natural resources management activities. The management units include urban/developed areas, natural areas, and beaches and dunes. Nuisance wildlife issues from coyote and nutria could occur in each of the management units but would be of greatest concern in the urban/developed areas and natural areas.

2.0 ROLES AND RESPONSIBILITIES

Navy program requirements for ensuring military readiness and sustainability while complying with natural resource protection laws, and conserving and managing natural resources includes coordination of roles and responsibilities. Specific assignment of responsibilities, centralized supervision, professionally trained personnel, and stakeholder coordination are necessary for managing natural resources, including nuisance wildlife, on Navy lands as specified in the Operational Navy Instruction Manual (OPNAVINST 5090.1D, M-5090.1), *Environmental Readiness Program*. Coordination with state and other federal agencies enhances the Navy's ability to achieve stewardship of natural resources in support of readiness and sustainability.

2.1 STATE

The Virginia Department of Game and Inland Fisheries (VDGIF) is responsible for non-migratory game and non-game wildlife management in the Commonwealth of Virginia. Department biologists can assist planning and compliance with state regulations pertaining to the management of wildlife, including nuisance species. VDGIF provides additional information on coyote control at <http://www.dgif.virginia.gov/wildlife/problems/coyotes/>, including the no kill permit requirement, continuous open season, no Sunday hunting or killing permitted, and requirement to contact the Commonwealth Attorney's office for local information regarding legal methods of animal removal (some cities or counties have stricter regulations than state law). The Invasive Species Working Group of Virginia was established in 2009 by the General Assembly (Code of Virginia § 2.2-220.2) to develop a state invasive species management plan and list of invasive species that pose the greatest threat to the Commonwealth (Virginia Invasive Species Working Group 2012). The nutria is included in the list of invasive species that are actively managed or monitored in Virginia.

2.2 FEDERAL

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services Division (USDA-APHIS-WS) is the federal program authorized by law to reduce damage caused by wildlife in accordance with the Animal Damage Control Act of 1931, as amended (7 U.S. Code [U.S.C.] 426-426c) and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 (7 U.S.C. 426c). USDA-APHIS-WS provides technical assistance for control of nuisance wildlife. Their mission is to provide federal leadership and expertise to resolve wildlife conflicts and allow people and wildlife to coexist. Additional information is provided at www.aphis.usda.gov/wildlife_damage. Executive Order (EO) 13112, *Invasive Species*, directs USDA-APHIS-WS to provide national leadership and oversight in managing invasive species, including nuisance wildlife, in cooperation with other federal agencies. All USDA-APHIS-WS wildlife damage management is conducted in compliance with state and federal relevant laws, regulations, policies, orders, and procedures.

2.3 DEPARTMENT OF DEFENSE

Management of nuisance wildlife concerns is specified in the NASO DNA INRMP (Navy 2013). EO 11987, *Exotic Organisms*, and EO 13112 address the control of invasive, non-native species on federal facilities. Procedures and responsibilities for management and control of nuisance

wildlife are prescribed in COMNAVREG MIDLANT INST 11015.3 (*Natural Resources Management for Fish and Wildlife, Feral Animals, Invasive Species, and Certain Pests*) (Appendix A). These documents direct installations to prevent introductions, conduct surveys on the distribution and abundance of non-native species, and to provide management for their control.

NAVFAC MIDLANT is responsible for management and control of, and providing services pertaining to, fish and wildlife, feral animals, invasive species, and pests. Pest management services are provided through the Environmental Services Department, which responds to routine service calls for removal of non-migratory birds and control of feral animals. Requests for services involving animals not under the purview of the Environmental Services Department are referred to NRMs.

Natural Resource Specialists, under the direction of the Regional Natural Resources Program Manager, are responsible for implementation of practices and procedures to manage fish and wildlife and control certain feral, nuisance, and invasive species. Under the direction of NRMs, Conservation Officers are responsible for enforcing fish and wildlife and other natural resources laws and regulations. They may conduct field inspections and employ approved control methods for certain species, perform wildlife forensic investigations, and respond to wildlife damage complaints.

Authority and responsibility for nuisance wildlife ultimately resides with the NAVFAC MIDLANT Core Environmental (EV) director. The NAVFAC MIDLANT CORE EV director may delegate this authority to the NAVFAC MIDLANT Core and/or the NAVFAC MIDLANT Installation NRM. The NAVFAC MIDLANT CORE EV director or an appointed delegate maintains the permits necessary for controlling species protected by federal or state law.

3.0 INSTALLATION DESCRIPTION

NASO DNA (Figure 2) was established by the Navy in 1941 in City of Virginia Beach, Virginia. The installation size was increased over several years and encompasses approximately 1,900 acres (ac, 769 hectares [ha]). The installation is adjacent to the Atlantic Ocean and bounded by mostly developed land to the north, south, and west. Surrounding land uses include industrial, commercial, residential, recreational, and agricultural. NASO DNA is part of NAS Oceana and its mission includes education and training to operational and systems commands, and to perform other functions and tasks as directed by higher authority. This installation description is taken from the INRMP (2013), which provides more detailed information on the physical and biological resources that are abbreviated below.

3.1 PHYSICAL RESOURCES

NASO DNA is located in Virginia's outer Atlantic Coastal Plain. The climate is moderated by the Atlantic Ocean; January is typically the coldest month (average 32.6° Fahrenheit [F], 0.3° Celsius [C]) and July is typically the warmest month (average 87.4° F, 30.8° C). The area receives an average of 45.7 inches of rain per year. The normal growing season (daily minimum temperatures higher than 32° F, 0.0° C) is approximately 250 days from 22 March to 21 November.

The outer Atlantic Coastal Plain physiographic province is characterized as flat with low relief and elevations of 0–60 feet (0–18 meters) above mean sea level. The largest portion of the installation lies in a low basin behind primary and secondary dunes adjacent to the Atlantic Ocean. Approximately half of the soils on NASO DNA are hydric and have severe constraints for development.

Most of NASO DNA is in the Southern Watersheds Area and drains into the Back Bay Watershed unit. A very small portion in the northern section of the installation is in the Rudee Inlet/Owl's Creek Watershed which drains into Rudee Inlet. Most of the installation is in the 100-year floodplain.

3.2 BIOLOGICAL RESOURCES

Wetlands occur on 922 ac (373 ha), mostly in the southern portion of NASO DNA. All of the major wetland systems except riverine wetlands were identified on NASO DNA. The primary wetland type consists of large tracts of palustrine forested wetlands.

NASO DNA is in the Virginian Barrier Islands and Coastal Marshes ecoregion, which is part of the Middle Atlantic Coastal Plain ecoregion that extends northeast from Georgia to New Jersey. The ecoregion is characterized by beaches, dunes, low terraces, beach ridges, and barrier islands that are fringed by lagoons, bays, tidal salt marshes, mudflats, tidal channels, and ocean.

The vegetative community types on NASO DNA include upland/developed, hardwood, beaches and dunes, pine, hardwood/pine, marsh, and early successional (old field). The undeveloped landscape on NASO DNA supports a diverse fauna of mammals, reptiles and amphibians, fish, and birds. One state- and federally-listed terrestrial wildlife species, piping plover (*Charadrius melodus*), is known to occur on NASO DNA.



Figure 2. NASO DNA Land Management Areas.

4.0 NUISANCE WILDLIFE

The house mouse, Norway rat, black rat, European starling, English sparrow, and pigeon are known to or likely occur at NASO DNA. The bird and small mammal species at the time of this plan, do not pose a significant threat to the health and safety of personnel or the military mission.

The VDGIF has created a feral hog committee to address the growing feral hog problem in Virginia (<http://www.dgif.virginia.gov/wildlife/feral-hogs/>). At the time of this plan, no feral hogs are reported as occurring on NASO DNA; however, recent VDGIF reports indicate that feral hogs are in the vicinity. The woodchuck is present everywhere in Virginia except the eastern shore and the extreme southeastern corner of the state. Although the feral hog has the potential to someday expand its range to NASO DNA and the woodchuck does occur at NASO DNA, at the time of this plan the feral hog and woodchuck do not present significant threats to the health and safety of personnel or the military mission.

Of the 10 species listed as nuisance wildlife in Virginia, the coyote and nutria were considered to have the greatest potential to adversely affect mission activities on NASO DNA. Early detection and rapid response management of coyote and nutria is required to avoid harm to the well-being of domestic animals, other wildlife, property, or human health and safety. Accordingly, the other listed species are not considered further in this management plan. As new information becomes available on the distribution and abundance of nuisance wildlife and their potential impact on NASO DNA, an updated version of this management plan will be prepared. Brief background information for the coyote and nutria are presented within the following sections.

Prevention or control of wildlife damage, which often includes removal of the animals responsible for the damage, is an essential and responsible part of wildlife management (The Wildlife Society 1990).

4.1 COYOTE

Historically, coyotes were most commonly found on the Great Plains of North America. Their range now includes all of the continental United States (USDA 2011). The coyote was first observed in Virginia in the early 1950s (VFWIS 2013a). The coyote's great adaptability to almost any circumstances has led to its widespread occurrence. Factsheets (USDA 2011) with additional information are provided in Appendix B.

Coyotes are about the size and weight of a medium-sized dog. Coyotes in the eastern United States are typically larger than coyotes elsewhere. The average weight of females is 35 pounds (15 kilograms [kg]) and average weight of males is 40 pounds (18 kg) (VDGIF n.d.).

Male and female coyotes form a pair bond and defend a home range that may range from 1,000 acres (404 ha) to 25,000 acres (10,117 ha). There is currently no published data on home-range sizes in the mid-Atlantic region (Mastro 2011). Litters range from 3 to 12 pups and may be born between late March and May. Coyotes have a high reproductive rate; both mates and offspring from a previous litter contribute to feeding the pups (VDGIF n.d.).

The coyote is a habitat generalist and thrives in a wide variety of habitats. Being primarily nocturnal and secretive during the daytime hours, some dense cover nearby is often associated

with coyote habitats. Small mammals and deer make up the majority of their diet, although vegetation and fruits are often listed as food items.

The coyote occurs throughout the Commonwealth of Virginia. Coyote populations in forested landscapes are generally less abundant than in their preferred habitats of semi-forested or open farm and pasture lands. Hunter surveys by the VDGIF have been the only estimates of coyote abundance and indicate that the coyote population is more abundant in counties west of the Blue Ridge Mountains (VDGIF n.d.).

Coyotes can carry rabies, which is contagious to humans. Typical signs of rabies include drooling, convulsions, circling, disorientation, partial paralysis, unprovoked aggression, and uncharacteristic tameness. If a person is bitten by a coyote, the animal should be captured without damaging the head and kept for analysis. The NRM should be immediately contacted for coordination with USDA-APHIS–WS to analyze the animal for rabies.

The coyote is filling an ecological niche that was void since the extirpation of wolves from Virginia around the beginning of the 20th century. In addition to preying on small (e.g., rodents and birds) to large (e.g., turkeys and deer) prey species, coyotes tend to kill or exclude red fox from their territories and thus potentially limit red fox population abundance (VDGIF n.d.). Coyotes are opportunistic feeders and will also take advantage of carrion, livestock, and pets (VFWIS 2013a).

Coyotes can be a nuisance to residents and present hazards to operating on NASO DNA. Animals that lose their natural fear of humans are more likely to pose a danger to humans and adversely impact the military mission. If food is deliberately or inadvertently provided by people, coyotes quickly learn not to fear humans. They will take advantage of easy food sources and their boldness to occupy residential areas could endanger human health and safety. Encouraging coyote avoidance behavior of humans by zero tolerance of coyotes around residences and facilities reduces the threat of coyotes in an area.

4.2 NUTRIA

The nutria is a large semi-aquatic mammal native to South America that has been introduced to numerous countries around the world, primarily for fur farming. Nutria are often confused with beavers or muskrats; however, nutria are much smaller than the beaver and much larger than the muskrat. Nutria have a thin, rounded, and pointed tail; beavers have a broad, horizontally flattened tail and muskrats have a vertically flattened tail. Nutria's hind legs are much longer than the front legs, giving the species a hunched appearance when on land. Nutria's prominent incisors are yellow to dark orange (LeBlanc 1994). Factsheets (USDA 2010) with additional information are provided in Appendix B.

Nutria are large rodents and average 12 pounds (5.4 kg). Males can grow to 20 pounds (9 kg) and females grow to 18 pounds (8 kg). Mature adults measure 2 feet (0.6 meters) in length (LeBlanc 1994). Nutria are almost entirely herbivorous and eat animal material incidentally when they feed on plants. Nutria consume a large variety of aquatic, semi-aquatic, and terrestrial plants including agricultural crops, lawn grasses, and ornamental plants.

Nutria have a very high reproductive potential; they are polygamous, breed throughout the year, and can produce up to three litters per year. Litter size varies between 2 and 11 and the gestation period is only four months. The young are precocial, leaving the nest or burrow and feeding on

solids within one day of birth. Sexual maturity is reached at approximately six months (VFWIS 2013b).

The nutria in Virginia originated from releases in Dorchester County, Maryland in 1943 to establish an experimental fur station at the Blackwater National Wildlife Refuge (Maryland Sea Grant 2013). By 1998, the nutria population in the refuge had increased to 50,000. Initiated in 2002, the Chesapeake Bay Nutria Eradication Project has reduced nutria populations to near zero on 150,000 wetland acres (USFWS 2012).

The first record of nutria in Virginia was in 1956. Coordinated nutria monitoring efforts in Virginia began in 2012 and populations are believed to be limited to the southeast corner of the state. Recent data by VDGIF indicate that nutria numbers and distribution appear to be increasing and the threat to Virginia wetlands may be increasing (VDGIF 2012).

Nutria are capable of carrying diseases, pathogens, and infections. Nutria are susceptible to rabies, equine encephalomyelitis, paratyphoid, salmonellosis, papillomatosis, leptospirosis, toxoplasmosis, richettsia, coccidiosis, and sarcoporidiosis. Nutria also host a wide variety of internal and external parasites (Sheffels and Sytsma 2007). Pathogens and parasites can be transmitted to humans, livestock, and pets (LeBlanc 1994).

Damage to vegetation and crops; banks of ditches, lakes, and other water bodies; and vegetation destruction in marshes and other wetlands caused by nutria are a direct result of feeding and burrowing. Nutria have caused widespread ecosystem changes by decimating native plants that hold marsh soils together and support the survival of native wildlife species. Burrowing is the most commonly reported damage caused by nutria. Burrows can weaken roadbeds, ditches, stream banks, dams, and dikes, which could collapse when the soil is saturated or when subjected to the weight of heavy equipment (USDA 2010). The subsequent damage from nutria burrowing activity has the potential to adversely impact water management and drainage efforts.

Adverse impacts on biodiversity by nutria foraging have been documented to directly and indirectly harm native flora and fauna (Sheffels and Sytsma 2007). Where at-risk species occur and there is concern for potential listing and designation of critical habitat, nutria presence could only worsen the concern because of their foraging and burrowing activities. The potential for adverse impacts on biodiversity and contributing to species listings ultimately threatens the military mission.

5.0 NUISANCE WILDLIFE AT NASO DNA

As stated earlier, all of the state identified nuisance wildlife occur or have the potential to occur on NASO DNA. However, coyote and nutria were determined to present the greatest threat to the military mission due to their potential impacts on biodiversity, natural ecosystems, water control structures, as well as potential threats to human health and safety. To better understand the distribution and abundance of these two species, field surveys were initiated to provide support to this management plan.

Field surveys for coyote and nutria were conducted between January 16 and February 15, 2013. Prior to the 2013 surveys, there were no formal surveys, inventories, or assessments conducted for nuisance wildlife species on NASO DNA. The nuisance wildlife surveys are summarized in *NASO DNA Nuisance Wildlife Survey: Coyote and Nutria* (Navy 2014). If additional nuisance species are determined to be of interest to the installation, similar studies and reports can be planned and generated to provide support for revisions of this management plan. The coyote and nutria survey results summaries and understanding of these species and threats on NASO DNA is provided in the following sections.

5.1 COYOTE

5.1.1 Survey, Abundance, and Distribution

Eleven remote camera scent stations were installed on NASO DNA to trap (photograph) coyotes to document occurrence and obtain baseline information for future comparisons. Placement of the scent station locations was based on aerial imagery assessments and field evaluations. Stations were placed at locations across the installations and focused on a variety of habitats, as coyote were expected to occur almost anywhere on the installation. Large wetland and inundated areas were avoided. Bait and lure (attractants) were used at each station and cameras were deployed for six camera days (24-hour periods). Two of the 11 cameras recorded at least a single coyote visit during the survey period. Two coyotes were caught on camera and the detection index of 0.035 coyotes per camera night was recorded.

This camera station survey documented presence of the coyote at NASO DNA and provided preliminary and scientific based information on abundance. Similar future studies could allow more inferences on abundance or changes in abundance. In general, the coyote is likely to inhabit almost all areas of the installation and is even likely to venture into developed areas. The coyote is probably no more abundant at NASO DNA than on adjacent lands.

5.1.2 Threats

The coyote is not known currently to present significant threats to the mission or human health and safety at NASO DNA. There are no reports of human/coyote conflicts for this installation; however, the coyote has the potential to be a threat of zoonotic disease transfer to humans and other wildlife, especially if it becomes overabundant. Coyotes are attracted to open areas of airfields and runways where small mammals are often found in greater abundance or carrion may occur as a result of air strikes and vehicle collisions. Conversely, coyotes are top predators and likely provide some level of control of deer, wild turkey, and waterfowl populations that also present air strike hazards. Coyotes will also use open air fields to mark territories and as travel

lanes between habitats. Coyotes may den within dry culverts or within constructed embankments within or nearby airfields and golf courses. BirdStrike.org reports that over 1,030 civil aircraft collisions with deer and 400 collisions with coyotes were reported in the United States, 1990-2012.

KEEP THE WILD IN WILDLIFE
ENCOURAGE COYOTE AVOIDANCE BEHAVIOR OF HUMANS (VDGIF)

Coyotes are wary creatures and are usually not aggressive toward humans except when humans attempt to feed or interact with them. Approaching any wildlife may provoke an attack if the animal feels threatened. Before confronting a coyote near a residence or any other human living space, be sure there is a safe position for escape in the event there is an unlikely attack and then scare off the animal by practicable means. Although there are very few recorded instances of coyotes attacking humans in the United States, coyotes that have contracted rabies may attack humans without warning. The possibility of an attack should always be considered for any close encounter with a coyote.

Coyotes typically hunt small mammals (i.e., mice, voles, and rabbits), but they will also make a meal of a pet cat if given the opportunity. Coyotes are medium-sized carnivores that are very territorial in nature, and generally will not tolerate other dogs in their territories, especially when coyotes are caring for their young between March and August. The territorial nature of coyotes poses a real risk to small, free-roaming dogs and cats. Dogs (especially small dogs) should be restrained on a leash when walking them outdoors. Pets are also vulnerable to attacks by coyotes when tethered outside; therefore, outdoor pets should be kept in a coyote-proof enclosure (7-foot high fence with outward slanting overhang) to prevent coyotes from attacking and killing a pet animal.

5.1.3 Current Management

Under the Code of Virginia (Title 4 VAC 15-20-160) the coyote is a nuisance species and may be killed at any time and in any manner allowed by law. According to VDGIF regulations, no hunting license is required to shoot nuisance wildlife. Under Virginia law, nuisance wildlife species can be killed at any time and in any manner that is legal under state and local laws. The Navy obtains a Kill Permit from VDGIF to be able to take coyote on NASO DNA any day of the year due to human health and safety concerns. However, for recreational trapping a trapping license is required to take coyote by legal trapping methods. It is not legal to live-trap nuisance wildlife and move them to another location. Hunting and trapping are permitted on NASO DNA; these recreational activities could contribute to control efforts for coyotes. An average of 425 hunting permits is sold each year for NAS Oceana, NAS Oceana Dam Neck Annex, Naval Auxiliary Landing Field Fentress, and Naval Support Activity Hampton Roads Northwest Annex.

5.2 NUTRIA

5.2.1 Survey, Abundance, and Distribution

Surveys were conducted to identify the available habitats for nutria on NASO DNA. Biologists reviewed aerial photography and other remote sensing data, coordinated with local experts from the USDA, and searched the available habitats for nutria and nutria field sign to assess

occupancy. A 50-foot (15-meter) buffer was added to streams and a 25-foot (7.6-meter) buffer was added to ditches to create polygons of potential habitat. Areas not considered to be viable habitat by the USDA experts were removed from the draft potential habitat map.

Approximately 286 ac (115 ha) of potential habitat were field surveyed to verify its designation as habitat and investigate nutria occupancy. All potential habitats were searched by biologists walking throughout the areas for nutria, tracks, scat, slides, and eat-out areas. Following the field surveys and further coordination with the USDA experts, 88 ac (25 ha) of potential nutria habitat was identified on NASO DNA. Nutria were observed on the installation, tracks were observed at several locations, and potential den sites were found along ditch banks. The data indicate that low numbers of nutria could be present. Future surveys in the designated habitat areas could be used to determine changes in the occurrence of nutria and level of potential habitat on NASO DNA.

5.2.2 Threats

The nutria is not currently known to present significant threats to the mission or human health and safety because of the low-level population that likely exist on NASO DNA. Although the data indicate the presence of low numbers, nutria could soon become a nuisance on NASO DNA and require management for control because of their high reproductive potential. They are associated with the destruction of stormwater control ditches that keep the installation from flooding. The damage to the ditches poses a mission loss because flooded areas have to be closed during flood events.

Nutria pose a general threat to the environment because of their foraging and burrowing habitats in wetlands, drainage ways, and croplands. Nutria can cause widespread ecosystem changes because of their destructive habits and in some areas the loss of soils and vegetation has caused permanent damage to ecosystems (USFWS 2012). The loss of vegetation increases erosion and reduces critical habitat for many species, including sensitive plant species, shorebirds, and waterfowl (Chesapeake Bay Nutria Working Group 2003).

Nutria can be infected with the bacterial disease tularemia, which can be transmitted to humans. Nutria droppings may contaminate water with giardia and cause infections when contaminated water is ingested. These infections cause flu-like symptoms in humans. Anyone handling a nutria should wear rubber gloves, and wash their hands well when finished.

5.2.3 Current Management

As a nuisance species (Title 4VAC15-20-160), nutria can be trapped year round for eradication. A trapping license is required for recreational trapping. As previously mentioned, it is not legal to live-trap nuisance wildlife and move them to another location. Nutria can also be taken by use of a firearm or other weapon at any time (except on Sunday). The NASO DNA INRMP lists the nutria as a nuisance species for management due to their non-native and invasive status. Shooting is recommended in the INRMP as the most effective method of control. Hunting and trapping are permitted on NASO DNA and these recreational activities could contribute to control efforts for nutria.

6.0 NUISANCE WILDLIFE MANAGEMENT

6.1 COYOTE

Prior to this plan, there was no plan for coyote management other than the general guidelines provided with the INRMP for nuisance wildlife control. The cited survey conducted in 2013 and this plan's attention to this species are due to its known presence and potential to quickly become problematic for the installation if disease or overabundance creates conflict with natural fauna or the military mission. As a result of the current condition, this plan focuses on treatment of individual incidents and provides guidance for the continuation of monitoring and additional studies to expand the coyote knowledge base.

6.1.1 Incidents/Encounters

All coyote encounters that are determined to be a threat or were reported as potential threat to installation personnel, visitors, or pets will be reported to the installation NRM. The report will include the location, the number of coyotes, and a description of the encounter or threat. The report should express the desire of the person (s) to have the situation resolved. Repeated incidents or problematic individual or groups of coyotes posing a non-immediate threat will each be evaluated by the NRM. The manager will develop a plan of action that may include passive actions (e.g., keep pets inside, habitat management) or more direct actions such as the removal of the coyote or group. If removal is warranted, the section below outlines the method for conducting such removal. Immediate threats to humans and pets will be handled by installation law enforcement officers at their discretion and reported to the NRM. Simple sightings of coyotes are not reportable incidents or encounters; a sighting must be accompanied by some sense of abnormal behavior or threat to safety.

6.1.2 Natural Fauna Conflicts

The impact of coyote on natural fauna, and therefore ecosystem health and biodiversity is unknown for NASO DNA. However, the coyote is native to the area and should be considered a natural predator and efforts to reduce or control the population should only be implemented if warranted. In a review of the effects of coyote control on their prey, Henke (1995) concluded that coyotes are often removed from an area because of their predatory nature, regardless of the effect such removal may have on the ecosystem. Questions to consider before concluding coyote removal is warranted include (1) will coyote control produce the desired effects, (2) would the increase in desired fauna expected as a result of coyote control be within the habitat carrying capacity, and (3) would coyote mortality be replaced with other mortality factors acting in a compensatory manner.

Coyotes are described as a keystone species (i.e., their presence effects other species around them). Coyotes tend to kill or exclude foxes from their territories and may subsequently limit fox population abundance. Studies have concluded that foxes are not eliminated but just become less common where coyotes occur. The coyote may indirectly benefit ground-nesting birds, by reducing ground-nest predators. In this way, coyotes help to maintain balance in the food web below and around them. Future study could focus on overabundance impacts on sensitive or

game species and/or consideration of its temporary control of sensitive or game species restoration opportunities (e.g., dismal swamp southeastern shrew, bobwhite quail).

6.1.3 Removal/Control

If the NRM determines that a removal action should be undertaken for population control, the manager will contact the USDA-APHIS–WS with the request. This will open the consultation phase and the NRM and WS will determine the best course of action to handle the removal attempt. There are several removal methods available including toxicants, trapping, and shooting (see Appendix B fact sheets for additional information). The selected method(s) will need to be adapted to the situation and left to the WS professionals or installation safety officers to implement. The NRM takes action for the removal of the occasional nuisance or sick animal call.

All coyotes that are taken, that area suspected of rabies will be tested for rabies. The NRM after review of the incident/encounter reports will determine if the rabies test is warranted and provide the direction to test to WS personnel. Any animal that is suspected to be sick or behaving abnormally (without obvious issues, such as a broken leg) should be tested. In addition, any coyotes taken or found dead that exhibit disease will be reported to the NRM. The NRM will provide direction on the need for a necropsy to WS personnel.

6.1.4 Habitat

Habitat management against the coyote is not practicable because the opportunistic nature of its foraging habits facilitates its occurrence in all habitat types. Eliminating brushy areas, dense thickets, and similar areas around residences, airfields, and facilities that coyotes may use as cover or foraging sites could be the focus of habitat management. However, these habitats also provide food and cover for many native species, so these efforts to reduce habitat should only be considered as responsive action rather than a proactive action. The NRM should coordinate with Public Works Department personnel responsible for grounds maintenance to eliminate habitats if it is determined to be the desired management action.

6.1.5 Survey

The 2013 nuisance wildlife survey for coyote provided an index of coyote abundance and should be replicated to determine changes in the occurrence of coyotes (Navy 2014). The cameras should be deployed in the station locations that were used in 2013 for consistency and trend analysis. In addition, consistent tracking of data on coyotes and incident/encounters reported under implementation of this plan should provide additional insights on coyote abundance and better quantify the nuisance level.

6.2 NUTRIA

Other than the general guidelines provided in the INRMP for nuisance wildlife control, this plan provides the only guidance for nutria management on NASO DNA. This plan provides guidance for the continuation of monitoring and additional studies to expand the nutria knowledge base.

6.2.1 Removal/Control

The NRM should be notified upon first observance of a nutria(s) on the installation. Removal of all nutria is warranted because of their invasiveness and damage potential. Natural resources personnel will document the recommendations for removal. If the NRM determines that a removal action should be undertaken, the NRM will contact the USDA-APHIS-WS with the request. This will open the consultation phase and NRM and WS will determine the best course of action to handle the removal attempt. There are several removal methods available including toxicants, trapping, and shooting (see Appendix B fact sheets for additional information). The selected method(s) will need to be adapted to the situation and implemented by the WS professionals.

6.2.2 Habitat

Nutria use a wide variety of habitats including farm ponds and other freshwater impoundments, drainage canals, rivers and bayous, freshwater and brackish marshes, swamps, and combinations of various wetland types. Freshwater marshes are the preferred habitat. Nutria do not use well-drained land that is free of dense, weedy vegetation. Eliminating brush, weeds, and thickets adjacent to ditches, drainages, and waterways to reduce food and cover will discourage nutria use. Drainages that retain water may be used by nutrias as travel routes; eliminating standing water and ensuring positive drainage will reduce their attractiveness. Nutria prefer to burrow on steep slopes to allow tunneling upward for establishing the den site above the water level. Den entrances may be located at or below the water level. They can be discouraged by keeping side slopes to a 3:1 or less ratio, and by controlling vegetation growth (i.e., routine mowing). Contouring bank slopes at less than 45° will discourage borrowing.

6.2.3 Survey

The 2013 nuisance wildlife survey for nutria confirmed the presence of nutria and should be replicated to determine changes in the occurrence of nutria. The potential habitats identified in 2013 should be surveyed using the same procedures for consistency and trend analysis. In addition to replicating the survey conducted in the winter of 2013, field surveys should be conducted in spring, summer, and fall to gather information on reproduction (observations of young of the year).

6.3 PROJECT IMPLEMENTATION

General guidelines to help reduce the potential for nuisance wildlife problems on NASO DNA are listed below.

1. Do not feed coyotes.
2. Secure garbage receptacles to avoid providing a potential food supply.
3. Conduct scheduled inspections of facilities to minimize nuisance wildlife entry.
4. Do not leave unconsumed pet food outdoors.
5. Remove or clean-up bird feeders if nuisance wildlife are attracted to the area.
6. Clear brushy areas around residences and facilities to reduce hiding and foraging cover.
7. Periodically inspect the major drainage ditches for nutria sign.
8. Contact the NRM to evaluate all nuisance wildlife concerns.

Environmental program priorities for control of nuisance wildlife are defined using environmental readiness levels (ERL) as specified in OPNAVINST 5090.1D, M-5090.1 and recurring or non-recurring natural resources management requirements as specified in the Department of Defense Instruction 4715.03, *Natural Resources Conservation Program*. Recognition of the potential for nuisance wildlife to threaten human health and safety or the military mission and determination that management action is necessary meet the ERL 4 funding priority and also contribute to investments in environmental leadership and general proactive environmental stewardship. The designation of enhancement actions beyond compliance for non-recurring natural resources management requirements is consistent with implementation of management actions to prevent nuisance wildlife from becoming a threat to NASO DNA military mission and operations. Table 1 provides the project implementation schedule for nuisance wildlife control on NASO DNA.

Table 1. Project Implementation Schedule.

Project No.	Project Description	Schedule
1	Distribute the USDA-APHIS–WS factsheets (Appendix B) on coyote and nutria to raise environmental awareness of nuisance wildlife on NASO DNA.	Recurring bi-annually, 2 times/year (Earth Day event and beginning of hunting season)
2	Conduct reconnaissance inspections of housing and facilities areas to look for incorrectly secured garbage receptacles that could become a food source for nuisance wildlife. Report corrective actions required to the Regional Environmental Program Manager.	Recurring bi-monthly, 6 times/year
3	Conduct reconnaissance inspections of housing and facilities areas to look for required actions to clear brush that could provide hiding and foraging cover for nuisance wildlife. Report corrective actions required to the Regional Environmental Program Manager.	Recurring bi-monthly, 6 times/year
4	Conduct reconnaissance inspections of roadsides and trails to look for evidence of coyote tracks and dens for early detection and rapid response. Report corrective actions required to the Regional Environmental Program Manager. Coyotes may dig their own den or enlarge another animals den to the size that would accommodate a medium-sized dog.	Recurring bi-monthly, 6 times/year
5	Conduct reconnaissance inspections of major drainage ditches to look for evidence of nutria burrowing activity	Recurring bi-monthly,

Project No.	Project Description	Schedule
	and denning as a means of early detection and rapid response. Report corrective actions required to the Regional Environmental Program Manager.	6 times/year
6	Replicate the 2013 nuisance wildlife surveys and expand the survey period seasonally to assess occurrences and determine the need for control of coyotes and nutrias. Report corrective actions required to the Regional Environmental Program Manager.	Recurring bi-annually, every other year

7.0 EDUCATION, TRAINING, AND PUBLIC OUTREACH

Public perception is an important consideration in management for nuisance wildlife problems. Misinformation leads to implementation of inappropriate management actions and unintended outcomes. Dissemination of current and factual information on the extent of nuisance wildlife problems is key to successful implementation of nuisance wildlife management. The following considerations for stakeholder coordination and public involvement provide the NRM opportunities to promote education, training, and public outreach for nuisance wildlife management on NASO DNA.

7.1 STAKEHOLDER COORDINATION

In 2011, the Mid-Atlantic Panel on Aquatic Invasive Species and the Virginia Tech Conservation Management Institute funded a collaborative project in Virginia to examine the expanding nutria population and to initiate the process of developing and implementing an eradication strategy. A steering committee of representatives from state and federal agencies has been formed to coordinate detection and response actions, maintain databases and records of nutria sightings, and prioritize future collaborations. The Virginia point of contact is Ray Fernald, 804-367-8364, Ray.Fernald@dgif.virginia.gov. Additional information on the Mid-Atlantic Panel on Aquatic Invasive Species is available at <http://www.midatlanticpanel.org/>.

Cooperation and coordination with external stakeholders is an integral part of the Navy's natural resources program. The NRM should coordinate annually with VDGIF and USDA-APHIS–WS for current information regarding nuisance wildlife management. The Virginia Wildlife Services point of contact is David Allaben, 804-739-7739, david.j.allaben@aphis.usda.gov. Additional information on nuisance wildlife assistance is available at http://www.aphis.usda.gov/wildlife_damage/state_office/virginia_info.shtml. In addition, the NRM should coordinate with the VDGIF and USDA-APHIS–WS stakeholders prior to any determination to conduct nuisance wildlife management actions on NASO DNA.

7.2 eMAMMAL

eMammal (<http://emammal.wordpress.com/author/emammal/>) is a project where citizen scientists work in collaboration with researchers at the Smithsonian Institution and North Carolina State University to document mammals throughout the mid-Atlantic region. Citizen volunteers place “camera traps”, infrared activated cameras, across the landscape in parks and other natural areas to collect photos of mammals. These photos help researchers answer questions about mammal distribution and abundance and use this information for conservation. The Smithsonian Institution presents projects that have used camera traps for conservation at <http://siwild.si.edu/about.cfm>. The NRM could use eMammal to promote volunteerism in natural resources and as an additional means of increasing environmental awareness of nuisance wildlife concerns on NASO DNA.

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APPENDIX A
COMNAVREG MIDLANT INSTRUCTION 11015.3
NATURAL RESOURCES MANAGEMENT FOR FISH AND WILDLIFE, FERAL
ANIMALS, INVASIVE SPECIES, AND CERTAIN PESTS

(The MIDLANT region is canceling this instruction and expects the installations to create equivalent instructions or to reference their INRMPs and associated SOPs as appropriate)



DEPARTMENT OF THE NAVY

COMMANDER
NAVY REGION, MID-ATLANTIC
6506 HAMPTON BLVD.
NORFOLK, VA 23508-1273

IN REPLY REFER TO:

COMNAVREG MIDLANT
INST 11015.3
REG ENG/Code 90
12 MAR 2003

COMNAVREG MIDLANT INSTRUCTION 11015.3

Subj: NATURAL RESOURCES MANAGEMENT FOR FISH AND WILDLIFE, FERAL ANIMALS, INVASIVE SPECIES, AND CERTAIN PESTS

Ref: (a) E.O. 13112
(b) NAVFAC P-73, Vol. II
(c) OPNAVINST 5090.1 (Series)
(d) 18 U.S. Code § 42
(e) 16 U.S. Code §§ 703-704
(f) 16 U.S. Code §§ 668-668c
(g) 16 U.S. Code § 1361, *et seq.*
(h) 50 C.F.R. pt. 10
(i) 50 C.F.R. pt. 21
(j) SECNAVINST 6401.1 (Series)
(k) NASOCEANAINST 3750.2 (Series)

1. Purpose. To prescribe procedures and assign responsibility for management and control of fish and wildlife, feral animals, invasive species, and certain pests within Commander, Navy Region, Mid-Atlantic (COMNAVREG MIDLANT) Area of Responsibility (AOR). This includes the areas of Naval Weapons Station (WPNSTA), Yorktown (including Cheatham Annex); Naval Air Station (NAS), Oceana (including Naval Auxiliary Landing Field [NALF] Fentress, Camp Pendleton, and Dam Neck Annex); Naval Station (NAVSTA), Norfolk (including St. Julien's Creek Annex and St. Helena Annex); Naval Support Activity (NAVSUPACT), Norfolk (including Northwest Annex); Naval Amphibious Base (NAVPHIBASE), Little Creek; Fleet and Industrial Supply Center (FISC), Norfolk (Craney Island Fuel Depot and Yorktown Fuel Terminal); and Norfolk Naval Shipyard (NAVSHIPYD Norfolk), Portsmouth, VA (only New Gosport Annex, Scott Center Annex, and South Gate Annex).

2. Policy

a. Per references (a) through (c), the Navy is authorized to take measures to control invasive species.

b. References (d) through (g), the Lacey, Migratory Bird Treaty, Eagle Protection, and Marine Mammal Protection Acts, respectively, protect designated wildlife and control activity involving protected wildlife parts. Violations of these statutes may result in criminal prosecution. Regulations contained in references (h) and (i) implement reference (e) and list species protected by Federal law. Reference (j) describes government responsibility for preventing injury and diseases from animals.

12 MAR 2003

3. Definitions

a. Per reference (a), an "invasive species" is a species that is non-native (or alien to the ecosystem under consideration), and whose introduction causes, or is likely to cause harm to economic, environmental, or human health.

b. Per reference (e), "take" means to pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.

c. Per reference (c), "pest" refers to any organism (except for microorganisms that cause human or animal diseases) that adversely affects the well-being of humans or animals, attacks real property, supplies, equipment or vegetation, or is otherwise undesirable.

d. Per reference (j), "feral" refers to wild animals and unowned dogs, cats, or other domestic animals.

4. Responsibilities

a. Regional Engineer. The Commanding Officer, Navy Public Works Center/Regional Engineer (PWC/RE), Norfolk, as the Regional Environmental Program Manager, is responsible for management and control of, and for providing services pertaining to, fish and wildlife, feral animals, invasive species, and pests. On behalf of COMNAVREG MIDLANT, the Regional Engineer obtains natural resources permits required by Federal law to carry out this program. Regional Engineer authority, in natural resources matters, may be sub-delegated to a properly trained Regional Natural Resources Program Manager, under the supervision of the Regional Environmental Group Head.

(1) Environmental Services Desk. The PWC/RE Environmental Group provides pest management services through the Environmental Services Department. In addition, the Environmental Services Department responds to routine service calls for removal of non-migratory birds and control of feral animals. These services may be requested through the Environmental Services Desk at (757) 444-7528 during working hours and (757) 444-3477 after hours. Requests for services involving animals, such as sea turtles, marine mammals, game animals and migratory birds or raptors, not under the purview of the Environmental Services Department, will be referred by Service Desk personnel to Natural Resources Managers.

(2) Natural Resources Specialists. Under the direction of the Regional Natural Resources Program Manager, installation Natural Resource Specialists use integrated management practices and procedures to manage fish and wildlife and control certain feral, nuisance and invasive species. Per reference (k), Natural Resources personnel also develop and execute depredation and

1 2 MAR 2003

dispersal procedures for Bird Animal/Aircraft Strike Hazard (BASH) purposes, and personally supervise these activities when lethal methods are required. Natural Resources Managers, and all other PWC/RE personnel involved in lethal control activities, must be properly trained and duly certified for all weapons employed in accordance with applicable regulations. These personnel are located in Storefront Compliance Departments of the Regional Environmental Group. Natural Resources personnel will also identify bird and/or other animal remains associated with aircraft mishaps in accordance with reference (k).

(3) Conservation Officers. Under the direction of Natural Resources Managers, Conservation Officers enforce fish and wildlife and other natural resources laws and regulations. They may conduct field inspections and employ approved control methods for certain species. Control measures include, but are not limited to, live trapping, relocation, and lethal methods. Conservation Officers also perform wildlife forensic investigations and respond to wildlife damage complaints.

(4) Regional Natural Resources Managers. Regional natural resources managers shall:

(a) Provide direction to natural resources managers and game wardens regarding the management of fish and wildlife and the control of feral animals, invasive species, and pests.

(b) Ensure appropriate approval and procedures are in place to properly issue, store, carry, and use firearms.

(c) Ensure the natural resource manager and game warden weapons qualifications cards are certified and remain current.

(d) Coordinate with local and regional security for required range time, qualifications, and DoD training as needed.

b. NAVSHIPYD Norfolk. Pest control services for NAVSHIPYD Norfolk are currently provided through government contract; these services may be requested through LANTNAVFACENCOM at (757) 396-5121, extension 200.

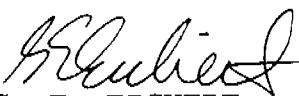
c. Security Officers. Security Officers respond to emergency wildlife complaints and requests for services. Security Officers are an after-hours emergency contact point for Natural Resources Managers, Conservation Officers, and pest management personnel. Within existing resources and according to established training priorities, Security Officers also assist Natural Resources personnel in obtaining required weapons qualifications.

12 MAR 2003

d. Airfield Facilities Division Officer. All bird/animal strikes should be investigated and reported in accordance with reference (k). Animal remains will be collected by the Airfield Facilities Division Officer and placed in appropriate BASH freezers located in Building 102 at NAS Oceana and LP-167 at Chambers Field, NAVSTA Norfolk.

e. Aviation Squadrons. All bird strikes must be reported in accordance with reference (k). Airfield Facilities or Natural Resources should be immediately contacted following any strike to ensure bird/animal remains are collected and identified.

5. Review. The Regional Natural Resources Program Manager is responsible for review and update of this instruction.


G. E. EICHERT
Chief of Staff

Distribution: www.cnrma.navy.mil

APPENDIX B

Nuisance Wildlife Factsheets

APHIS Coyote

APHIS Nutria

NC Coyote

VA Coyote

MD Nutria

NC Nutria

Wildlife Services

Protecting People
Protecting Agriculture
Protecting Wildlife

Factsheet

December 2011

Coyotes in Towns and Suburbs



Wildlife Services (WS), a program of the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), provides Federal leadership and expertise to resolve wildlife conflicts that threaten the Nation's agricultural and natural resources, human health and safety, and property.

As coyotes have become more common in urban and suburban settings, WS has received increased calls in every State to address coyote-related damage. Often the damage is linked to human activity that attracts the animals. WS can assist with problems using an integrated approach.

Historically, coyotes were most commonly found on the Great Plains of North America. Their range now extends from Central America to the Arctic. Except for Hawaii, coyotes live in all of the United States, Canada, and Mexico. More coyotes exist today than when the U.S. Constitution was signed.

Almost no animal in America is more adaptable to changing conditions than the coyote. Coyotes can live just about anywhere. They are found in deserts, swamps, tundra, grasslands, brush, and dense forests, from below sea level to high mountains. They have also learned to live in suburbs and cities like Denver, Los Angeles, New York, and Phoenix.

One of the keys to the coyote's success is its diet. A true scavenger, the coyote will eat just about anything. Identified as a killer of sheep, poultry, and deer, the coyote will also eat snakes and foxes, doughnuts and sandwiches, rodents and rabbits, fruits and vegetables, birds, frogs, grass and grasshoppers, pet cats and cat food, pet dogs and dog food, carrion, and just plain garbage.

Coyotes are active mainly during the night, but they can also move about during the day. Most sightings of coyotes occur during the hours close to sunrise and sunset.

Adult coyotes weigh between 20 and 45 pounds. Females are generally smaller than males, and western coyotes are generally smaller than eastern coyotes.

Coyotes look like small collie dogs. They have erect pointed ears, slender muzzle, and a bushy tail. Most coyotes are brownish gray in color with a light gray to cream-colored belly. However, a coyote's color varies and may be somewhat darker or lighter depending upon the geographic region and the time of year. Most coyotes have dark or black hairs over their back and tail.

Coyotes quickly learn not to fear humans and develop a dependency on easy food sources.



A high reproductive rate and the rapid growth of its offspring also aid in the coyote's success. Coyotes breed in February and March, and pups are born about 60 days later. During this time, territorial male coyotes do not tolerate other canines in their territory; many conflicts between coyotes and domestic dogs result from this territorial behavior. An average coyote litter contains four or five pups, born in dens. In urban environments, dens can be in storm drains, under storage sheds, in holes dug in vacant lots, parks, or golf courses, or any other dark, dry place.

Coyote pups are cared for, fed, and protected by both parents. The pups mature quickly and can eat meat and move about well by the time they are a month old. By 6 months, pups have permanent teeth and are taught to hunt for food. During this time of pup rearing, the amount of food that coyotes hunt and eat increase significantly. As a result, conflicts between coyotes and humans are common. It is not unusual to observe a family of coyotes traveling through urbanized areas such as parks or golf courses. If food is deliberately or inadvertently provided by people, the pups quickly learn not to fear humans and develop a dependency on easy food sources.

The pups are fully independent at about 9 months, and they disperse. During the next year, these young adults may be seen as nuisances in urban/suburban areas while they seek safe living areas away from established coyote territories. A few pups may stay with the parents, forming family groups as population densities increase or where food is abundant, such as in urbanized areas. Coyotes adapting to an urban environment can become bolder because they are less likely to be harmed and more likely to associate people with an easy and dependable food source.

Urban Area Coyote

Coyotes have learned that small dogs and cats are easy prey. Newspapers across the country have carried stories of coyotes harassing leashed dogs on

walks with their owners in and near parks and golf courses within city limits. Calls to WS for help or information about urban coyotes often pertain to the animals attacking pets, eating garbage, or simply coming too close to houses or people on foot.

Remember, all wild animals are unpredictable and caution is the watchword when they are around. Don't ever put food out to lure them closer. Nearly all wild animal bites occur when people attempt to feed wildlife or treat them like domestic animals.

Here are some steps you can take to reduce the chance of human-coyote conflicts:

- Do not feed coyotes!
- Eliminate sources of water, particularly in dry climates.
- Bird feeders should be positioned so that coyotes cannot get feed. Coyotes are attracted by bread, table scraps, and even seed. They may also be attracted by the birds and rodents that come to feeders.
- Do not discard edible garbage where coyotes can get to it.
- Secure garbage containers and eliminate garbage odors.
- Feed pets indoors whenever possible. Pick up any leftovers if feeding outdoors. Store pet and livestock feed where it is inaccessible to wildlife.
- Trim and clean, near ground level, any shrubbery that provides hiding cover for coyotes or prey.
- Fencing your yard could deter coyotes. The fence should be at least 6 feet high with the bottom extending at least 6 inches below ground level for best results.
- Don't leave small children unattended outside if coyotes have been frequenting the area.
- Don't allow pets to run free. Keep them safely confined and provide secure nighttime housing for them. Walk your dog on a leash and accompany your pet outside, especially at night. Provide secure shelters for poultry, rabbits, and other vulnerable animals.

- Discourage coyotes from frequenting your area. If you start seeing coyotes around your home or property, chase them away by shouting, making loud noises, or throwing rocks.

These steps may decrease the frequency of coyote sightings in your area if practiced continuously. However, coyotes are adaptable to change and are quick to learn new ways of survival. Occasional sightings most likely will continue. By making life for coyotes in your neighborhood more difficult, you will increase the likelihood that they will go somewhere else.

Suburban/Semi-rural

“Hobby farms” and “ranchettes” are more common today than ever before. Many Americans are enjoying a return to the rural lifestyle, living on a few acres and keeping poultry, horses, and other livestock. Many of these new “farmers” and “ranchers” are shocked to discover that coyotes kill and eat pets, poultry, and stock.

WS suggests (and offers technical assistance for) the following nonlethal methods to reduce coyote damage:

- Use net-wire or electric fencing to keep coyotes away from livestock.
- Shorten the length of calving or lambing seasons.
- Confine livestock in a coyote-proof corral at night when coyotes are most likely to attack livestock.
- Use lights above corrals.
- Remove dead livestock so coyotes won't be attracted to scavenge.
- Remove habitats that provide homes to natural prey of coyotes, like rabbits, from lambing and calving areas.
- Use strobe lights and sirens to scare coyotes away.
- Use guard animals, such as dogs, donkeys, and llamas, to protect livestock.

Additional Information

For more information about this and other WS programs contact your WS State office at 1-866-4- USDA-WS (1-866-487-3297) or visit www.aphis.usda/wildlife_damage. WS is not the sole source for wildlife damage management services; these services may be available from private sector providers.



Protecting People | Protecting Agriculture | Protecting Wildlife



United States Department of Agriculture
Animal and Plant Health Inspection Service

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Wildlife Services

Protecting People
Protecting Agriculture
Protecting Wildlife

Factsheet

October 2010

Nutria, an Invasive Rodent



Wildlife Services (WS), a program within the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), provides Federal leadership and expertise to resolve wildlife conflicts that threaten the Nation's agricultural and natural resources, human health and safety, and property.

The increased population and range of invasive species can harm native ecosystems, impact agricultural resources, and increase disease transmission. Under an Executive Order that directs Federal agencies to address invasive species damage, the WS program works to control and prevent damage caused by nutria.

The nutria (*Myocastor coypus*), a large, semi-aquatic rodent native to South America, originally was brought to the United States in 1889 for its fur. When the nutria fur market collapsed in the 1940s, thousands of nutria were released into the wild by ranchers who could no longer afford to feed and house them. Entrepreneurs began selling the herbivores to control noxious weeds. Wildlife agencies further expanded the range of the nutria by introducing the species into new areas of the United States. While the nutria did devour weeds and overabundant vegetation, they also destroyed native aquatic vegetation, crops, and wetland areas.

Recognized in the United States as an invasive wildlife species, nutria have been found in 22 States, and are currently established in 16 States. The nutria's relatively high reproductive rate combined with a lack of population controls have resulted in a proliferation of the species. In many regions they cause severe damage. Nutria are most abundant in the Gulf Coast States, but they also cause problems in other southeastern States and along the Atlantic coast. In addition to damaging vegetation and crops, nutria destroy the banks of ditches, lakes, and other water bodies. Of greatest significance, however, is the permanent damage nutria can cause to marshes and other wetlands.

In these areas, nutria feed on native plants that hold wetland soil together. The destruction of this vegetation intensifies the loss of coastal marshes that has been stimulated by rising sea levels.

Identification

Nutria are approximately 2-feet long, with a large head, short legs and a stout body that appears hump-backed on land. They are dark brown in color, although occasional light-colored and albino animals are observed. Because nutria spend much of their time in the water,

A small bay area along Maryland's Chesapeake Bay shows recovery in the 2 years after invasive nutria were removed by Wildlife Services biologists and specialists.



they are highly adapted for a semi-aquatic existence.

Their hind feet are partially webbed for swimming, and their eyes, ears, and nostrils are set high on their heads, so they can stay above the waterline when swimming. Nutria are excellent swimmers, and valves in their nostrils and mouths seal out water when submerged to swim or feed. When pursued, they can swim long distances underwater, seeing well enough to evade capture. Female nutria have teats located high on their backs so that their young can suckle when floating in the water. From a distance, nutria often are mistaken for beavers and muskrats. All three species are dark brown in color and semi-aquatic with large front teeth that are yellow to orange in color. However, at 15- to 20-pounds for a large adult, nutria are about one-third the size of an adult beaver (45 pounds) and 5 to 8 times larger than an adult muskrat (2–4 pounds).

Additionally, the tails and whiskers of the three species are distinctly different. Beavers have large broad flat tails that they often smack loudly on the water to signal alarm. Muskrats have long narrowly flattened tails that can be seen whipping snake-like behind when swimming the water. Nutria have a heavy, rat-like tail thinly covered in bristly hairs that trails smoothly behind when swimming. In northern climates, nutria often suffer frostbite to their tails and may retain only a stub tail following a cold winter. Another distinguishing characteristic of nutria

are the long (3–5 inch) noticeable white whiskers that protrude from either side of their nose and can be easily seen from a distance. Beaver and musk-



Sometimes mistaken for beaver or muskrat, some characteristics can assist in identifying nutria. These include large front teeth that are yellow to orange in color; a heavy, rat-like tail thinly covered in bristly hairs; and noticeable white whiskers that protrude from either side of their nose and can be easily seen from a distance (USFWS photo).

rat have subtle black whiskers that can only be viewed from very close.

Nutria adapt to a wide variety of habitats but are usually closely associated with water. In the United States, the largest nutria populations are located in freshwater marshes in coastal areas along Gulf Coast States. These regions have an abundance of small trees, shrubs, and vegetation with underwater roots and surface leaves. In these areas, nutria live in farm ponds and other fresh water impoundments, drainage canals, rivers, bayous, freshwater and brackish marshes, and swamps. In cities, they can be found under buildings, in overgrown lots, on golf courses, and in storm drains.

Beaver create lodges from mud and sticks and muskrat create mounded huts from mud and vegetation. Nutria do not create their own shelters from the elements. Nutria sometimes live in burrows; in

Included in the nutria's preferred diet are the roots, rhizomes and tubers of cattails, cordgrass, and bulrush.

marshes they often create flat, nest-like platforms of dead vegetation for feeding, loafing, grooming, and birthing. Sometimes, nutria will burrow into muskrat houses and displace their residents.

Damage

Nutria damage is evident to varying degrees in every area they are found. Burrowing causes the most noticeable damage. Nutria are notorious in Louisiana and Texas for undermining and breaching water-retention levees in flooded fields used to produce rice and crawfish. Nutria burrows also can damage flood-control levees that protect low-lying areas; weaken the foundations of reservoir dams, buildings, and roadbeds; and erode the banks of streams, lakes, and ditches.

Nutria damage, however, is not limited to burrowing. Depredation on crops is well documented.

In the United States, sugarcane and rice are the primary crops damaged by the nutria. Grazing on rice plants can significantly reduce yields, with severe localized loss. Other crops damaged by the nutria include corn, milo, sugar and table beets, alfalfa, wheat, barley, oats, peanuts, various melons, and a variety of vegetables. This depredation can lead to significant losses, especially for small farmers.

The negative impact this invasive species has on native vegetation and associated wetlands is critically important. In Louisiana, some nutria feed on seedling bald cypress with such intensity that the trees cannot survive. Similarly, nutria can severely damage coastal marshes by decimating native plants that hold marsh soils together and support the survival of native wildlife species. The impact of nutria on disappearing marshlands along the Gulf Coast and the Chesapeake Bay in Maryland has been well documented. Nutria have caused widespread ecosystem changes. In some cases, nutria damage to marsh vegetation and soils is so severe that these resources are permanently lost. The

destruction of these marshlands also increases the vulnerability of adjacent upland sites to erosion and flooding during storms.

Nutria also can impact public health and safety. The rodents can serve as hosts for several pathogens, including tuberculosis and septicemia, which can infect people, pets, and livestock. In addition, nutria can carry parasites, such as blood flukes, tapeworms, and liver flukes and a nematode known to cause a rash called “nutria itch.” Many of these organisms—found in nutria feces and urine—can contaminate drinking water supplies and swimming



Highly adapted for a semi-aquatic existence, from a distance, nutria often are mistaken for beavers and muskrats while swimming.

areas.

How Wildlife Services Manages the Damage

WS is authorized by Congress to resolve damage caused by wildlife. A 1997 Executive Order also directs USDA to provide national leadership and oversight in managing invasive species, such as the nutria, in cooperation with other Federal agencies.

When requested, WS provides nutria assistance; WS program specialists work closely with Federal, State, and local governments to develop comprehensive management plans that include

Their eating, digging, rooting, and swimming causes massive erosion, converting healthy marsh and habitat for native species into open water habitat.

provisions for protecting native vegetation, marsh soil, and other natural resources against nutria damage.

Preventive measures should be used whenever possible, especially in areas where nutria damage is common. Habitat management can help reduce rodent numbers by manipulating vegetation and water sources attractive to nutria. Small areas, such as gardens, can be enclosed by partially buried fences. Wire tubes can be used to protect bald cypress and other tree seedlings from nutria damage and bulkheads can be used to deter burrowing into banks. These methods can be expensive to implement and are not always effective or practical.

When damage cannot be resolved by nonlethal measures, WS has the expertise to remove nutria populations in problem areas. Relocation is not a viable option; nutria are an invasive species that threaten both native wildlife species and vegetation. Relocating nutria to a new area just relocates the problem, and can lead to the establishment of new nutria colonies and new damage concerns.

Additional Information

For more information about this and other WS programs or to request assistance from your WS State office call 1-866-4USDA-WS (1-866-487-3297). Find more information at www.aphis.usda.gov/wildlife_damage.



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United States Department of Agriculture

Animal and Plant Health Inspection Service

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Coexisting with Coyotes



U.S. Fish and Wildlife

If you live in North Carolina, you've probably seen a coyote, or know someone who has.

The animal's unique ability to adapt to a wide range of habitats, including suburban environments, along with rapid human population growth across the state, has led to an increase in sightings. While in most cases coyotes are harmless, people can take steps to prevent conflicts with the animals.

Coyote Quick Facts

Where did coyotes come from?

Coyotes were once found only in the mid-western portion of North America. But as Europeans settled across the country, the subsequent landscape changes, coupled with elimination of wolves, allowed the coyote to expand its range toward the eastern United States. By the 1980s coyotes started to appear in western North Carolina as a result of natural range expansion from our neighboring states. Coyotes are now established in all 100 counties of North Carolina and live in many towns.



National Park Service

What do coyotes look like?

Often described as a "mangy-looking dog," coyotes weigh about 20-45 pounds (similar to a mid-sized dog) with, typically, reddish to dark gray thick fur. They have long slender snouts, a bushy tail and pointed ears.

Do they make noise?

Yes, coyotes howl. While some find it unnerving, this howl serves many purposes, none of which are malicious. If you hear a family of coyotes howling, it is easy to think that the area is overflowing with coyotes. In reality, there are usually only 2-6 coyotes, including the pups.

Will coyotes attack me or my child?

Attacks on people, including children, are extremely rare. Normal coyote behavior is to be curious, but wary, when close to humans. Like other wildlife, they will become bold and habituated if people feed them, either purposely or inadvertently, such as with garbage or outdoor pet food. They rarely contract rabies.

Will coyotes attack my pet?

Possibly. Coyotes view outdoor cats and small unleashed dogs as prey, while larger dogs are viewed as threats to their territory and/or their pups. Coyotes are most likely to confront larger dogs during the mating and pup birthing period, January through June.

What should I do if I see a coyote?

Simply seeing a coyote is not cause for concern. If you see a coyote frequently, you and your neighbors should take steps to prevent conflicts with it and other wildlife.

Preventing Conflicts with Coyotes

To prevent problems with coyotes:

- **Secure garbage** in containers with tight-fitting lids, and take them out in the morning or pick up, not the night before. Coyotes and other wildlife will scavenge trash.
- **Don't feed or try to pet** coyotes. Feeding a coyote rewards it for coming in close proximity to people. Once a coyote becomes habituated, it loses its natural wariness of people and may become bold and aggressive.
- **Protect your pets by keeping them inside**, leashed, or inside a fenced area.
- **Install coyote-proof fencing** around your home to protect unsupervised pets.
- **Feed pets indoors** or remove food when your pet is finished eating outside. Coyotes and other wildlife are attracted to pet food left outdoors.
- **Keep bird-feeder areas clean.** Use bird feeders that keep seed off the ground. Coyotes are attracted to small animals congregating on the ground. If coyotes are frequently seen, remove all feeders.
- **Close off crawl spaces** under sheds and porches. Coyotes and other wildlife may use these spaces for resting and raising young.
- **Cut back brushy edges** in your yard, which provide cover for coyotes.
- Don't be intimidated by a coyote. Maintain its wariness by throwing a small object, such as a tennis ball, at it, making a loud noise or spraying it with a hose. Let it know it is unwelcome near your home.
- **Clear fallen fruit** from around fruit trees.
- **Educate your neighbors.** Your efforts to prevent coyote conflicts will be less effective if some neighbors are still providing foods.
- **Allow hunters or trappers** access to your property, so the local coyote population can be managed. Coyotes avoid areas in which threats are perceived.



National Park Service

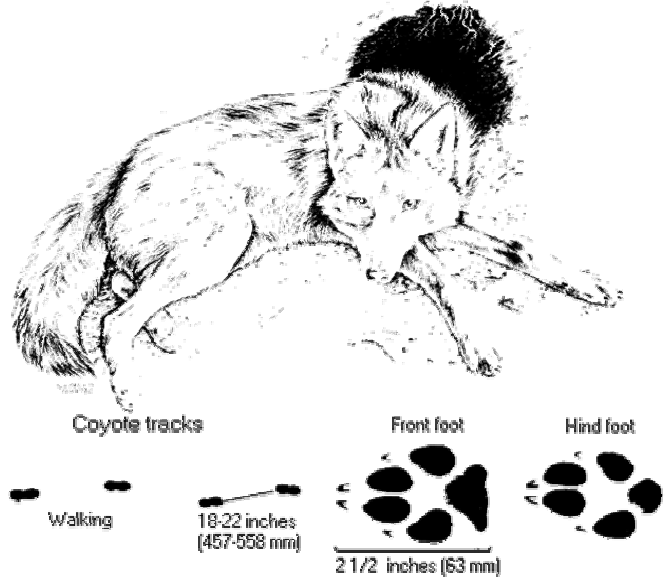
If you already have a problem with a coyote:

- **Implement the non-lethal steps** described above.
- **Contact a Wildlife Damage Control Agent**, a private individual who charges for his/her services. A list is available at www.ncwildlife.org under "Coexisting with Wildlife."
- **Contact a licensed trapper** during the regulated trapping season. See the list at www.ncwildlife.org under "Coexisting with Wildlife."
- **Coyotes can be hunted** year-round using firearms and archery equipment. However, check to see if local ordinances restrict the discharge of firearms. A landowner can shoot a coyote in the act of causing damage.



N.C. Wildlife Resources Commission
1751 Varsity Drive
Raleigh, NC 27606
(919) 707-0040
www.ncwildlife.org

LIVING WITH THE COYOTE IN VIRGINIA



The coyote population in Virginia continues to become more abundant and is distributed throughout the Commonwealth. To avoid conflicts with coyotes, it is important to understand coyote behavior and to consider the following advice:

❖ **KEEP THE WILD IN WILDLIFE – ENCOURAGE COYOTE AVOIDANCE BEHAVIOR OF HUMANS**

REMOVE ACCESS TO UNNATURAL FOOD SOURCES: Unnatural man-made food sources alter coyote behavior and may result in coyotes becoming tolerant of and dependent on humans. In addition, feeding or unintentionally providing a food source (such as pet food on your porch or in your back yard) over a long period of time may result in coyotes becoming less wary of your presence or actions. **Such behavior may result in coyotes becoming bold and even aggressive towards humans.** If you feed pets in your yard or on your porch, feed only enough food that can be completely consumed by your pet in a short amount of time. Secure garbage cans and lids in order to prevent coyotes from overturning the can for an easy meal.

DEFEND YOUR LIVING SPACE: Tolerating coyotes around your residence may result in coyotes becoming less wary of your presence or actions. **Such behavior may result in coyotes becoming bold and even aggressive around humans.** It is the responsibility of everyone living in a residential community to dissuade coyotes from occupying or using space in areas frequented by humans. When coyotes attempt to extend their living space to include space around your residence, find a safe position that affords you an opportunity to escape an unlikely attack, and yell, throw non-edible objects in the direction of the coyote, or otherwise convey to any “trespassing” animal that it is not welcome in your “space”.

❖ **AVOID COYOTE PREDATORY AND TERRITORIAL BEHAVIOR**

PEOPLE: Approaching any wildlife may provoke an encounter if the animal feels cornered or restricted in movement. This is particularly true of animals that have become accustomed to the presence of humans and their activities as a consequence of being fed, or because of access to a readily available food source such as pet food or refuse in a garbage can or compost pile. **Be aware that coyotes in other eastern states have attacked and severely injured small toddlers when left unattended for even a short period of time. Although the likelihood of such an attack is very remote, never leave small children unattended in areas frequented by coyotes.**

Consider removing habitat that provides protective cover for coyotes and their prey such as small rodents. Modifying such habitat around residential areas will dissuade coyotes from using the space as a part of a territory or home range and will reduce the likelihood of conflicts.

PETS: The territorial nature of predatory coyotes poses a real risk to small, free-roaming dogs and cats. Keep small dogs restrained on a leash when walking them outdoors and avoid walking in areas where coyotes are raising their pups from March – August. **Be aware that there have been a few recorded instances of coyotes attacking small dogs on a leash.**

Small dogs and cats are also vulnerable to attacks by coyotes when tethered outside of your house or even on your porch. Small dogs and cats should be kept in an enclosure when kept outdoors in order to prevent coyotes from attacking and killing a pet animal. **Even though a fence may dissuade coyotes from attacking your pet, be aware that coyotes can jump over fences less than 7-feet high and can climb over taller fencing that does not have an outward slanting overhang.**

LIVESTOCK: Contact the Virginia Department of Agriculture and Consumer Services - USDA Wildlife Services Virginia Cooperative Coyote Damage Control Program at 540-381-7387 to obtain information and assistance on preventing and alleviating coyote damage to livestock or other agricultural products.



THE COMMONWEALTH OF VIRGINIA
VIRGINIA DEPARTMENT OF GAME AND INLAND FISHERIES
P.O. BOX 11104, 4010 WEST BROAD STREET
RICHMOND, VIRGINIA 23230-1104
(804) 367-1000 <http://www.dgif.virginia.gov>



COYOTE INFORMATION

HISTORY OF THE COYOTE IN VIRGINIA: The coyote is not a native species of Virginia, and was first observed in the very western regions of the Commonwealth in the early 1950s.

DESCRIPTION: Coyotes are about the size and weight of a medium-sized dog. They generally have longer and thicker hair or fur than a dog. Their long black tipped tail is usually bushy and is pointed downward rather than outward or upward. The fur of the coyote in Virginia can vary from blond, light reddish-brown or tan, grayish black, or black with a small white blaze in the center of the chest. The coyote ears are pointed and erect, and the snout is relatively long and slender. The coyote in the eastern United States is typically larger than coyotes in the western United States. Female coyotes weigh on average 30 – 40 pounds, and male coyotes weigh on average 35 – 45 pounds. Coyotes can weigh as much as 60 pounds.

DISTRIBUTION AND ABUNDANCE: The coyote is distributed throughout the Commonwealth and prefers semi-forested or open farm and pasture lands. Coyote populations in more forested landscapes are generally less abundant and typically exhibit different foraging and social behaviors depending on forest prey species size and abundance. Surveys of hunter harvest of coyotes as well as surveys of hunter observations of coyotes while hunting big game indicate that the coyote population is more abundant in counties west of the Blue Ridge Mountains.

HABITS: Coyotes are elusive and normally avoid humans. They can be active at anytime of day or night, but are more typically observed at dawn and dusk. The coyote communicates by barking, yelping, and howling. Male and female coyotes form a pair bond and establish and defend a territory where they raise 3-12 pups that are born anytime between late March and May. The pups are fed by both the male and female, and sometimes by one or two offspring from a previous litter. The pups may disperse and leave the parents territory anytime after August. However, the parents may tolerate the pups occupying their territory as late February if prey resources are plentiful and large in size (e.g. deer). They remain active and do not hibernate in dens regardless of winter severity. Coyotes will develop a “search image” for a prey type that is more easily scavenged or killed. A coyote’s “search image” includes visual, auditory, and olfactory senses. When the abundance of a specific prey decreases to the point that a coyote is opportunistically finding and consuming more of a different prey resource than it is actually hunting for, the search image of the coyote will change to reflect the more abundant or most easily accessible food resource available in its home range. The habitat and space that the coyote hunts in may also change depending on the type of habitat that the predator is more likely to fill its belly. In situations where wild game is stocked to reestablish populations for hunting, or situations where livestock are raised and maintained throughout the year, coyotes may artificially retain a search image for the artificially abundant game or livestock that also tend to be more vulnerable to predation.

FOOD: The coyote is an opportunistic forager that will consume anything of nutritional value. They do not specialize in hunting and killing only one type of prey, and they will not turn down an easy meal if they happen to stumble onto other prey that they were not hunting for. Consequently, coyotes will prey and scavenge on anything including vegetable matter and fruits, insects, and the meat of wildlife killed or scavenged. Although coyotes generally prey on small rodents, rabbits, birds, snakes and frogs, they will kill larger animals such as big game and livestock during periods when the larger prey are more vulnerable to predation (e.g., turkey on nests; deer fawns in the spring and summer; lambs, kid goats, and newborn calves). The coyote will not pass up a free meal to feed its belly with artificial food resources. They will scavenge exposed garbage or other refuse, and may even kill and consume house cats.

LEGAL STATUS: The coyote is legally classified as a nuisance species and may be killed at anytime, except coyotes may not be killed with a gun, firearm, or other weapon on Sunday.

ECOLOGY: The coyote, a medium sized canid predator, occupies an ecological niche that has been void since the extirpation of wolves from Virginia around the beginning of the 20th century. In addition to inflicting mortality on small as well as large prey species such as beaver, turkey and deer, coyotes tend to kill or exclude red fox from their territories in red fox habitat and may subsequently limit red fox population abundance. The coyote may also indirectly benefit ground-nesting bird species, such as Bobwhite quail, by killing or excluding ground-nest predators such as raccoon, opossum and skunks.

MANAGEMENT: Coyote populations, not unlike all wildlife populations, will continue to grow until their numbers are limited by food availability or space. Unlike most wildlife populations, the reproductive potential of coyotes is such that harvesting coyotes for recreation or fur pelts or other economic incentive will not generally have any impact on limiting or even reducing the abundance of the coyote population. In general, increasing coyote mortality through hunting and trapping will tend to only change the age distribution of the population rather than change pre-whelping population density.

When populations of game species decline, hunters and some game resource managers may sensibly conclude that coyote predation on game is reducing or limiting game populations. Under certain conditions coyote predation has been shown to limit the abundance of big game populations. However, under normal conditions – that is when there is an abundance of game habitat available and the game population has not been decimated by disease or by another catastrophic mortality factor – **predation will rarely limit the population abundance of a game species.** In fact, it is more often the case that overall prey abundance and diversity will dictate the total number of coyotes that can thrive in a given area. If you feel coyotes are reducing big game populations in your area, please obtain a copy of “Coyote Management Strategies to Enhance Big Game Survival” for information on determining if it is necessary and feasible to manage coyote predation in your area.

INTERACTION WITH PETS: Coyotes are medium sized carnivores that are very territorial in nature, and generally will not tolerate other coyotes or dogs trespassing in their territories. This behavior is even more pronounced when coyotes are caring for their young anytime between March and August. For this reason, **coyotes have been known to show aggression and attack or even kill free-roaming small domestic dogs and cats that live within a coyote family’s territory.** Attacks have also been known to occur in the yard or on the porch of houses.

INTERACTION WITH HUMANS: There are very few recorded instances of coyotes attacking humans in the United States. Coyotes that have contracted rabies, as is the case with any domestic animal or wildlife that contracts rabies, may attack humans without warning. However, **there are very few recorded instances of non-rabid coyotes actually attacking humans unprovoked.** In most cases where coyotes act aggressively towards humans, a coyote is responding to the presence of a dog with the human and the aggression occurs within a few hundred yards of a den with pups. In those instances where coyotes have actually attacked humans, coyote populations were very abundant and coyotes were residing and foraging for food in residential areas. In most cases, the attacks occurred on small children, and may have been due to hunger or due to the territorial nature of the coyote to exclude small “animals” from its territory.

Aquatic Invasive Species

in the Chesapeake Bay

A M A R Y L A N D S E A G R A N T B R I E F

Nutria

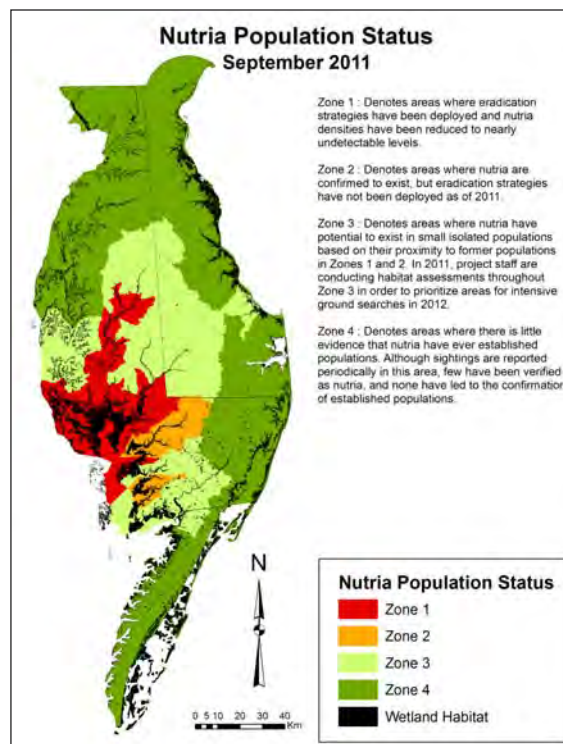
What Are Nutria?

Nutria (*Myocastor coypus*) are prolific aquatic rodents native to South America. They were introduced into the United States during the late 1800s and early 1900s to establish a fur farm industry. However, nutria farming was not successful, and nutria were intentionally released into the wild or translocated to the Southeast to serve as “weed cutters” to control undesirable vegetation.

The species was first introduced into Maryland’s Lower Eastern Shore in 1943 in order to establish an experimental fur station at the Blackwater National Wildlife Refuge. The nutria population in the wildlife refuge increased to approximately 50,000 by the early 1990s.

Why Are They Harmful to the Chesapeake Bay?

Feeding behaviors by nutria are extremely damaging to marsh ecosystems. Nutria can eat 25 percent of their body



weight in a single day. They consume plants by excavating the roots, creating circles of mudflats called “eat outs.” As a result, these areas become highly susceptible to erosion, and the wetlands are quickly converted to open water, removing valuable habitat for native species. Nutria also create deep swimming channels through marshes, fragmenting the area and preventing marsh-dependent species from using all of the available habitat. Over 7,000 acres of marshland in Blackwater National Wildlife Refuge have been destroyed since the introduction of nutria — almost half the refuge’s total acreage.

What Is Being Done to Control Them?

Management efforts to control or eradicate nutria in Maryland began in the late 1980s. They led to the development in 2000 of a three-year pilot program. It brought together state, federal, and private organizations to investigate

and apply the most successful methods. These include sending out teams to track and trap the animals.

In 2002 the Chesapeake Bay Program (CBP), in partnership with Maryland Sea Grant, sponsored a workshop aimed at developing Baywide management strategies for problematic invasive species, including nutria. In 2003 President George W. Bush signed a law that provided \$20 million over five years for nutria eradication in Maryland. The CBP — the partnership of federal and state agencies that oversees Bay restoration efforts — concluded that the nutria populations needed to be eliminated throughout the Chesapeake Bay region, not just in Maryland. The CBP created a Chesapeake Bay Nutria Working Group in 2003 to develop a Baywide management plan, which set a target date of 2009 to eradicate the animals.

What is Their Status?

Management efforts have resulted in substantial progress in controlling the nutria population in the

Chesapeake region. As of 2004, nutria have been completely eradicated from Blackwater National Wildlife Refuge. Intensive surveys conducted throughout the Delmarva Peninsula from 2010 to 2012 indicate that the remaining nutria populations are confined to Maryland's Lower Shore in Wicomico and Somerset Counties, primarily in the Wicomico and Manokin rivers. Eradication efforts continue, and resource managers hope to remove the remaining populations within a few years.

For More Information

Chesapeake Bay Nutria Eradication Project
(U.S. Fish & Wildlife Service)

<http://www.fws.gov/chesapeakenutriaproject/Index.html>

Nutria and Blackwater Refuge
(U.S. Fish & Wildlife Service)

<http://www.fws.gov/blackwater/nutriafact.html>

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NUTRIA

Fig. 1. Nutria (*Myocastor coypus*)



Damage Prevention and Control Methods

Exclusion

Protect small areas with partially buried fences.

Wire tubes can be used to protect baldcypress or other seedlings but are expensive and difficult to use.

Use sheet metal shields to prevent gnawing on wooden and styrofoam structures and trees near aquatic habitat.

Install bulkheads to deter burrowing into banks.

Cultural Methods and Habitat Modification

Improve drainage to destroy travel lanes.

Manage vegetation to eliminate food and cover.

Contour stream banks to control burrowing.

Plant baldcypress seedlings in the fall to minimize losses.

Restrict farming, building construction, and other "high risk" activities to upland sites away from water to prevent damage.

Manipulate water levels to stress nutria populations.

Frightening

Ineffective.

Repellents

None are registered. None are effective.

Toxicants

Zinc phosphide on carrot or sweet potato baits.

Fumigants

None are registered. None are effective.

Trapping

Commercial harvest by trappers.

Double longspring traps, Nos. 11 and 2, as preferred by trappers and wildlife damage control specialists.

Body-gripping traps, for example, Conibear® Nos. 160-2 and 220-2, and locking snares are most effective when set in trails, den entrances, or culverts.

Live traps should be used when leghold and body-gripping traps cannot be set.

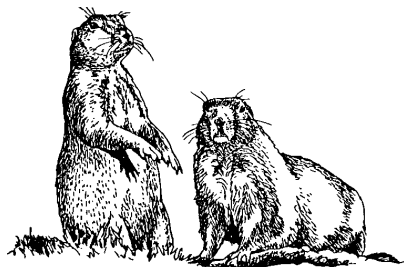
Long-handled dip nets can be used to catch unwary nutria.

Shooting

Effective when environmental conditions force nutria into the open. Night hunting is illegal in many states.

Other Methods

Available control techniques may not be applicable to all damage situations. In these cases, safe and effective methods must be tailored to specific problems.



PREVENTION AND CONTROL OF WILDLIFE DAMAGE — 1994

Cooperative Extension Division
Institute of Agriculture and Natural Resources
University of Nebraska - Lincoln

United States Department of Agriculture
Animal and Plant Health Inspection Service
Animal Damage Control

Great Plains Agricultural Council
Wildlife Committee

Identification

The nutria (*Myocastor coypus*, Fig. 1) is a large, dark-colored, semiaquatic rodent that is native to southern South America. At first glance, a casual observer may misidentify a nutria as either a beaver (*Castor canadensis*) or a muskrat (*Ondatra zibethicus*), especially when it is swimming. This superficial resemblance ends when a more detailed study of the animal is made. Other names used for the nutria include coypu, nutria-rat, South American beaver, Argentine beaver, and swamp beaver.

Nutria are members of the family Myocastoridae. They have short legs and a robust, highly arched body that is approximately 24 inches (61 cm) long. Their round tail is from 13 to 16 inches (33 to 41 cm) long and scantily haired. Males are slightly larger than females; the average weight for each is about 12 pounds (5.4 kg). Males and females may grow to 20 pounds (9.1 kg) and 18 pounds (8.2 kg), respectively.

The dense grayish underfur is overlaid by long, glossy guard hairs that vary in color from dark brown to yellowish brown. The forepaws have four well-developed and clawed toes and one vestigial toe. Four of the five clawed toes on the hind foot are interconnected by webbing; the fifth outer toe is free. The hind legs are much larger than the forelegs. When moving on land, a nutria may drag its chest and appear to hunch its back. Like beavers, nutria have large incisors that are yellow-orange to orange-red on their outer surfaces.

In addition to having webbed hind feet, nutria have several other adaptations to a semiaquatic life. The eyes, ears, and nostrils of nutria are set high on their heads. Additionally, the nostrils and mouth have valves that seal out water while swimming, diving, or feeding underwater. The mammae or teats of the female are located high on the sides, which allows the young to suckle while in the water. When pursued, nutria can swim long distances under water and see well enough to evade capture.

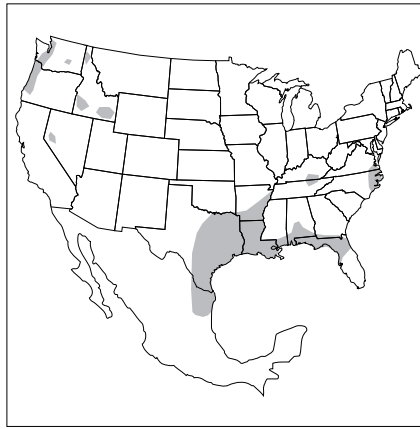


Fig. 2. Range of the nutria introduced in North America.

Range

The original range of nutria was south of the equator in temperate South America. This species has been introduced into other areas, primarily for fur farming, and feral populations can now be found in North America, Europe, the Soviet Union, the Middle East, Africa, and Japan. *M. c. bonariensis* was the primary subspecies of nutria introduced into the United States.

Fur ranchers, hoping to exploit new markets, imported nutria into California, Washington, Oregon, Michigan, New Mexico, Louisiana, Ohio, and Utah between 1899 and 1940. Many of the nutria from these ranches were freed into the wild when the businesses failed in the late 1940s. State and federal agencies and individuals translocated nutria into Alabama, Arkansas, Georgia, Kentucky, Maryland, Mississippi, Oklahoma, Louisiana, and Texas, with the intent that nutria would control undesirable vegetation and enhance trapping opportunities. Nutria were also sold as “weed cutters” to an ignorant public throughout the Southeast. A hurricane in the late 1940s aided dispersal by scattering nutria over wide areas of coastal southwest Louisiana and southeast Texas.

Accidental and intentional releases have led to the establishment of widespread and localized populations of nutria in various wetlands throughout the United States. Feral animals have been reported in at least 40 states and

three Canadian provinces in North America since their introduction. About one-third of these states still have viable populations that are stable or increasing in number. Some of the populations are economically important to the fur industry. Adverse climatic conditions, particularly extreme cold, are probably the main factors limiting range expansion of nutria in North America. Nutria populations in the United States are most dense along the Gulf Coast of Louisiana and Texas (Fig. 2).

Habitat

Nutria adapt to a wide variety of environmental conditions and persist in areas previously claimed to be unsuitable. In the United States, farm ponds and other freshwater impoundments, drainage canals with spoil banks, rivers and bayous, freshwater and brackish marshes, swamps, and combinations of various wetland types can provide a home to nutria. Nutria habitat, in general, is the semiaquatic environment that occurs at the boundary between land and permanent water. This zone usually has an abundance of emergent aquatic vegetation, small trees, and/or shrubs and may be interspersed with small clumps and hillocks of high ground. In the United States, all significant nutria populations are in coastal areas, and freshwater marshes are the preferred habitat.

Food Habits

Nutria are almost entirely herbivorous and eat animal material (mostly insects) incidentally, when they feed on plants. Freshwater mussels and crustaceans are occasionally eaten in some parts of their range. Nutria are opportunistic feeders and eat approximately 25% of their body weight daily. They prefer several small meals to one large meal.

The succulent, basal portions of plants are preferred as food, but nutria also eat entire plants or several different parts of a plant. Roots, rhizomes, and tubers are especially important during winter. Important food plants in the

United States include cordgrasses (*Spartina* spp.), bulrushes (*Scirpus* spp.), spikerushes (*Eleocharis* spp.), chaffflower (*Alternanthera* spp.), pickleweeds (*Pontederia* spp.), cattails (*Typha* spp.), arrowheads (*Sagittaria* spp.), and flatsedges (*Cyperus* spp.). During winter, the bark of trees such as black willow (*Salix nigra*) and baldcypress (*Taxodium distichum*) may be eaten. Nutria also eat crops and lawn grasses found adjacent to aquatic habitat.

Because of their dexterous forepaws, nutria can excavate soil and handle very small food items. Food is eaten in the water; on feeding platforms constructed from cut vegetation; at floating stations supported by logs, decaying mats of vegetation, or other debris; in shallow water; or on land. In some areas, the tops of muskrat houses and beaver lodges may also be used as feeding platforms.

General Biology, Reproduction, and Behavior

General Biology

In the wild, most nutria probably live less than 3 years; captive animals, however, may live 15 to 20 years. Predation, disease and parasitism, water level fluctuations, habitat quality, highway traffic, and weather extremes affect mortality. Annual mortality of nutria is between 60% and 80%.

Predators of nutria include humans (through regulated harvest), alligators (*Alligator mississippiensis*), garfish (*Lepisosteus* spp.), bald eagles (*Haliaeetus leucocephalus*), and other birds of prey, turtles, snakes such as the cottonmouth (*Agkistrodon piscivorus*), and several carnivorous mammals.

Nutria densities vary greatly. In Louisiana, autumn densities of about 18 animals per acre (44/ha) have been found in floating freshwater marshes. In Oregon, summer densities in freshwater marshes may be 56 animals per acre (138/ha). Sex ratios range from 0.6 to 1.6 males per female.

In summer, nutria live on the ground in dense vegetation, but at other times of the year they use burrows. Burrows may be those abandoned by other animals such as armadillos (*Dasypus novemcinctus*), beavers, and muskrats, or they may be dug by nutria. Underground burrows are used by individuals or multigenerational family groups.

Burrow entrances are usually located in the vegetated banks of natural and human-made waterways, especially those having a slope greater than 45°. Burrows range from a simple, short tunnel with one entrance to complex systems with several tunnels and entrances at different levels. Tunnels are usually 4 to 6 feet (1.2 to 1.8 m) long; however, lengths of up to 150 feet (46 m) have been recorded. Compartments within the tunnel system are used for resting, feeding, escape from predators and the weather, and other activities. These vary in size, from small ledges that are only 1 foot (0.3 m) across to large family chambers that measure 3 feet (0.9 m) across. The floors of these chambers are above the water line and may be covered with plant debris discarded during feeding and shaped into crude nests.

In addition to using land nests and burrows, nutria often build flattened circular platforms of vegetation in shallow water. Constructed of coarse emergent vegetation, these platforms are used for feeding, loafing, grooming, birthing, and escape, and are often misidentified as muskrat houses. Initially, platforms may be relatively low and inconspicuous; however, as vegetation accumulates, some may attain a height of 3 feet (0.9 m).

Reproduction

Nutria breed in all seasons throughout most of their range, and sexually active individuals are present every month of the year. Reproductive peaks occur in late winter, early summer, and mid-autumn, and may be regulated by prevailing weather conditions.

Under optimal conditions, nutria reach sexual maturity at 4 months of age. Female nutria are polyestrous, and nonpregnant females cycle into estrus

(“heat”) every 2 to 4 weeks. Estrous is maintained for 1 to 4 days in most females. Sexually mature males can breed at any time because sperm is produced throughout the year.

The gestation period for nutria ranges from 130 to 132 days. A postpartum estrus occurs within 48 hours after birth and most females probably breed again during that time.

Litters average 4 to 5 young, with a range of 1 to 13. Litter sizes are generally smaller during winter, in suboptimal habitats, and for young females. Females often abort or assimilate embryos in response to adverse environmental conditions.

Young are precocial and are born fully furred and active. They weigh approximately 8 ounces (227 g) at birth and can swim and eat vegetation shortly thereafter. Young normally suckle for 7 to 8 weeks until they are weaned.

Behavior

Nutria tend to be crepuscular and nocturnal, with the start and end of activity periods coinciding with sunset and sunrise, respectively. Peak activity occurs near midnight. When food is abundant, nutria rest and groom during the day and feed at night. When food is limited, daytime feeding increases, especially in wetlands free from frequent disturbance.

Nutria generally occupy a small area throughout their lives. In Louisiana, the home range of nutria is about 32 acres (13 ha). Daily cruising distances for most nutria are less than 600 feet (183 m), although some individuals may travel much farther. Nutria move most in winter, due to an increased demand for food. Adults usually move farther than young. Seasonal migrations of nutria may also occur. Nutria living in some agricultural areas move in from marshes and swamps when crops are planted and leave after the crops are harvested.

Nutria have relatively poor eyesight and sense danger primarily by hearing. They occasionally test the air for scent. Although they appear to be

clumsy on land, they can move with surprising speed when disturbed. When frightened, nutria head for the nearest water, dive in with a splash, and either swim underwater to protective cover or stay submerged near the bottom for several minutes. When cornered or captured, nutria are aggressive and can inflict serious injury to pets and humans by biting and scratching.

Damage and Damage Identification

Kinds of Damage

Nutria damage has been observed throughout their range. Most damage is from feeding or burrowing. In the United States, most damage occurs along the Gulf Coast of Louisiana and Texas. The numerous natural and human-made waterways that traverse this area are used extensively for travel by nutria.

Burrowing is the most commonly reported damage caused by nutria. Nutria are notorious in Louisiana and Texas for undermining and breaking through water-retaining levees in flooded fields used to produce rice and crawfish. Additionally, nutria burrows sometimes weaken flood control levees that protect low-lying areas. In some cases, tunneling in these levees is so extensive that water will flow unobstructed from one side to the other, necessitating their complete reconstruction.

Nutria sometimes burrow into the styrofoam flotation under boat docks and wharves, causing these structures to lean and sink. They may burrow under buildings, which may lead to uneven settling or failure of the foundations. Burrows can weaken roadbeds, stream banks, dams, and dikes, which may collapse when the soil is saturated by rain or high water or when subjected to the weight of heavy objects on the surface (such as vehicles, farm machinery, or grazing livestock). Rain and wave action can wash out and enlarge collapsed burrows and compound the damage.

Nutria depredation on crops is well documented. In the United States, sugarcane and rice are the primary crops damaged by nutria. Grazing on rice plants can significantly reduce yields, and damage can be locally severe. Sugarcane stalks are often gnawed or cut during the growing season. Often only the basal internodes of cut plants are eaten. Other crops that have been damaged include corn, milo (grain sorghum), sugar and table beets, alfalfa, wheat, barley, oats, peanuts, various melons, and a variety of vegetables from home gardens and truck farms.

Nutria girdle fruit, nut, and shade trees and ornamental shrubs. They also dig up lawns and golf courses when feeding on the tender roots and shoots of sod grasses. Gnawing damage to wooden structures is common. Nutria also gnaw on styrofoam floats used to mark the location of traps in commercial crawfish ponds.

At high densities and under certain adverse environmental conditions, foraging nutria can significantly impact natural plant communities. In Louisiana, nutria often feed on seedling baldcypress and can cause the complete failure of planted or naturally-regenerated stands. Overutilization of emergent marsh plants can damage stands of desirable vegetation used by other wildlife species and aggravate coastal erosion problems by destroying vegetation that holds marsh soils together. Nutria are fond of grassy arrowhead (*Sagittaria platyphylla*) tubers and may destroy stands propagated as food for waterfowl in artificial impoundments.

Nutria can be infected with several pathogens and parasites that can be transmitted to humans, livestock, and pets. The role of nutria, however, in the spread of diseases such as equine encephalomyelitis, leptospirosis, hemorrhagic septicemia (Pasteurellosis), paratyphoid, and salmonellosis is not well documented. They may also host a number of parasites, including the nematodes and blood flukes that cause "swimmer's-itch" or "nutria-itch" (*Strongyloides myopotami* and

Schistosoma mansoni), the protozoan responsible for giardiasis (*Giardia lamblia*), tapeworms (*Taenia* spp.), and common liver flukes (*Fasciola hepatica*). The threat of disease may be an important consideration in some situations, such as when livestock drink from water contaminated by nutria feces and urine.

Damage Identification

The ranges of nutria, beavers, and muskrats overlap in many areas and damage caused by each may be similar in appearance. Therefore, careful examination of sign left at the damage site is necessary to identify the responsible species.

On-site observations of animals and their burrows are the best indicators of the presence of nutria. Crawl outs, slides, trails, and the exposed entrances to burrows often have tracks that can be used to identify the species. The hind foot, which is about 5 inches (13 cm) long, has four webbed toes and a free outer toe. A drag mark left by the tail may be evident between the footprints (Fig. 3).

Droppings may be found floating in the water, along trails, or at feeding sites. These are dark green to almost black in color, cylindrical, and approximately 2 inches (5 cm) long and 1/2 inch (1.3 cm) in diameter. Additionally, each dropping usually has deep, parallel grooves along its entire length (Fig. 4).

Trees girdled by nutria often have no tooth marks, and bark may be peeled from the trunk. The crowns of seedling trees are usually clipped (similar to rabbit [*Sylvilagus* spp.] damage) and discarded along with other woody portions of the plant.

In rice fields, damage caused by nutria, muskrats, and Norway rats (*Rattus norvegicus*) can be confused. Nutria and muskrats damage rice plants by clipping stems at the water line in flooded fields; Norway rats reportedly clip stems above the surface of the water (E. A. Wilson, personal communication).

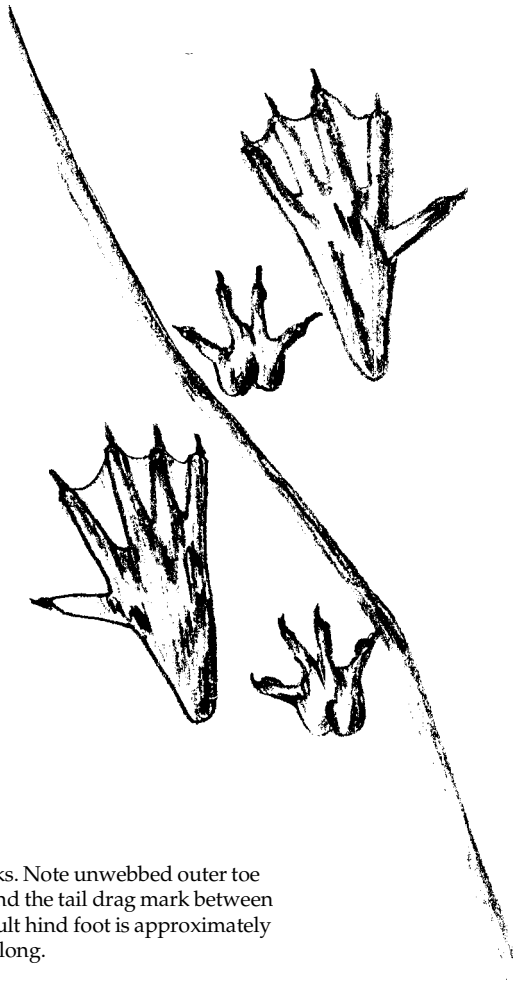


Fig. 3. Nutria tracks. Note unwebbed outer toe on the hind foot and the tail drag mark between the tracks. The adult hind foot is approximately 5 inches (12.7 cm) long.



Fig. 4. Nutria dropping in relation to a 2-inch (5.1-cm) camera lens cover. Note longitudinal grooves along the length of the dropping.

Legal Status

Nutria are protected as furbearers in some states or localities because they are economically important. Permits may be necessary to control animals that are damaging property. In other areas, nutria have no legal protection and can be taken at any time by any legal means. Consequently, citizens experiencing problems with nutria should be familiar with local wildlife laws and regulations. Complex problems should be handled by professional wildlife damage control specialists who have the necessary permits and expertise to do the job correctly. Your state wildlife agency can provide the names of qualified wildlife damage control specialists and information on pertinent laws and regulations.

Damage Prevention and Control Methods

Preventive measures should be used whenever possible, especially in areas where damage is prevalent. When control is warranted, all available techniques should be considered before a control plan is implemented. The objective of control is to use only those techniques that will stop or alleviate anticipated or ongoing damage or reduce it to tolerable levels. In most cases, successful control will depend on integrating a number of different techniques and methods.

Timing and location of control activities are important factors governing the success or failure of any control project. Control in sugarcane, for example, is best applied during the growing season, after damage has started. At this time, nutria in affected areas are relatively stationary and concentrated in drainages adjacent to fields. Conversely, efforts to protect rice field levees or the shorelines of southern lakes and ponds should be initiated during the winter when animals are mobile and concentrated in major ditches and other large bodies of water.

Nutria are best controlled where they are causing damage or where they are most active. Baiting is sometimes used to concentrate nutria in specific locations where they can be controlled more easily. After the main concentrations of nutria are removed, control efforts should be directed at removing wary individuals.

Exclusion

Fences, walls, and other structures can reduce nutria damage, but high costs usually limit their use. As a general rule, barriers are too expensive to be used to control damage to agricultural crops. Low fences (about 4 feet [1.2 m]) with an apron buried at least 6 inches (15 cm) have been used effectively to exclude nutria from home gardens and lawns. Sheet metal shields can be used to prevent gnawing damage to wooden and styrofoam structures and trees. Barriers constructed of sheet metal can be expensive to erect and unsightly.

Protect baldcypress and other seedlings with hardware cloth tubes around individual plants or wire mesh fencing around the perimeter of a stand. Extensive use of these is neither practical nor cost-effective. Plastic seedling protectors are not effective in controlling damage to baldcypress seedlings because nutria can chew through them.

Sheet piling, bulkheads, and riprap can effectively protect stream banks from burrowing nutria. Installation requires heavy equipment and is expensive. Use is usually restricted to industrial or commercial applications.

Cultural Methods and Habitat Modification

Land that is well-drained and free of dense, weedy vegetation is generally unattractive to nutria. Use of other good farming practices, such as precision land leveling and weed management, can minimize nutria damage in agricultural areas.

Draining and Grading. Any drainage that holds water can be used by nutria as a travel route or home site. Consequently, eliminate standing

water in drainages to reduce their attractiveness to nutria. This may be extremely difficult or impossible to accomplish in low-lying areas near coastal marshes and permanent bodies of water. Higher sites, such as those used for growing sugarcane and other crops, are better suited for this type of management.

On poorly drained soils, contour small ditches to eliminate low spots and sills and enhance rapid drainage. Use precision leveling on well-drained soils to eliminate small ditches that are occasionally used by nutria.

Grading and bulldozing can destroy active burrows in the banks of steep-sided ditches and waterways. In addition, contour bank slopes at less than 45° to discourage new burrowing. Sculpting rice field levees to make them gently sloping is similarly effective. Continued deep plowing of land undermined by nutria can destroy shallow burrow systems and discourage new burrowing activity.

Vegetation Control. Eliminate brush, trees, thickets, and weeds from fence lines and turn rows that are adjacent to ditches, drainages, waterways, and other wetlands to discourage nutria. Burn or remove cleared vegetation from the site. Brush piles left on the ground or in low spots can become ideal summer homes for nutria.

Water Level Manipulation. Many low-lying areas along the Gulf Coast are protected by flood control levees and pumps that can be used to manipulate water levels. By dropping water levels during the summer, stressful drought conditions that cause nutria to concentrate in the remaining aquatic habitat can be simulated, thus increasing competition for food and space, exposure to predators, and emigration to other suitable habitat. Raising water levels in winter will force nutria out of their burrows and expose them to the additional stresses of cold weather. Water level manipulation is expensive to implement and has not yet been proven to be effective. Nevertheless, this method should be considered when a comprehensive nutria control program is being developed.

Other Cultural Methods. Alternate field and garden sites should be considered in areas where nutria damage has occurred on a regular basis. New fields, gardens, and slab-on-grade buildings should be located as far as possible from drainages, waterways, and other water bodies where nutria live.

Late-planted baldcypress seedlings are less susceptible to damage by nutria than those planted in the spring. For this reason, plant unprotected seedlings in the early fall when alternative natural foods are readily available.

Frightening

Nutria are wary creatures and will try to escape when threatened. Loud noises, high pressure water sprays, and other types of harassment have been used to scare nutria from lawns and golf courses. The success of this type of control is usually short-lived and problem animals soon return. Consequently, frightening as a control technique is neither practical nor effective.

Repellents

No chemical repellents for nutria are currently registered. Other rodent repellents (such as Thiram) may repel nutria, but their effectiveness has not been determined. Use of these without the proper state and federal pesticide registrations is illegal.

Toxicants

Zinc Phosphide. Zinc phosphide is the only toxicant that is registered for controlling nutria. Zinc phosphide is a Restricted Use Pesticide that can only be purchased and applied by certified pesticide applicators or individuals under their direct supervision. It is a grayish-black powder with a heavy garlic-like smell and is widely used for controlling a variety of rodents. When used properly, zinc phosphide poses little hazard to nontarget species, humans, pets, or livestock.

Zinc phosphide is highly toxic to wildlife and humans, so all precautions and instructions on the product label

should be carefully reviewed, understood, and followed precisely. Use an approved respirator and wear elbow-length rubber gloves when handling this chemical to prevent accidental poisoning. Mix and store baits treated with zinc phosphide only in well-ventilated areas to reduce exposing humans to chemical fumes and dust. When possible, mix zinc phosphide at the baiting site to avoid having to store and transport treated baits. Never transport mixed bait or open zinc phosphide containers in the cab of any vehicle. Store unused zinc phosphide in a dry place in its original watertight container because moisture causes it to deteriorate. Immediately wash off any zinc phosphide that gets on the skin.

Past studies have shown that zinc phosphide can kill over 95% of the nutria present along waterways when applied to fresh baits at a 0.75% (7,500 ppm) rate. Today, the use of zinc phosphide at this concentration is illegal. Federal and state registrations, however, allow lower rates to be used. For example, the label held by USDA-APHIS-ADC (EPA Reg. No. 56228-9) allows for a maximum 0.67% (6,700 ppm) treatment rate. At this rate, approximately 94 pounds (42.7 kg) of

bait can be treated with 1 pound (0.4 kg) of 63.2% zinc phosphide concentrate.

Where to Bait. The best places to bait nutria are in waterways, ponds, and ditches where permanent standing water and recent nutria sign are found. Baiting in these areas increases efficiency and reduces the likelihood that nontarget animals will be affected. Small chunks of unpeeled carrots, sweet potatoes, watermelon rind, and apples can be used as bait.

The best baiting stations for large waterways are floating rafts spaced 1/4 to 1/2 mile (0.4 to 0.8 km) apart throughout the damaged area. In ponds, use one raft per 3 acres (1.2 ha). Rafts measuring 4 feet (1.2 m) square or 4 x 8 feet (1.2 x 2.4 m) are easily made from sheets of 3/8- to 3/4-inch (1.0- to 1.9- cm) exterior plywood and 3-inch (7.6-cm) styrofoam flotation. Install a thin wooden strip around the perimeter of the raft's surface to keep bait from rolling into the water. The raft should float 1 to 4 inches (2.5 to 10.2 cm) above the surface and should be anchored to the bottom with a heavy weight or tied to the shore (Fig. 5).

In small ditches or areas where nutria densities are low, use 6-inch (15.2-cm) square floating bait boards made of wood and styrofoam, in lieu of rafts (Fig. 5). These can be maintained in place with a long slender anchoring pole made of bamboo, reed, or other suitable material that is placed through a hole in the center of the platform. This allows the board to move up and down as water levels change. Attach baits to small nails driven into the surface of the platform. Bait boards should be spaced 50 to 100 feet (15.2 to 30.5 m) apart in areas where nutria are active.

Other natural sites surrounded by water can also be baited for nutria. Small islands, exposed tree stumps, floating logs, and feeding platforms are excellent baiting sites. Avoid placing baits on muskrat houses and beaver lodges. Baits can be attached to trees, stumps, or other structures with small nails and should be kept out of the water.

Baiting on the ground should only be used when water sites are unsuitable or lacking. Ground baiting is justified and effective when eliminating the last few nutria in a local population. Use care when ground baiting because baits may be accessible to nontarget animals and humans. Place ground baits near sites of nutria activity, such as trails and entrances to burrows.

Prebaiting. Prebaiting is a crucial step when using zinc phosphide because it leads to nutria feeding at specific sites on specific types of food (such as the baits; carrots or sweet potatoes are preferred). Nutria tend to be communal feeders, and if one nutria finds a new feeding spot, other nutria in the area will also begin feeding there.

To prebait, lightly coat small (approximately 2-inch [5.1-cm] long) chunks of untreated bait with corn oil. Place the bait at each baiting station in late afternoon, and leave it overnight. Use no more than 10 pounds (4.5 kg) of bait per raft, 4 pieces of bait per baiting board, or 2 to 5 pieces at other sites at one time. Prebaiting should continue at least 2 successive nights after nutria begin feeding at a baiting site. Large

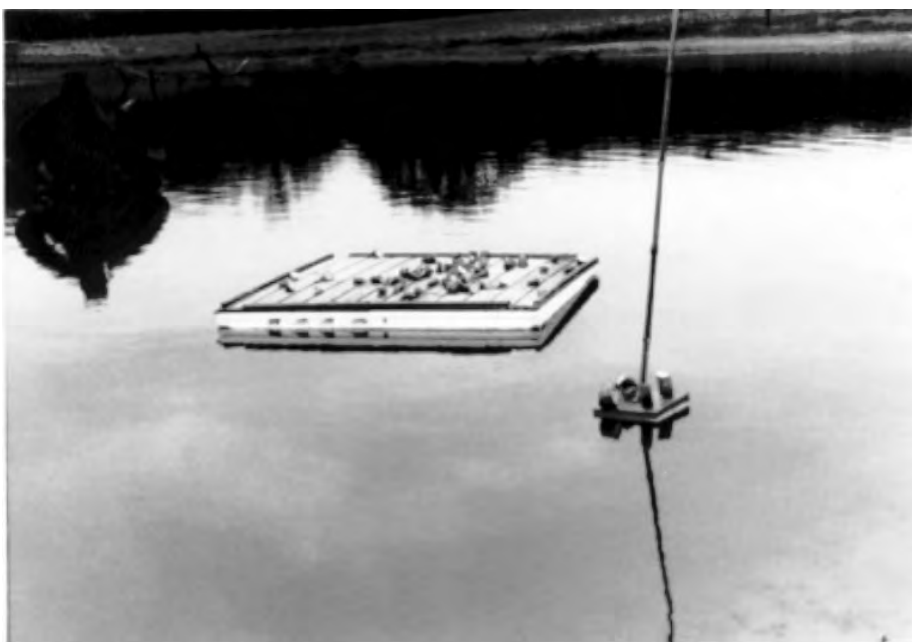


Fig. 5. Examples of a 4-foot (1.2-m) square raft (left) and a 6-inch (15.2-cm) square baiting board, which are used to concentrate nutria for shooting, trapping, or poisoning. These baiting platforms are constructed of plywood and styrofoam and baited with sweet potatoes.

(more than 1 week) gaps in the prebaiting sequence necessitate that the process be started over.

Observations of prebaited sites will help you decide how the control program should proceed. If nontarget animals are feeding at these sites (as determined by sign or actual observations of animals), then prebaiting should start over at another location. Prepare and apply zinc phosphide-treated baits when nutria become regular users of prebaited baiting stations and nontarget animals are not a problem.

Applying Zinc Phosphide. Prepare zinc phosphide baits as needed to prevent deterioration. Treated baits are prepared in 10-pound (4.5-kg) batches (enough to treat one raft) by using the following ingredients: 10 pounds (4.5 kg) of bait (carrots or sweet potatoes are preferred), prepared as for prebaiting; 1 fluid ounce or 2 tablespoons (30 ml) of corn oil; and 1.7 ounces or 7.5 tablespoons (48.2 g) of 63.2% zinc phosphide concentrate.

To prepare treated baits, add corn oil to the bait in a 5 gallon (18.9 l) plastic or metal container. Stir the mixture until the bait is lightly coated with corn oil. Sprinkle zinc phosphide over the mixture and stir until the bait is uniformly coated. Treated baits have a shiny black appearance and should be dried for about 1 hour in a well-ventilated area until the color changes to a dull gray. Properly dried baits are weather-resistant and remain toxic until they deteriorate. Although treated baits can survive light rain, they should not be used when heavy rains are expected or on open water that is subject to heavy wave action.

The amount of untreated bait eaten the last night of prebaiting determines how much treated bait should be used on the first night. When all or most of the untreated prebait is gone from baiting stations by morning, the same amount of treated bait is used on the stations the following night (e.g., up to 10 pounds [4.5 kg] per raft, 4 pieces per baiting board, and 2 to 5 pieces at other sites). When smaller quantities are eaten, reduce the amount of

treated bait that is used per station proportionately. When only a few pieces of prebait on a raft are eaten, the raft should be removed and replaced with several scattered baiting boards.

The quantity of treated bait eaten each treatment night is the quantity that should be put out the following afternoon. Continue baiting until no more bait is being taken. Most nutria can be controlled after 4 nights of baiting. When densities are high, control may require more time.

Post-Control Procedures. Usually only 25% of the poisoned nutria die where they can be found. Many nutria die in dens, dense vegetation, and other inaccessible areas. Carcasses of nutria killed with zinc phosphide should be collected as soon as possible and disposed of by deep burial or burning to prevent exposure of domestic and wild scavengers to undigested stomach material containing zinc phosphide. Dispose of any leftover treated bait in accordance with label directions.

Cessation of damage is the best indicator that zinc phosphide is controlling problem animals. You can quantify the reduction in nutria activity by putting out untreated bait at baiting stations after the last application of zinc phosphide. The amount eaten at this time is compared to the amount of bait eaten on the last night of prebaiting.

Fumigants

Several fumigants are registered for controlling burrowing rodents but none are registered for use against nutria. Some, such as aluminum phosphide, may have potential as nutria control agents, but their efficacy has not been scientifically demonstrated. Carbon monoxide gas pumped into dens has reportedly been used to kill nutria, but this method is neither practical nor legal because it is not registered for this purpose.

Trapping

Commercial Harvest. Damage to crops, levees, wetlands, and other resources is minimal in areas where

nutria are harvested by commercial trappers. The commercial harvest of nutria on private and public lands should be encouraged as part of an overall program to manage nutria-caused damage. Landowners may be able to obtain additional information on nutria management, trapping, and a list of licensed trappers in their area from their state wildlife agency.

Leghold traps. Leghold traps are the most commonly used traps for catching nutria. Double longspring traps, No. 11 or 2, are preferred by most trappers; however, the No. 1 1/2 coilspring, No. 3 double longspring, or the soft-catch fox trap can also be used effectively. Legholds are more efficient and versatile than body-grip traps and are highly recommended for nutria control work. Leghold traps should be used with care to prevent injury to children and pets.

Several ways of setting leghold traps are effective. Set traps just under the water where a trail enters a ditch, canal, or other body of water. Make trail sets by placing a trap offset from the trail's center line so that nutria are caught by the foot. Traps can be lightly covered with leaves or other debris to hide them, but nutria are easily captured in unconcealed traps.

Bait can be used to lure nutria to leghold sets. Nutria use their teeth to pick up large pieces of food; therefore, bait should be placed beside, rather than inside, the trap jaws. Leghold traps are also effective when set on floating rafts that have been prebaited for a short period of time.

Use drowning sets when deep water is available. Otherwise, stake leghold traps to the ground, or anchor them to solid objects in the water or on land (such as floating logs, stumps, or trees and shrubs). Nutria caught in non-drowning leghold sets should be humanely dispatched with a shot or hard blow to the head. Nontarget animals should be released.

Live Traps. Nutria are easily captured in single- or double-door live traps that measure 9 x 9 x 32 inches (22.8 x 22.8 x 81.3 cm) or larger. Use



Fig. 6. Hand-caught nutria must be handled carefully to avoid being bitten or clawed.

Place set snares in trails and other travel routes, feeding lanes, trails, and bank slides. Snares do not kill the animals they catch, so anchor the snare securely. Check snares frequently because they are often knocked down by nutria and other animals. Snared nutria should be dispatched with a shot or blow to the head. Release any nontarget animals that are captured.

Shooting

Shooting can be used as the primary method of nutria control or to supplement other control techniques. Shooting is most effective when done at night with a spotlight, however, night shooting is illegal in many states and should not be done until proper permits have been obtained. Once shooting has been approved by the proper authorities, nutria can be shot from the banks of waterways and other bodies of water or from boats. In some cases, 80% of the nutria in an area can be removed by shooting with a shotgun or small caliber rifle, such as the .22 rimfire. Care should be taken when shooting over open water to prevent bullets from ricocheting.

Shooting at Bait Stations. Baits can attract large numbers of nutria to floating rafts, baiting boards, and other areas where they can be shot. Shooting from dusk to about 10:00 p.m. for 3 consecutive nights is effective once a regular feeding pattern has been established. Feeding sites should be lit continuously by a spotlight and easily visible to the shooter from a vehicle or other stationary blind. At night, nutria can be located by their red-shining eyes and the V-shaped wake left by swimming animals. As many as 4 to 5 nutria per hour may be taken by this method. Shooters should wait 2 to 3 weeks before shooting nutria at the same site again.

Boat Shooting. Shooting can also be done in the late afternoon or early evening from a small boat paddled slowly along waterways and large ditches or along the shores of small lakes and ponds. Nutria are especially vulnerable to this method when water levels are extremely high or vegetative

these when leghold and body-grip traps cannot be set or when animals are to be translocated. Bait live traps with sweet potatoes and carrots and place them along active trails or wherever nutria or their sign are seen. A short line of baits leading to the entrance of a live trap will increase capture success. Live traps placed on floating rafts will effectively catch nutria but prebaiting is necessary. A large raft can hold up to 8 traps. Unwanted nutria should be destroyed with a shot or blow to the head. Nontarget animals should be released.

Floating, drop-door live traps catch nutria but are bulky and cumbersome to use. The same is true for expensive suitcase-type beaver traps. Unwary nutria can be captured using a long-handled dip net. This method should only be used by trained damage control professionals who should take special precautions to prevent being bitten or clawed (Fig. 6). Live nutria can be immobilized with an injection of ketamine hydrochloride. Funnel traps are not effective for controlling nutria.

Body-gripping Traps. The Conibear® trap, No. 220-2, is the most commonly used body-gripping trap for controlling nutria. Nos. 160-2 and 330-2 Conibear® traps can also be used. Place sets in trails, at den entrances, in culverts, and in narrow waterways. Large body-grip traps can be dangerous and should be handled with extreme caution. These traps should not be set in areas frequented by children, pets, or desirable wildlife species.

Other Traps. Use locking snares to catch nutria when other traps cannot be set. Snares are relatively easy to set, safer than leghold and body-grip traps, and almost invisible to the casual observer. Snares constructed with 3/32-inch (0.2-cm) diameter, flexible (7 x 7-winding) stainless steel or galvanized aircraft cable are suitable for catching nutria. Ready-made snares and components (for example, cable, one-way cable locks, swivels, and cable stops) for making homemade snares can be purchased from trapping suppliers.

cover is scarce. At times, animals can be stimulated to vocalize or decoyed to a boat or blind by making a "maw" call, which imitates the nutria's nocturnal feeding and assembly call. This call can be learned from someone who knows it or by listening to nutria vocalizations at night. Nutria become wary quickly, so limit shooting to no more than 3 nights, followed by 2 to 3 weeks of no activity.

Bank Shooting. Nutria can be shot by slowly stalking along the banks of ditches and levees; this can be an effective control method where nutria have not been previously harassed. Unlike night shooting from a boat or blind, bank shooting is most effective at twilight, both in the evening and morning. Several nutria can usually be shot the first night, however, success decreases with each successive night of shooting. Daytime shooting from the bank of a waterway is effective in some situations.

Economics of Damage and Control

Nutria can have either positive or negative values. They are economically important furbearers when their pelts provide income to commercial trappers. Conversely, they are considered pests when they damage property.

From 1977 to 1984, an average of 1.3 million nutria pelts were harvested annually in the United States. Based on prices paid to Louisiana trappers during this period, these pelts were worth about \$7.3 million.

The estimated value of sugarcane and rice damaged by nutria each year has ranged from several thousand dollars to over a million dollars. If losses of other resources are added to this amount, the estimated average loss would probably exceed \$1 million annually.

Management plans developed for nutria should be comprehensive and should consider the needs of all stakeholders. Regulated commercial trapping should be an integral part of any management scheme because it can provide continuous, long-term income to trappers; maintain acceptable nutria densities; and reduce damage to tolerable levels.

The value of the protected resource must be compared with the cost of control when determining whether nutria control is economically feasible. Most people will not control nutria if costs exceed the value of the resource being protected or if control will adversely impact income derived from trapping. Of course, there are exceptions, especially when the resource has a high sentimental or aesthetic value to the owner or user.

Acknowledgments

This chapter is a revision of an earlier chapter written by Evans (1983). Kinler et al. (1987) and Willner (1982) were the primary sources consulted for biological information on nutria.

Figures 1 and 3 by Peggy A. Duhon of Lafayette, Louisiana.

Figure 2 from Willner (1982) and reprinted with permission of The Johns Hopkins University Press, Baltimore, Maryland.

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Enclosure 9. Rare, Threatened, and Endangered Species



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NAVFAC Atlantic Biological Resource Services

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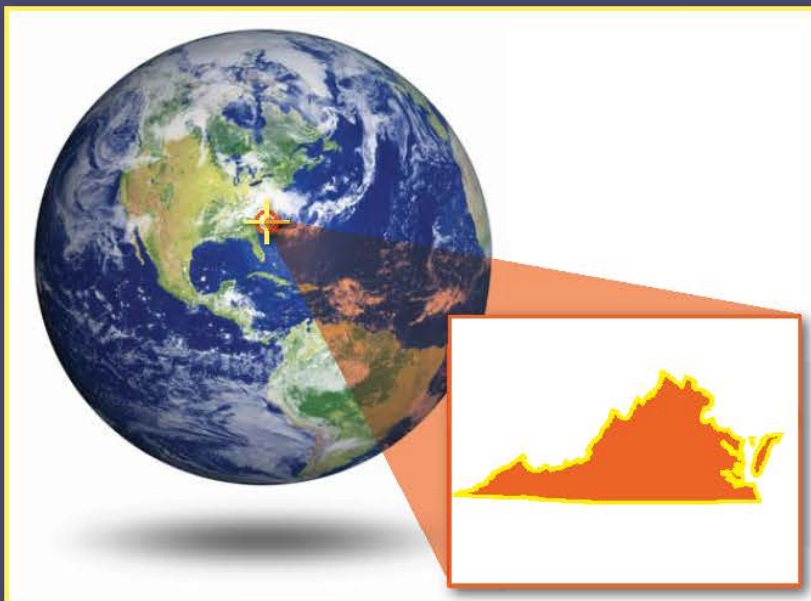
Listed Species Surveys at Naval Air Station Oceana Dam Neck Annex Virginia Beach, Virginia



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ACRONYMS AND ABBREVIATIONS

ac	acres
BBNWR	Backbay National Wildlife Refuge
BRI	Biodiversity Research Institute
C	Celsius
CFR	Code of Federal Regulations
cm	centimeters
DCR-DNH	Virginia Department of Conservation and Recreation, Department of Natural Heritage
DSS	Dismal Swamp Southeaster [shrew]
DOD	Department of Defense
E	Endangered
ESA	Endangered Species Act
F	Fahrenheit
ft	feet
GIS	Geographic Information System
GPS	Global Positioning System
ha	hectares
in	inches
INRMP	Integrated Natural Resources Management Plan
km	kilometers
m	meters
mi	miles
msl	mean sea level
NASO DNA	Naval Air Station Oceana Dam Neck Annex
NAVFAC Atlantic	Naval Facilities Engineering Command Atlantic
Navy	Department of the Navy
NMFS	National Marine Fisheries Service
Project	Naval Air Station Oceana Dam Neck Annex
S1	Critically Imperiled
S2	Imperiled
S3	Vulnerable
S4	Apparently Secure
S5	Secure
SC	Species of Concern
SIAs	Special Interest Areas
SWAP	State Wildlife Action Plan
T	Threatened
Tetra Tech	Tetra Tech, Inc.
U.S.	United States
USC	United States Code
USDA NRCS	United States Department of Agriculture Natural Resources Conservation Service
USFWS	United States Fish and Wildlife Service
VDACS	Virginia Department of Agriculture and Consumer Services
VDGIF	Virginia Department of Game and Inland Fisheries
WNS	White-nose syndrome

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1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) was contracted by the United States (U.S.) Department of the Navy (Navy), Naval Facilities Engineering Command Atlantic (NAVFAC Atlantic) to conduct Listed Species Surveys at Naval Air Station Oceana Dam Neck Annex (NASO DNA) (Project). NASO DNA is located along the Atlantic Coast on the border between southeastern Virginia and northeastern North Carolina (Figure 1). These activities are a continuation of previous natural heritage studies completed at the NASO DNA in 1990 (VDCR-DNH 1990), 1992 (Buhlman et al. 1992), 2001 (Van Alstine et al. 2001), and 2010 (Evans and Belden 2010).

The approximately 1,900 acres (ac) (769 hectares [ha]) that compose NASO DNA provide habitats and open space for a wide variety of floral and faunal species. The federal regulation referred to as the Sikes Act Improvement Act (Sikes Act) (16 United States Code [USC] §670 a-f) requires the Secretary of the Department of Defense (DOD) to prepare and implement an Integrated Natural Resources Management Plan (INRMP) for any installations with significant natural resources. The purpose of an INRMP is to guide conservation and long-term management of natural resources through implementation of ecosystem-based conservation and management programs that provide for integrated conservation, restoration, and enhancement of natural resources consistent with each installation's mission. In accordance with the Sikes Act, one of several elements that every INRMP shall provide for is the enforcement of applicable natural resource laws and regulations.

The primary regulatory protection for threatened and endangered species on federal lands is the Endangered Species Act (ESA) of 1973 (16 Code of Federal Regulations [CFR] §1531 to §1544). The federal ESA is intended to serve as a mechanism for conservation of ecosystems upon which threatened and endangered species depend, as well as to provide programs for species conservation that reduces their potential for becoming extinct. The ESA is administered by the United States Fish and Wildlife Service (USFWS) for terrestrial and freshwater wildlife, and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) for marine species. Section 7 of the ESA requires all federal agencies, in consultation with USFWS and/or NMFS, to use their authority to further the purpose of the ESA and to ensure that their actions are not likely to jeopardize the continued existence of listed species as a result of destruction or adverse modification of their habitat.

Furthermore, the Virginia Endangered Species Act (Section 29.1-564 through 570, Code of Virginia) gives the Virginia Department of Game and Inland Fisheries (VDGIF) regulatory authority over federally- or state-listed fish and wildlife species (excluding Class Insecta) in Virginia. The Office of Plant Protection within the Virginia Department of Agriculture and Consumer Services (VDACS) has regulatory responsibility for the listing and protection of the state's insects and plants under the Virginia Endangered Plant and Insect Act (Section 3.1-1020 through 1030, Code of Virginia). The Virginia Department of Conservation and Recreation, Department of Natural Heritage (DCR-DNH) is a primary source of recommendations to each regulatory agency for species in need of listing as endangered or threatened. Therefore coordination with federal (USFWS) and state (VDGIF, VDACS, and DCR-DNH) agencies is necessary when actions have the potential to affect listed species (Navy 2014).

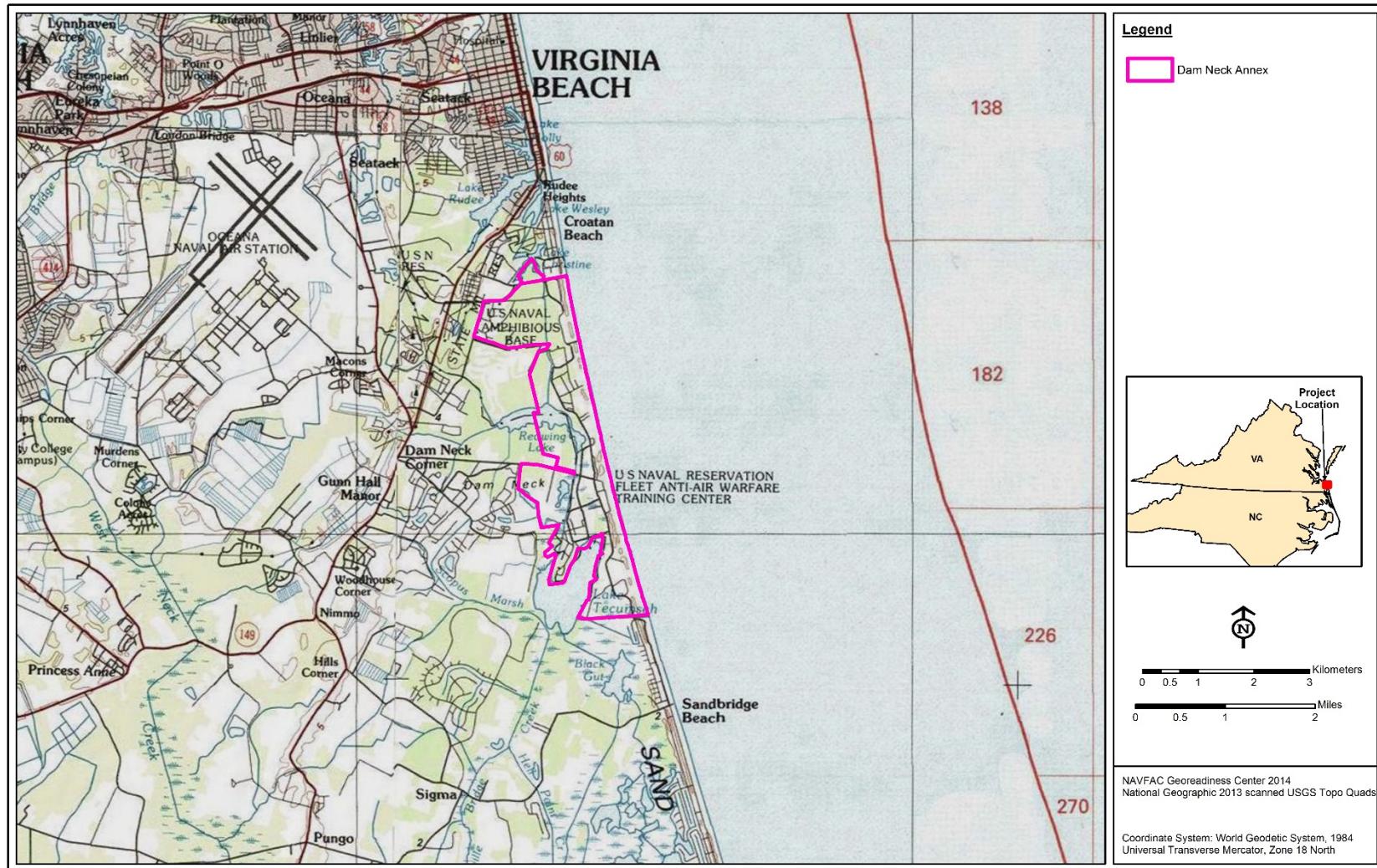


Figure 1. Site Location for NASO DNA, Virginia Beach, Virginia.

To avoid or minimize impacts to threatened and endangered species and species of concern, DOD natural resources managers must be aware of current conditions and status of species. In fact, 32 CFR 190 (Natural Resources Management Program) requires that INRMPs include current inventories and conditions of natural resources. Therefore, periodic surveys of installation resources, including threatened and endangered species, are necessary to maintain compliance with federal regulations. Furthermore, coordinated, proactive management and conservation actions that protect imperiled species not yet listed at the federal level (e.g., state-listed and special concern species) on DOD installations may help prevent them from being listed under the ESA.

1.1 GOALS AND OBJECTIVES

The goal of threatened and endangered species management at NASO DNA is to protect known listed species in compliance with state and federal endangered species laws (Navy 2014). The most recent surveys targeting listed species were conducted 5 years ago in the northern portion of the survey area and more than 10 years ago in the larger, southern section of the installation.

The goal of this Project to complete surveys to determine the presence of state- or federally-listed threatened or endangered species, or species of concern that may occur at NASO DNA. Specific Project objectives are as follows:

1. Establish a list of target species to be the focus of the field surveys using available information,
2. Establish appropriate methods for conducting baseline presence/absence surveys of target species and significant plant community types,
3. Implement survey methods to assess the presence of target species and significant plant communities, and
4. Summarize and report survey data.

1.2 REPORT ORGANIZATION

This report provides an overview of the Project and study area and synthesizes results of the species and plant community surveys.

- **Section 1.0 Introduction** – Describes Project overview, discusses background and regulatory basis, and describes Project goals and objectives.
- **Section 2.0 Description of Study Area: NASO DNA** – Describes the setting and land use, climate, physiography, topography, and soils of the study area.
- **Section 3.0 Selection of Project Target Species** – Provides background information on the steps that were followed in developing a list of species that would be the focus of the Project.
- **Section 4.0 Survey Methods** – Describes survey procedures used to determine presence of target species including desktop and field analyses.
- **Section 5.0 Results and Discussion** – Summarizes results of species and community surveys and discusses findings in relation to the habitats present at NASO DNA.

- **Section 6.0 Special Interest Area Background and Recommendations** – Provides an overview of the Special Interest Areas (SIAs) found on the installation and describes recommended protection areas.
- **Section 7.0 Conclusion** – Provides an overall summary and discusses how Project objectives were met.
- **Section 8.0 References** – Provides a complete list of references used during field survey efforts and in preparation of this report.

2.0 DESCRIPTION OF STUDY AREA: NASO DNA

2.1 INSTALLATION SETTING AND LAND USE

NASO DNA is located in the southeastern portion of the City of Virginia Beach, Virginia (see Figure 1) and encompasses approximately 1,900 acres (ac) (769 hectares [ha]). The installation is bounded by the community of Sandbridge to the south; the Atlantic Ocean to the east; Hampton Roads Sanitation Division, City of Virginia Beach Properties, and private properties to the west; and Virginia Army National Guard - Camp Pendleton to the north. Area surrounding the installation includes industrial, commercial, residential, recreational, and agricultural land uses. However, most of the agricultural lands are rapidly being converted to residential and recreational developments.

2.2 PHYSICAL ENVIRONMENT

NASO DNA is located in Virginia's outer Atlantic Coastal Plain physiographic province. This physiographic province is characterized as flat with low relief and elevations of 0–60 feet (ft) (0–18 meters [m]) above mean sea level (msl). Elevations at NASO DNA range from sea level along the beaches to approximately 20 ft (6 m) above msl on the tallest dunes (ESRI 2012). The largest portion of the installation lies in a low basin behind the primary and secondary dunes and has an elevation of less than 5 ft (2 m) above msl.

The United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS) prepared a soil survey report for Virginia Beach in 1985 (Navy 2014). The survey indicates that approximately half of NASO DNA is composed of Newhan-Duckston-Corolla association of the beaches and dunes and the very poorly drained, flood-prone Backbay-Nawney association in the marshes and swamps. The hydric soils at NASO DNA are Acredale silt loam, Backbay mucky peat, Chapanoke silt loam, Duckston fine sand, Nawney silt loam, Nimmo loam, and Tomotley loam (USDA NRCS 2009b). Fifty-nine percent of the soils are hydric. Other soil types mapped at NASO DNA are Udorthents and Urban Land. Udorthents are soils that have been disturbed by excavation and grading and have had top soils removed. They generally occur in areas of low intensity development. Urban Land occurs in developed areas where more than 80 percent of the land is covered by impermeable surface such as concrete, asphalt, or buildings. Five percent of the soils at NASO DNA are mapped as Udorthents and 11 percent are Urban Land.

NASO DNA is located in an area where temperature extremes are moderated by the Atlantic Ocean. The average yearly temperature is 60.0° Fahrenheit (F) (16.0° Celsius [C]). January is the coldest month with an average low of 32.6°F (0.3°C), and July is the warmest month with an average high of 87.4°F (30.8°C). The average growing season (daily minimum temperatures higher than 32.0°F (0.0°C) for a light frost) lasts approximately 250 days from 22 March to 21 November. The average annual precipitation is 45.7 inches (in) (116 centimeters [cm]) and is generally somewhat concentrated in the late summer. The prevailing wind is from the southwest in summer and northeast in winter at an average speed of 10 miles (mi) (16 kilometers [km]) per hour. During the hurricane season (June through September), torrential rainfall may accompany these storms with winds greater than 75 mi (121 km) per hour. The average relative humidity is 62 percent.

3.0 SELECTION OF PROJECT TARGET SPECIES

3.1 DEVELOPING A LIST OF TARGET SPECIES

A preliminary list of target species was created by completing a query of the DCR-DNH database. Search outputs for the City of Virginia Beach, Virginia resulted in a list of sensitive species for the installation. To be included in the preliminary list for the Project, each species had to meet one of two criteria:

1. Federally-listed as endangered, threatened, candidate, or species of concern; or
2. State-listed as endangered, threatened, proposed, or candidate.

The initial screening process excluded several species from the database outputs that were designated with only global or state natural heritage rankings (e.g., S1, S2, G2, G3) and no listing designation. The preliminary species list was further refined by conducting a cursory desktop analysis to determine the presence of potential habitat for each species at the installation. Based on this analysis and habitat requisites of each species, it was determined that several species listed for the City of Virginia Beach would not likely be found at NASO DNA. Finally, the installation's INRMP was reviewed for additional species with the potential to occur at NASO DNA (Navy 2014). The final list of target species with a reasonable likelihood of occurring at NASO DNA is provided in Table 1.

Although all five species of sea turtles have the potential to occur at NASO DNA, this group of reptiles was not included in the project surveys due to ongoing surveys and other work that address them. Two species, loggerhead (*Caretta caretta*) and Kemp's Ridley (*Lepidochelys kempii*) are known to nest in on NASO DNA and another species, the green sea turtle (*Chelonia mydas*) is known to nest in the vicinity of NASO DNA (Navy 2014). Loggerhead sea turtles nested on the installation in 1992 and 2002. Furthermore, a loggerhead sea turtle false crawl was documented on NASO DNA in 2014 and in 2015 a loggerhead sea turtle nested on VA Army National Guard property border NASO DNA. A Kemp's Ridley sea turtle nested on NASO DNA in 2012.

In addition, all five species including leatherback (*Dermochelys coriacea*) and hawksbill (*Eretmochelys imbricata*), have the potential to strand on the beaches of NASO DNA. The Navy coordinates with USFWS, Backbay National Wildlife Refuge (BBNWR), and Virginia Aquarium on sea turtle management and stranding response and conducts annual nesting and stranding surveys. Additional information on this group of turtles can be found in the installation's INRMP (Navy 2014).

3.2 FEDERAL AND STATE LISTING STATUS

Federal status is determined by USFWS and NMFS. This status is used for all animals listed as endangered or threatened by the U.S. government and receiving protection under the federal ESA. The list also notes those species that are currently candidates under consideration for listing. A list of Virginia Species of Concern can be found on the USFWS Virginia Ecological Services website (USFWS 2011). State status in Virginia is determined by VDGIF (all animals

except insects) and VDACS (insects and plants) primarily through recommendation from DCR-DNH.

Table 1. Preliminary List of Target Species for Natural Heritage Surveys, NASO DNA, Virginia Beach, Virginia.

Common Name	Scientific Name	Federal Status/ Rank ¹	State Status/ Rank ¹	Habitat	Potential Habitat Present?
HERPETOFAUNA					
Barking treefrog	<i>Hyla gratiosa</i>	n/a	T	Graminoid dominated temporary pools with open-canopies and surrounding forest (non-breeding).	YES
Canebrake rattlesnake	<i>Crotalus horridus</i>	n/a	E	In the coastal plain, canebrakes are found in bottomland hardwood and mixed hardwood-conifer communities, cane fields and higher areas of swamps.	YES
Chicken turtle	<i>Deirochelys reticularia</i>	n/a	E	Primarily associated with ephemeral water bodies. Prefer a soft substrate and copious vegetation.	YES
Eastern glass lizard	<i>Ophisaurus ventralis</i>	n/a	T	Has been found only in Back Bay NWR, False Cape State Park and west of False Cape near Munden. Inhabits grassy areas with sandy soils, wet meadows, forested wetlands, hammocks, and pine woods	YES
Loggerhead sea turtle ²	<i>Caretta caretta</i>	LE	LT	Coastal waters with a muddy or rocky bottom, coral reefs, salt marshes, brackish lagoons, and river mouths.	YES
Hawksbill sea turtle ²	<i>Eretmochelys imbricata</i>	E	n/a	Marine. Young live in floating masses of plants like Sargassum.	YES
Leatherback sea turtle ²	<i>Dermochelys coriacea</i>	E	n/a	Forages along coast and only come on land to nest on tropical beaches.	YES
Kemp's Ridley sea turtle ²	<i>Lepidochelys kempii</i>	E	n/a	Marine. Shallow coastal regions like bays and lagoons, with muddy or sandy	YES
Green sea turtle ²	<i>Chelonia mydas</i>	T	n/a	Nearshore coastal habitats; associated with sea grass beds. Only on shore when females are nesting.	YES
MAMMALS					
Northern long-eared bat	<i>Myotis septentrionalis</i>	T	T	Strong association with large blocks of older forests, forages along wooded hillsides and ridgelines.	YES
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii macrotis</i>	n/a	E	Heavily forested areas with minimal anthropogenic activity often near perennial water sources.	YES

Common Name	Scientific Name	Federal Status/ Rank ¹	State Status/ Rank ¹	Habitat	Potential Habitat Present?
Dismal Swamp southeastern shrew	<i>Sorex longirostris fisheri</i>	n/a	T	Successional stages from grassy openings to closed forests, generally in moist to wet areas in or bordering swamps, marshes, or rivers; with a heavy ground cover.	YES
BIRDS					
Piping plover	<i>Charadrius melodus</i>	T	T	Coastal beaches above high tide, sand flats at end of sandpits and barrier islands, fore dunes, blowout behind primary dunes, and wash over areas around dunes.	YES
Roseate tern	<i>Sterna dougallii</i>	E	E	Breeds on rocky offshore islands, barrier breaches, and salt marsh islands. Winters along coasts or offshore.	YES
Red knot	<i>Calidris canutus rufa</i>	T	T	Winter habitats are large, sandy, tidal flats and coastlines near inlet of undeveloped bays and coves. Breeds in tundra.	YES
INSECTS					
Brimley's assassin bug	<i>Pnirontis brimleyi</i>	SC	S1S3	Limited habitat information available.	YES
PLANTS					
Seabeach amaranth	<i>Amaranthus pumilus</i>	T	T	Annual; grows on sandy beaches along the Mid-Atlantic coast of the U.S.	
Blue witch grass	<i>Dichantherium caeruleum</i>	SC	S1	Interdunal swales, tidal marshes, wet flatwoods, bogs, and boggy clearings. Sandy, peaty areas with low nutrient quantity.	YES
Virginia least trillium	<i>Trillium pusillum var. virginianum</i>	SC	S2	Non-riverine flatwoods and swamps	YES
Florida Thoroughwort	<i>Eupatorium anomalum</i>	SC	S1	Wet and low ground, typically intertidal zones.	YES
Long Beach seedbox	<i>Ludwigia brevipes</i>	SC	S2	Shallow water and low, wet places including pondshores, lakeshores, pools, marshes, swamps, blackwater rivers, interdunal swales, borrow ponds, ditches and impoundments.	YES

¹ T = Threatened, E = Endangered, and SC = Species of Concern, S1 = Critically Imperiled (in Virginia), S2 = Imperiled (in Virginia), S3 = Vulnerable (in Virginia)

² Species was removed from consideration for this project due to ongoing or imminent studies focusing on the species.

Endangered: A species (taxon) in danger of extinction throughout all or a significant portion of its range.

Threatened: A species (taxon) that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Federal Candidate: A species (taxon) under consideration for official listing for which there is sufficient information to support listing.

State Candidate: There is enough available information to propose the taxon for listing, but listing is “precluded by other pending proposals of higher priority.” The USFWS is “directed to make prompt use of the emergency listing if the wellbeing of any such species is at significant risk.”

Proposed Endangered: A species (taxon) is proposed for listing as endangered.

Proposed Threatened: A species (taxon) is proposed for listing as threatened.

Federal Species of Concern: A species that has not been petitioned or been given endangered, threatened, or candidate status but has been identified as important to monitor. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

3.3 STATE HERITAGE RANKINGS

State ranks are assigned by a consensus of the network of natural heritage programs, scientific experts, and The Nature Conservancy to designate a rarity rank based on the range-wide status of a species or variety. Although this system was developed by The Nature Conservancy for ranking taxon on a global scale, it is widely used by other agencies and organizations and is considered the best available scientific and objective assessment of a taxon’s rarity and level of threat to its existence. The ranks are assigned after considering a suite of factors, including number of occurrences, number of individuals, and severity of threats. State ranks consider only those factors within political boundaries of the Commonwealth of Virginia. Descriptions of ranks that pertain to the target species for this Project are provided below (Roble 2013, Townsend 2015).

S1, Critically Imperiled: At very high risk of extirpation from the state due to extreme rarity (often five or fewer populations), very steep declines, or other factors.

S2, Imperiled: At high risk of extirpation from the state due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

S3, Vulnerable: At moderate risk of extirpation from the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

S4, Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5, Secure: Common, widespread, and abundant.

4.0 METHODS

Various types of studies were conducted to assess the presence of the target species at the installation. Studies included visual surveys, auditory call surveys, and trapping. The following sections provide a description of specific survey methods used for each of the target species or groups of species. All state permits required to conduct these surveys were acquired and can be found in Appendix D.

4.1 AMPHIBIANS AND REPTILES

4.1.1 Barking Treefrog

Frog call surveys were conducted to assess the presence of barking treefrog (*Hyla gratiosa*) at NASO DNA. Survey protocol generally followed the North American Amphibian Monitoring Program as outlined in the Virginia Frog and Toad Survey Training Manual (VDGIF 2002). Prior to initiating the field effort, the field team completed a desktop review and identified a potential survey route comprising 10 call sites at NASO DNA. The 10 preliminary sites were verified in the field to assess suitability for inclusion in the survey route. Site 12 was later removed from field surveys, as it was inaccessible due to construction at the time of the surveys. Site 22 was added during field surveys due to observation of frog chorus and accessibility. The route of finalized sites was sampled two times in late spring/early summer during suitable weather conditions (Figure 2). A description of the survey sites is presented in Table 2. Suitable survey conditions were anytime between sunset and 12:00 am during or immediately after substantial precipitation events, with temperatures at or near 70 °F (21 °C) or higher. At each survey site the observer recorded all species heard during a 5 minute survey window.

Each species was assigned a calling index (1–3) based on the relative number of calling individuals. According to this index a 1 is recorded for the fewest individuals of a single species detected where individuals can be counted and there is space between calls. An index 2 is recorded when individuals can be distinguished but there is some overlapping of calls. An index of 3 represents a full chorus where calls are constant, continuous, and overlapping. The influence of background noise in terms of impairment of detecting species was recorded (type of noise and duration), as were any timeouts taken during the survey window to avoid major and excessive disturbances.

4.1.2 Canebrake Rattlesnake

Suitable habitats for canebrake rattlesnake surveys include relatively mature hardwood or mixed hardwood forest with somewhat open understory, abundant downed woody debris, periodic gaps in the forest canopy, and cane (*Arundinaria spp.*) thickets.

Surveys were completed for canebrake rattlesnakes (*Crotalus horridus*) within forested habitats of NASO DNA (Survey Areas A-E in Figure 3) using visual reconnaissance. Visual surveys entailed walking haphazardly through habitats determined to be suitable for the target species. Cover objects on the ground (e.g., logs, rocks) were turned over on an irregular basis and root masses and caverns under tipped up tree mounds were inspected.



Figure 2. Barking Treefrog Survey Locations, NASO DNA, Virginia Beach, Virginia.

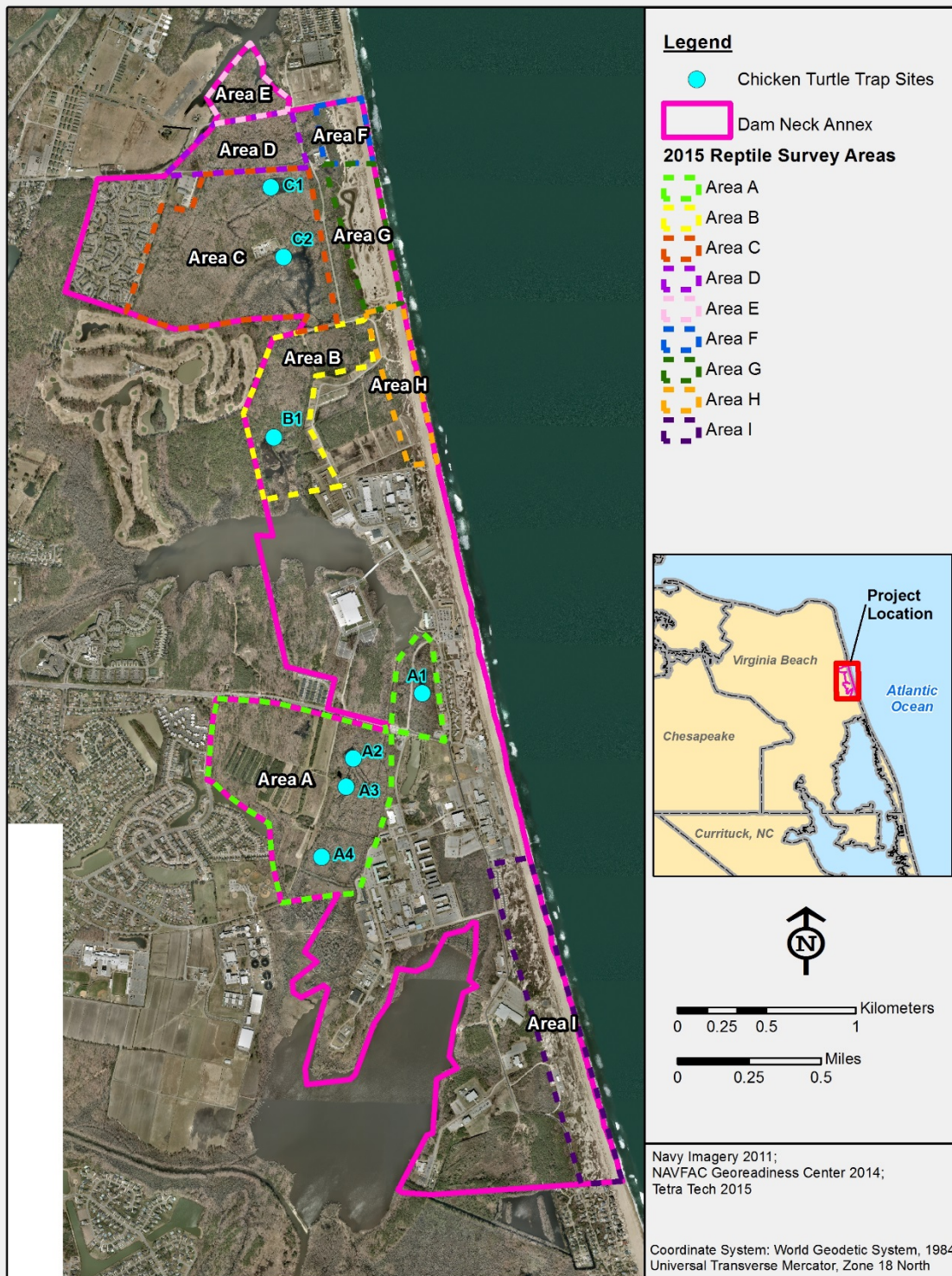


Figure 3. Reptile Survey Areas, NASO DNA, Virginia Beach, Virginia.

Table 2. Barking Treefrog Survey Sites, NASO DNA, Virginia Beach, Virginia.

Site	Description
01	Likely an old borrow pit. Open canopy w/ ~2ft deep water. Vegetation: buttonbush (<i>Cephalanthus occidentalis</i>), black willow (<i>Salix nigra</i>), and unknown emergent vegetation in the water. Lined with red maple (<i>Acer rubrum</i>), pines (<i>Pinus</i> spp.), & black cherry (<i>Prunus serotina</i>).
03	Large lake with water >2ft deep. West side has an herbaceous portion with floating mats of vegetation and emergent vegetation. Vegetation: rushes (<i>Juncus</i> spp.), wax myrtle (<i>Morella cerifera</i>), red maple saplings, and sweetgum (<i>Liquidambar styraciflua</i>). Mixed hardwoods surrounding lake.
05	Marsh separated from lake by a berm. Open canopy full of emergent vegetation. Vegetation: black willow, wax myrtle, rushes, & cattails (<i>Typha</i> spp.). Access most difficult, requires 6 minutes of walking through woods and a total of 10 minutes of walking to get to solid ground
06	High Value. Fully open canopy. Open water with a wide margin of emergent vegetation. Vegetation: black willow, red maple, rushes, cattail, & wool grass (<i>Scirpus cyperinus</i>).
07	Main ditch with 3-4 separate depressional pools. Main ditch is likely unsuitable, but a secondary ditch and pools are valid. Shallow water, ~0.5 ft surrounded by mowed turf grass. Various unknown emergent vegetation in pools.
08	Drainage ditch with several spots with standing water and emergent vegetation and scrub/shrub. Vegetation: black willow, wax myrtle, cattail, common reed (<i>Phragmites australis</i>), red maple, & water dock.
11	Inundated swale ending with small pond, surrounded by mowed turf grass. ~1 ft. deep and partially shaded by adjacent canopy, but none directly above and it has a southern exposure. Vegetation is various emergent.
12	Small depressional wetland, ~1 ft deep, adjacent to road with a mostly open canopy. Vegetation: small red maple, sweetgum, wax myrtle, rushes, sedges, cattail, & greenbrier (<i>smilax</i> sp.). Removed from study due to inaccessibility during field surveys.
13	Open marsh, ~1 ft deep water and thick emergent. Salt intrusion possible, but no solid evidence. Possible chorus frog heard. Vegetation: pine within and surrounding marsh, sedges, broom sedge (<i>Andropogon virginicus</i>), blue panic grass (<i>Panicum</i> sp.) & unknown other herbaceous.
14	Description limited by restricted access: observations made from road edge only. Open canopy wetland with ~15 ft tall pines and other typical hardwoods. Vegetation: black willow, wax myrtle, pine, cattail, red maple & unknown emergent.
22	A new site added on available frog choruses. Water depth ~6 inches and dominated by rushes.

4.1.3 Eastern Glass Lizard

Surveys were completed for eastern glass lizards (*Ophisaurus ventralis*) at NASO DNA using visual reconnaissance surveys. Visual surveys entailed walking haphazardly through habitats determined to be suitable for the target species. Cover objects on the ground (e.g., logs, rocks) were turned over on an irregular basis. Habitats that were targeted for eastern glass lizard surveys included old-field habitats, and other graminoid-dominated communities such as dunes and wet meadows (Survey Areas F-I in Figure 3). Maintained grassy areas were avoided.

4.1.4 Chicken Turtle

Prior to initiating field surveys, the Project herpetologist conducted a desktop analysis of available information to identify areas containing potentially suitable habitat for chicken turtle (*Deirochelys reticularia*). During this analysis, aerial photographs of NASO DNA were reviewed to determine preliminary locations within freshwater aquatic habitat that would be suitable for placing turtle traps.

Field surveys to assess the presence of chicken turtles were completed during one spring survey event. The first day of the survey event involved ground-verifying preliminary trap locations and adjusting final trap locations as needed based on conditions in the field (see Figure 3). After trap locations were finalized, eight 30-in hoop traps with nylon netting, with and without leads, were set in locations identified in freshwater ponds. Traps were set so that a portion remained above the water level so that captured turtles would not drown. In addition to traps with leads, a supplemental trap that lacked leads or wings was set during the survey effort. Traps were set without bait and checked within 24 hours of installation and for one to three consecutive days. Brief descriptions of the turtle trapping sites are provided in the following paragraphs.

Area A

Four ponds were sampled in Area A (Figure 3). One pond (A1) was situated at the southeastern border of NASO DNA. This was a large pond bordered by a road to the east, which had an open canopy and abundant emergent vegetation. As with all the forested areas on DNA dominant trees included red maple (*Acer rubrum*), white oak (*Quercus alba*), and mixed pines (*Pinus* spp.). One hoop trap without a lead was set in this pond for two trap nights. The remaining three ponds (A2, A3, and A4) were located in the most southern part of the installation in heavily forested areas with a high percentage of canopy cover. Hoop traps with leads were set in these three ponds for two trap nights. Pond A2 is a large pond with an island in the middle. One trap was set at the southern edge of A2. Pond A3 was a medium-sized pond separated into two parts with a narrow section connecting the two. One trap was set in A2 near the connecting section in the middle. Pond A4 was a smaller pond and one trap was set at the southern end.

Area B

One pond (B1) was sampled in Area B (Figure 3). This was a large, open canopy pond adjacent to a road with a deer stand at the edge. Dominant trees included red maple, white oak, and mixed pines. Two traps were set in this pond, one on the eastern border and one near the southern border. Two hoop traps with leads were set for three trap nights. Initially, one hoop trap without a lead was set towards the northeastern portion of the pond for one trap night and subsequently moved to another location.

Area C

Two ponds (C1 and C2) were sampled in Area C (Figure 3). Pond C1 was in an interior, forested area. This was an open canopy medium-sized pond with little emergent vegetation. Dominant trees included red maple, white oak, and mixed pines. One hoop trap with a lead was set towards the southeastern portion of the pond for three trap nights. Pond C2 was a large feature approximately 300 ft (91 m) west of a paved road in an interior forested area. Two hoop traps with leads were set for three trap nights.

4.2 MAMMALS

4.2.1 Dismal Swamp Southeastern Shrew

Field surveys were conducted to assess the presence of Dismal Swamp southeastern (DSS) shrew (*Sorex longirostris fisheri*) and led by Dr. Robert Rose of Kerr Environmental Services. Generally accepted methods, specifically the use of pitfall traps, were used for the DSS shrew study to assess presence of the species at the installation. Field study protocol for this species required the use of pitfall traps due to the fact that these shrews are rarely caught using live or snap traps.

Prior to initiating field surveys, biologists used habitat maps and aerial photos to identify eight preliminary locations as likely places for study. Several of these sites were eliminated from consideration due to access restrictions. An initial field reconnaissance was completed during which five of the eight potential sites were inspected for conditions that could potentially support the shrews: suitable soils, adequate leaf litter, and did not appear to be subject to prolonged flooding. The two best locations were selected for study and are described below (Figure 4).

Site 1

This site was flat and relatively free of disturbances, i.e., of depressions or mounds formed by earlier construction activity. It was a fairly open forested wetland located near Redwing Lake. Red maple trees were dominant (95%), with some trees and many seedlings of red bay (*Persea borbonia*), and wax myrtle (*Morella cerifera*) trees in the midstory. Vines included greenbriers (*Smilax rotundifolia* and *S. latifolia*), Japanese honeysuckle (*Lonicera japonica*), and trumpet creeper (*Campsis radicans*). Also present were sparse patches of blackberry (*Rubus allegheniensis*) and scattered grasses such as panic grasses (*Panicum* spp.). Other elements in the forest included sweet gum (*Liquidambar styraciflua*), black cherry (*Prunus serotina*), laurel oak (*Quercus latifolia*), and highbush blueberry (*Vaccinium corymbosum*). This 20-30 year old forest contained maples approximately 45 cm diameter above breast height (dbh), and soils were black loam and relatively dry. No water was reached when the 25-cm holes were dug for placement of the pitfall traps, indicating that the water table was well below the surface at that time of year.

Site 2

This site was flat and relatively free of earlier disturbances, except for one mound representing a loading platform from an earlier logging operation. It contained a relatively open forested wetland. The forest on this site was somewhat older (35-45 years) and among the oaks, laurel oak was both largest and most common. Also present were black gum (*Nyssa sylvatica*), some red maples, black cherry, and black oak (*Q. velutina*), one loblolly pine and numerous seedlings (*Pinus taeda*). The ground cover included Japanese honeysuckle, greenbriers, scattered blackberry and privet (*Ligustrum vulgare*) in the shrub stratum. A few grasses, most likely panic grasses, were also present. The loamy soils on this site were heavier (more clay) than those on Site 1 and were covered with a layer of leaf litter.

Pitfall traps were installed on a grid pattern at both sites. The methods included measuring and setting traps in 5 x 5 trap grids of pitfall traps set at 41 ft (12.5 m) intervals, resulting in an

effective trapping area of 0.61 ac (0.25 ha). Pitfall traps were installed using Iwan augers to drill the holes for the #10 cans.

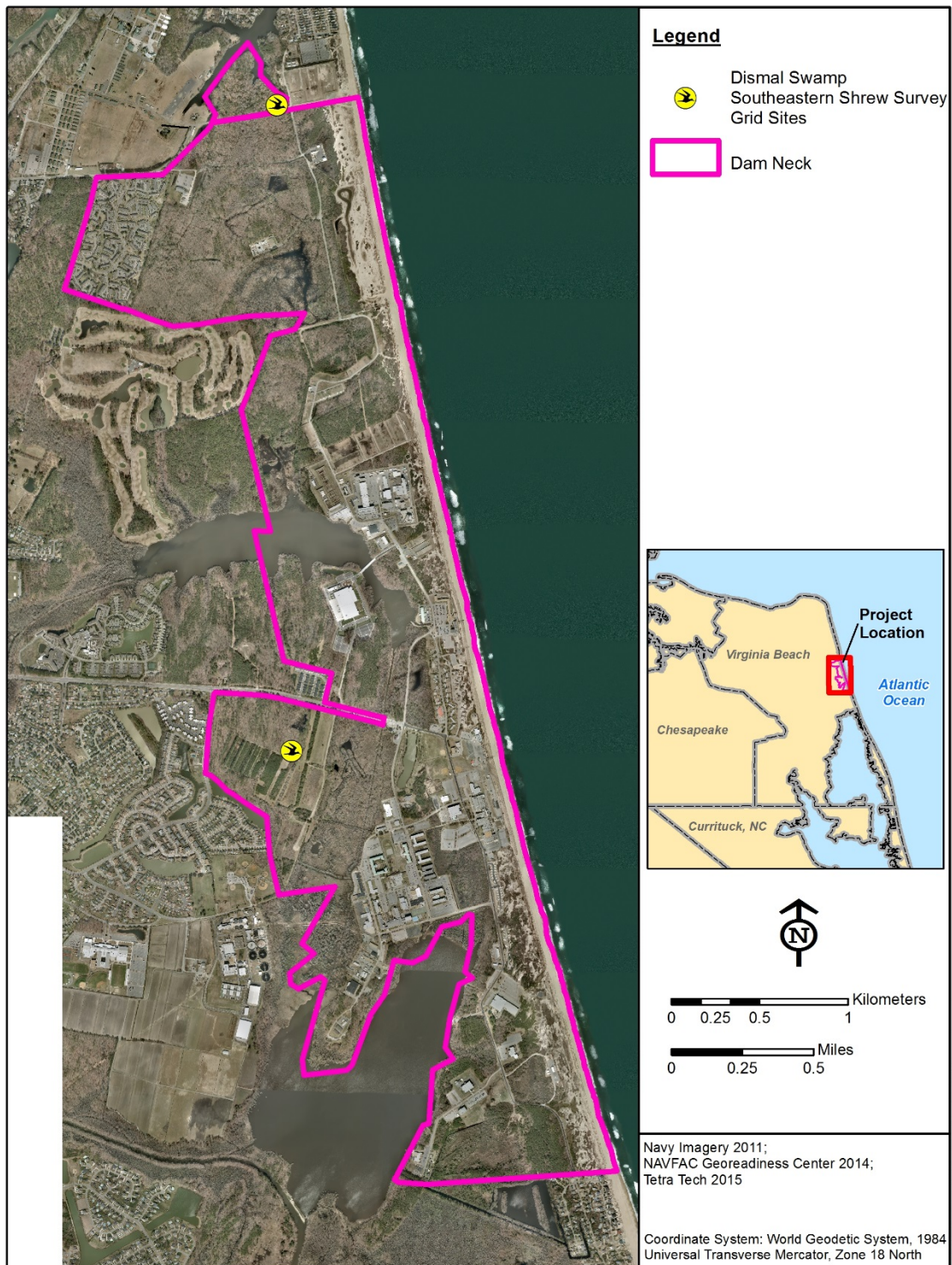


Figure 4. Dismal Swamp Southeastern Shrew Survey Locations, NASO DNA, Virginia Beach, Virginia

Traps were checked at regular intervals for the rest of the month and into early December. All small mammals that had fallen into the pitfall traps were to be removed and placed into plastic bags, labeled with date, grid number, and then frozen, to be examined and identified at a later time. Care was taken when the water was poured from each removed pitfall trap to make certain no small mammal at the bottom of the can was missed. On 12 December, the traps were checked one last time and then removed, as were the surveyors' flags and all ribbon flagging from the grids.

4.2.2 Bat Mistnet Survey

Field surveys were conducted to assess the presence of Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) and the northern long-eared bat (*Myotis septentrionalis*) at NASO DNA. These efforts included site reconnaissance to identify the most suitable survey sites and five calendar nights of mist net surveys. Mist netting activities were led by Biodiversity Research Institute (BRI), assisted by a Tetra Tech biologist. A Threatened/Endangered Species Permit (#051933) was acquired from VDGIF to perform the mist net surveys (Appendix D).

A typical mist net site is at least two net sets active for one night. Three (3) mist net sites were planned for the survey, or a minimum of six (6) nets. The final survey included a total of three sites each with three nets for a total of nine nets (Figure 5). Precipitation on the night of 6 August required that nets A and B were closed for approximately 15 minutes. Net C was under enough tree cover to prevent rainfall from being heavy enough to warrant closing the nets. A full five hours of survey was completed at all nets.

Before initiating mist netting, Tetra Tech biologists selected preliminary sampling locations based on prior knowledge of the installation acquired during other environmental surveys. Areas considered suitable for mist net sites were wooded corridors (e.g., roads, trails, road ruts, creeks). All locations were finalized in the field with BRI on the first survey day. Three net sets were established at each site and each net was placed with neighboring environmental features in mind to maximize capture success (e.g., near or over pools or ponded ruts, away from adjacent open canopy, under overarching canopy). Mist net poles were placed in wooded edges and with the nets directly under canopy. Whenever feasible, nets were set over or adjacent to water sources, as they provide both foraging and drinking locations for bats, thus increasing capture potential.

Net sets were placed across expected travel corridors and road ruts holding water from approximately ground level to the tree canopy; ground level was near 1 ft (0.3 m) but varied due to canopy and features underneath nets (e.g., road ruts and vegetation). A mist net is made up of four vertically stacked sections (shelves) and totals 8.5 ft (2.6 m) in height. Each net set was constructed with at least two nets stacked on top of each other ("double high") so that the total capture area when deployed was up to 17.1 ft (5.2 m) high. A double high mist net setup often overlaps one of the "shelves" to remove any gaps in the junction of the nets. The overlap can vary, but the overall height of a double high net is between 15 ft (4.55 m) and 17.1 feet (5.2 m). Some nets were "triple high" with the same procedure as above. The overall height for a triple high varied between 21 feet (6.4 m) and 25 feet (7.6 m).

Mist nets were supported by up to three approximately 10-ft (3.1-m) aluminum poles stacked on top of each other (i.e., one 20-ft [6.1-m] pole at each end of the net), standard rope gny lines, and



Figure 5. Bat Mist Net Survey Locations, NASO DNA, Virginia Beach, Virginia.

aluminum stakes. It should be noted that the equipment used on this project was custom and some variability was present. Surveyors selected the length of net that could span the corridor completely in order to minimize the bats' evasive maneuvers. Typically, each net set was placed more than 100 ft (30.5 m) from its paired net set, except in the case of prohibitive environmental constraints or where the arrangement improved bat capture success. All net sets in a site were within the same general habitat, but in some cases they were placed over different microhabitats such as road ruts, corridors, or streams. The following paragraphs include a brief description of the habitats at each net site.

Surveys began at approximately sunset each night and continued for a minimum of 5 hours. Weather conditions that would be considered a significant detriment to sampling results include sizeable duration of precipitation (i.e., more than a drizzle), extreme cold (less than 50 °F [10 °C]), steady high winds (i.e., mist nets are blowing around frequently), and moonlight illuminating the nets (USFWS 2007). Therefore, in accordance with survey protocol, if one or more of these conditions were observed, surveys were suspended until the following night. General information recorded hourly included ambient temperatures, sky condition, and wind condition.

Nets were checked on 10-minute intervals and the following information was recorded for each bat captured: time, species, sex, age, reproductive status, forearm length, weight, height of capture, and identification of capture net. Individuals were placed in paper bags to await data collection if more than one bat was captured at once or if a surveyor was working alone. Bats were weighed by being placed in a paper sandwich bag and on a hanging scale. Any individuals of the target species were to be banded before release. Band numbers were recorded on the data sheets.

White-nose syndrome (WNS) is a highly transmissible disease that has been responsible for the deaths of more than 5.7 million bats in the eastern U.S. since its discovery at Howe's Caverns west of Albany, New York in the winter of 2006 (USFWS 2012). The USFWS, state agencies, and bat researchers have worked together to identify appropriate methods for decontaminating all equipment and/or persons that come in contact with bats. These methods are outlined in the National White-nose Syndrome Decontamination Protocol – Version 06.25.2012 (USFWS 2012a) and were used at all net sites established for this Project.

Several methods were used to prevent the transmission of WNS between bats. Surveyors used a new pair of rubber gloves for each bat that was handled. Disinfectant wipes were used in the event of contact with bare skin or work gloves. Paper bags used to hold bats prior to data collection were disposed of after each bat was released. All hard, non-porous equipment (e.g., rulers, scales) was wiped down with disinfectant wipes between bats. All previously-used equipment was disinfected before arriving at the Project site. Stakes and poles also were decontaminated using disinfectant wipes or by spraying with an approved cleaner.

Mist Net Site 1

All three net sets at Site 1 were set across a hunting road corridor in a young, but mature, relatively even-aged conifer forest near a large emergent wetland on the south edge of the installation boundary. Some pocosin habitats were intermixed with the forest. The canopy of the

forest surrounding this site was relatively dense and dominated by pine. Common reed was dominant in the area where the large adjacent wetland has some interstitial flow across the hunting road. One double high and two triple high sets were placed at this site. Two nets were placed over a large ponded ruts on the hunting road.

Mist Net Site 2

All three net sets at Site 2 were set across a relatively wide and maintained road in the Development Group area of NASO DNA. The nets were close to a large emergent wetland with significant presence of open water. The entire surrounding habitat was a young pine and sweetgum mixed forest, with varying density of understory. One double high and two triple high net sets were placed at this site, all across the road.

Mist Net Site 3

All three nets in Site 3 were set in maintained trail clearings in a large planted area. The planted areas were a young successional forest with a very thick understory. The surrounding habitat for the planted area was a mature deciduous forest with a thick understory. One double high net and two triple high nets were set at this location.

4.3 BIRDS: PIPING PLOVER, RED KNOT, AND ROSEATE TERN

Three two-day avian point count surveys were completed and led by Tetra Tech biologist Joseph Campo. The purpose of the surveys was to determine presence/absence of bird species at NASO DNA with a specific focus on the three target species associated with shore habitat. Inland forest habitat was sampled as well at the request of the installation natural resources manager in order to assess presence of state-ranked bird species targeted during previous surveys including king and Virginia rails (*Rallus elegans* and *R. limicola*). Two point count transects (R1 and R2) were established based on appropriateness of habitat and ease of travel within the NASO DNA property: R1 along the beach/dune areas for focusing on presence of shorebird survey species and R2 to the west in undeveloped and forest interior areas of the facility. Each transect consisted of 10 points each for a total of 20 fixed point count stations (Figure 6). Survey transects were a combination of driving route(s) with roadside observation points and walking routes. Point count station sites were situated in representative habitat types within the installation including forests, wetlands, open water, beaches and dunes. Transects were sampled two times on separate days during the spring, summer, and fall season.

Point counts were spaced accordingly by habitat type to minimize double counting individual birds and to maintain independence from other observation points. At each point count station (observation point) birds seen or heard were counted during a 10-minute sampling period. Incidental observations of birds during transit between point count stations also were recorded. All point count stations were recorded by a Global Positioning System (GPS) unit and plotted on maps. A list of species observed during field efforts is provided in Appendix A.

4.4 INSECTS: BRIMLEY'S ASSASSIN BUG

Brimley's Assassin Bug (*Pnirontis brimleyi*): Although it is considered the most distinctive species of *Pnirontis* in North America, little is known about the distribution and habitat requirements of Brimley's assassin bug (Asquith 1992).

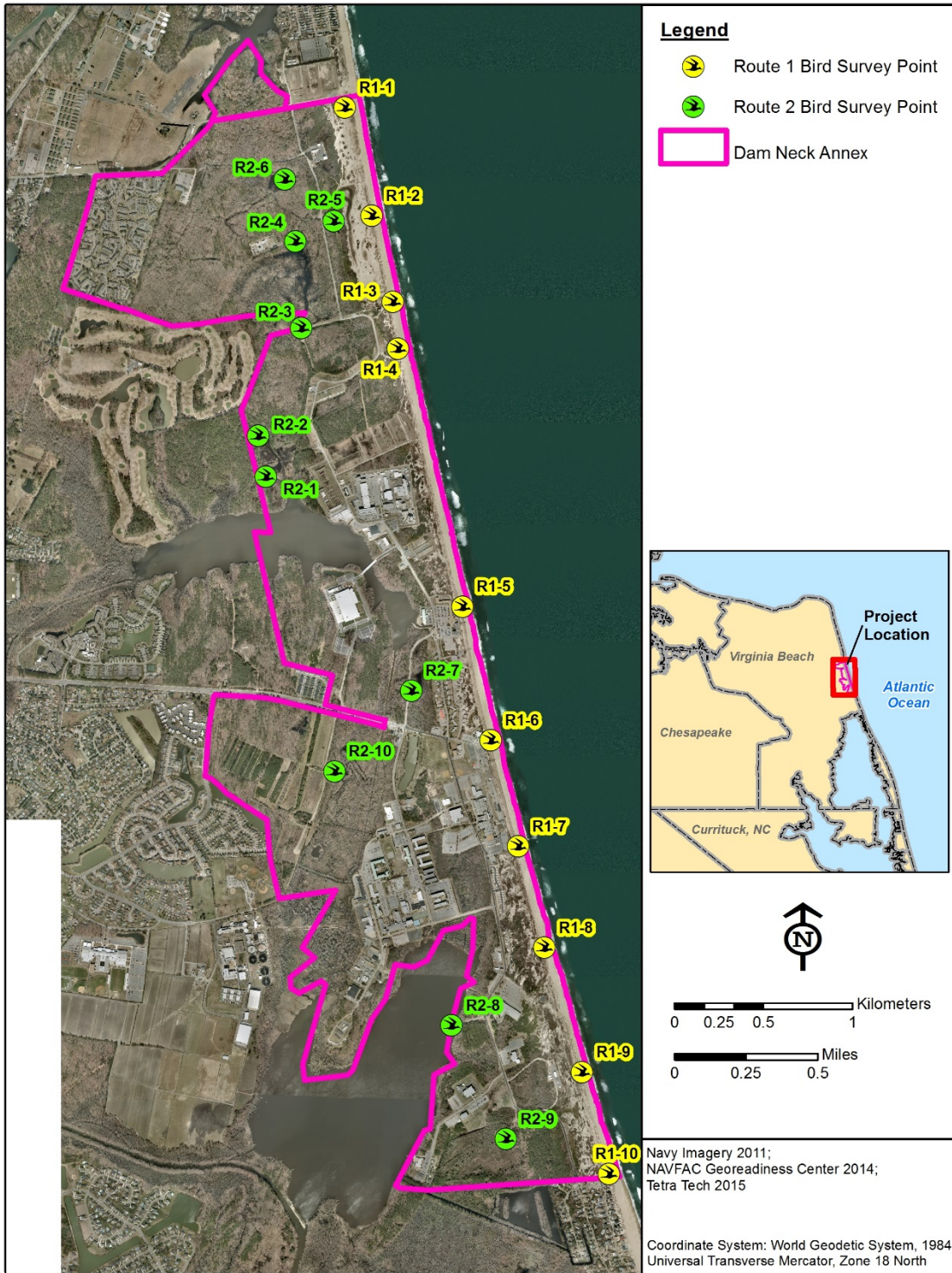


Figure 6. Avian Point Count Stations, NASO DNA, Virginia Beach, Virginia.

Tetra Tech conducted background research to determine the extent of knowledge for this species. This analysis included contacting subject matter experts to determine known habitat use in Virginia and neighboring states. There is no existing data available on the preferred habitat of this species, though a historical record of a single occurrence on NASO DNA exists (Hoffman 2006).

4.5 PLANTS AND SIGNIFICANT NATURAL COMMUNITIES

Surveys for target plant species were led by Tetra Tech biologist Joseph Campo, assisted by a Tetra Tech plant biologist. Potential habitat for target species was reviewed with a geographic information system (GIS) desktop survey to assess suitable forested, wetland, stream, and dune/beach habitats.

Plant surveys were conducted during two separate site visits in late summer and early spring in order to survey within the ideal window for each target species. Each survey event consisted of meander searches covering as much suitable habitat as could be accessed within the given timeframe. Surveys were conducted over a 3-day period each for September 2014 and April 2015. (Figure 7). GPS coordinates were recorded at regular intervals to depict the meander routes on each survey day. In addition to documenting occurrence of target species, incidental observations of any rare species encountered were documented. A plant was considered a species of concern if it occurred in the Natural Heritage Resources of Virginia: Rare Plants List (Townsend 2015).

The initial fall survey targeted intertidal dune swales that might be suitable for long beach seedbox (*Ludwigia brevipes*), Florida thoroughwort (*Eupatorium anomalum*), seabeach amaranth (*Amaranthus pumilus*), and blue witch grass (*Dicanthelium caeruleum*). This primarily included intertidal dune swales along the east shore line but also incorporated limited sampling of forested wetlands and mesic woods within the ‘South Parcel’ (western-most parcel on south side of Dam Neck Road) and Camp Pendleton Annex. The large expanse of dunes and beaches on the eastern section of the installation was targeted as potential habitat for other species of interest, as were the woods and forests on the interior western/northern portions of the installation. An additional three day survey was completed in the spring, targeting inland mesic woods and wetland habitats suitable for Virginia least trillium (*Trillium pusillum*) and long beach seedbox. Survey routes, points of interest, and potential habitats to revisit were recorded using a hand-held Trimble GeoXH sub-meter hand-held GPS unit. Notes on habitat and current conditions were documented for all sites visited.

Significant natural communities with a state ranking S1, S2, or S3 were identified and mapped via desktop analysis. Results of a concurrent project for the installation to identify and map the natural communities at NASO DNA using the National Vegetation Classification System (USNVC 2015) were used to determine the presence of significant natural communities according to the *Natural Communities of Virginia: Ecological Groups and Community Types* (Fleming and Patterson 2013).

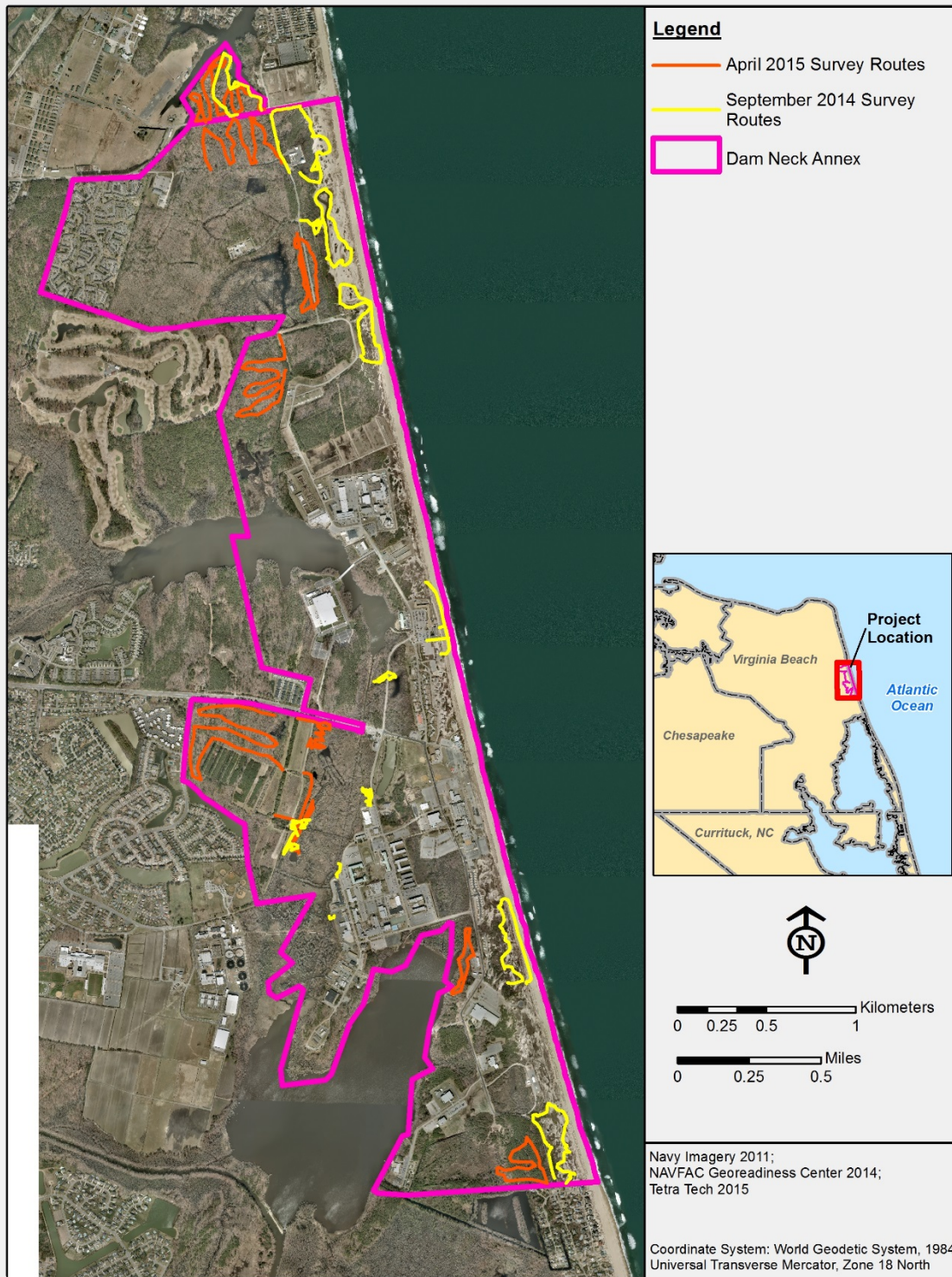


Figure 7. Plant Survey Routes, NASO DNA, Virginia Beach, Virginia.

5.0 RESULTS AND DISCUSSION

The following sections summarize results and observations for the presence/absence species surveys. A list of bird, mammal, amphibian, reptile, and plant species observed during field surveys is provided in Appendix A. Photographic documentation is provided in Appendix B and field data forms are provided in Appendix C. Permits that were acquired to conduct surveys are provided in Appendix D, and survey location coordinates are listed in Appendix E. It should be noted the limited photographic documentation was collected due to a high level of security in many areas of the installation.

5.1 AMPHIBIANS AND REPTILES

Amphibian surveys were completed during two survey events on 15 May and 15 June 2015. Reptile surveys were completed during a single field effort conducted between 5 May and 8 May, 2015. No target species were detected at NASO DNA. The following sections provide the results of amphibian and reptile surveys at the installation.

5.1.1 Barking Treefrog

Ten call sites at NASO DNA were assessed for the presence of barking treefrogs during two survey events on 15 May and 15 June 2015. Because Site 12 was found to be inaccessible due to road construction on Regulus Avenue, a new site (22) was added opportunistically during field surveys based on audible chorus and ease of access.

Both frog call surveys were conducted immediately after or during significant rain events with temperatures ranging from 65° to 81 °F (18° to 27 °C). No barking treefrogs were detected during the surveys. Table 3 includes species observed by site and relative abundance for each survey run.

The greatest number of species (6) were detected at Sites 5, 7, and 22 followed by Sites 1, 3, 6, 11, and 13 with five species. The fewest number of species (0) was detected at Site 8. Two or more hylid (treefrog) species were detected in 9 of 10 locations surveyed (Table 3).

Barking treefrogs typically are associated with sandy areas. The wetlands surveyed for barking treefrogs at Sites 7, 8, 11, 13, and 14 were all mapped as Duckston Fine Sand. The remaining sites were mapped as silt loam, loam, or mucky peat.

Some habitat preferences of the pine woods treefrog are similar to that of the barking treefrog. Pine woods treefrogs are associated with sandy sites and primarily breed in shallow forest pools and freshwater wetlands including Carolina bays, marshes and shallow swamps that lack predatory fish. Therefore, the presence (or absence) of pine woods treefrogs may be an indicator of the suitability of a particular site for barking treefrogs. This smaller treefrog was detected at only one of the sandy sites that occur at NASO DNA, Site 13.

The wetlands that occur at NASO DNA are marginal for barking treefrog habitat. Whereas the majority of known barking treefrog breeding sites in Virginia are ephemeral pools that have abundant emergent vegetation, open canopy, sandy soils and are surrounded by mature forest habitat, wetlands at NASO DNA are missing one or more of these key features. Furthermore, the

historically disturbed and fragmented condition of forests at NASO DNA and highly developed surrounding land use make it all the more unlikely that this species occurs there.

Table 3. Frog Call Survey¹ Results for NASO DNA, Virginia Beach, Virginia.

Site ID	Green Treefrog		Squirrel Treefrog		Pine Woods Treefrog		Northern Green Frog		American Bull Frog		Southern Leopard Frog		Southern Toad		Eastern Narrow-Mouthed Toad		Pickerel Frog		
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	
Run No.																			
Site																			
1	2	1					1			1	1								
3	3	2						1	1				3						
5	3	2							1	1	2				1				
6	2	3					1				1							1	
7	2	2	2	2									2			1			
8																			
11			2	3									1		2	1			
13			1		1	1					1							2	
14	2	2											3	1					
22		3	3	3							1		2	1					

¹Frog Call Index: 1 = individuals can be counted, there is space between calls; 2 = calls of individuals can be distinguished but there is some overlapping of calls; 3 = full chorus, calls are constant, continuous and overlapping.

5.1.2 Canebrake Rattlesnake

Undeveloped areas of the installations were assessed for suitability of canebrake habitat during the May 2015 field effort. However, no canebrake rattlesnakes were observed at NASO DNA. The lack of high quality canebrake habitat observed at this installation is attributed to the immature stands of hardwood forested parcels and historically disturbed conditions. The cryptic nature of canebrake rattlesnakes makes them extremely difficult to detect; however, no suitable habitat was observed at NASO DNA. The likelihood of occurrence is very low as this species prefers old hardwood forests with cane thickets.

5.1.3 Eastern Glass Lizard

Undeveloped areas of NASO DNA that were identified as most suitable eastern glass lizard habitat were surveyed during a single field effort: 5–8 May 2015. Two areas of unmaintained grassy habitat in the secondary (back) dune systems were determined to be the most suitable habitat at the installation for eastern glass lizard. The first of these non-maintained search areas is located in the northeast corner of NASO DNA and is bounded by Jefferson Street/Rifle Range Road to the north, buildings to the south, and the Atlantic Ocean to the east (Survey Area F in Figure 3). The second habitat is located south of the area described above and is loosely bounded to the west by Regulus Avenue, with the Atlantic Ocean to the east (Survey Area H in Figure 3).

No eastern glass lizards were observed during meandering surveys. Furthermore, a minimal amount of moderate eastern glass lizard habitat was observed at NASO DNA. The majority of grass-dominated areas at the installation were either fore dunes or in the interface between grassy areas and the forest edge where shallow water accumulates. Most grasses behind the fore dunes were in clumps, while the preferred habitat for this species is matted grasses. A small amount of appropriate habitat exists in the interface between the grassy areas behind the dunes and the edge of the forest in the northeastern-most corner of NASO DNA (Survey Area F in Figure 3). No appropriate habitat was found in Survey Areas G or I. During the field effort to assess potential eastern glass lizard habitat, field biologists discovered that few cover objects were present within the most suitable glass lizard survey area.

Despite the presence of moderately suitable eastern glass lizard habitat, current and historic disturbed conditions that exist throughout much of NASO DNA, as well as highly developed land use surrounding it, make it unlikely that eastern glass lizards occur there. Although there is a specimen in the Florida State Museum found in 1951 by an unknown collector that lists the collection site as “nr Norfolk” (Mitchell 1994), there are no confirmed records that indicate this lizard’s range ever extended this far north or west in Virginia. Furthermore, the closest known populations to NASO DNA—and only known locations in the state—are at BBNWR and False Cape State Park approximately 10 miles to the south. The area between NASO DNA and the known locations is highly developed, and the absence of vegetated corridors make it unlikely that individuals would be able to populate what limited suitable habitat occurs at NASO DNA.

5.1.4 Chicken Turtle

During the first trapping effort eight hoop net traps (six with leads or wings) were deployed on 5-6 May and removed on 6-8 May 2015. Each trap was set for 1-3 nights depending on location. A total of 73 turtles comprising five species were collected across all sites (Table 4). No chicken turtles were observed during this trapping effort.

Table 4. Turtle Trapping Results for NASO DNA, Virginia Beach, Virginia.

Site	No. of Traps	Total Trap Nights	Snapping Turtle	Painted Turtle	Stinkpot Turtle	Red-bellied Cooter	Yellow-bellied Slider	Total	Trap Rate ³
A1	1	2	2	0	0	3	2	7	3.5
A2	1	2	0	1	0	0	0	1	0.5
A3	1	2	1	1	0	0	0	2	1.0
A4	1	2	1	0	2	0	1	4	2.0
B1 ¹	2	6	0	13	10	0	10	33	5.5
C1	1	3	1	9	8	1	2	21	7.0
C2 ²	1	2	0	2	3	0	0	5	2.5
Total			5	26	23	4	15	73	

¹Note that one trap was moved from its original location at B1 (one trap night) to A1 (two trap nights).

²Note that one trap was moved from its original location at C2 (two trap nights) to A2 (one trap night).

³Number per trap night.

Painted turtles were the most abundant species detected with 26 individuals captured, followed by stinkpot turtles with 23 individuals captured. Fifteen yellow-bellied sliders were captured, while very few common snapping turtles (5) and red-bellied cooters (4) were captured.

The greatest number of species and number of individuals was captured at Pond C1. This pond had the greatest trap rate with 7.0 captures per trap night.

Of all trap sites at NASO DNA, none was associated with preferred chicken turtle habitat. This species requires ephemeral ponds, not the permanent ponds that occur at NASO DNA. They generally do not use altered landscapes, and the terrestrial habitat has been altered throughout NASO DNA.

5.2 MAMMALS

DSS surveys were completed between 21 November and 12 December 2014. Bat surveys were completed between 6 August and 8 August 2014. No target species were detected at NASO DNA. Incidental observations of non-target species are included in Appendix A and photographic documentation is provided in Appendix B. The following sections provide the results of mammal surveys at the installation.

5.2.1 Dismal Swamp Southeastern Shrew

A site reconnaissance to locate potential DSS shrew habitat was completed at NASO DNA in early November 2014. No old fields or other areas of early successional habitat, the prime habitat for southeastern shrews, were seen on the maps and in fact Dam Neck has no such habitats. Five potential sites were inspected during the reconnaissance and three were identified potentially supporting populations of Dismal Swamp southeastern shrews: each had suitable soils, adequate leaf litter, and did not appear to be subject to prolonged flooding. Two of these sites were selected as the best locations for study.

Trapping efforts were initiated on 21 November and continued through 12 December 2014. A total of 21 days of trapping were completed at NASO DNA. No specimens of small mammal were collected over the 21 days of trapping at the two forested sites at Dam Neck. Thus, the presence of the target species of this project was not confirmed.

Such results are not unexpected when a small number of grids is used in forested sites. Forests support fewer species overall than early successional habitats such as grassy old fields or those with much herbaceous vegetation and few shrubs or trees. Forests also support fewer individuals of the species that do occupy forests. Further, the catch rates for pitfall traps are low, often in the range of 1 or so specimen per 100 trap-nights; a trap-night is defined as one trap in place for one night. Because forests have low densities of small mammals, on the order of 10 per hectare, and pitfall traps have a low catch rate, the yield in forests often is a fraction of a specimen per 100 trap-nights.

If management plans at NASO DNA have the goal to increase biological diversity, then cutting blocks of forest at 4-7 year intervals and allowing natural regeneration of native plants would substantially enhance the diversity of plant communities and these plots in turn would promote the numbers and species of wildlife of all kinds, including small mammals.

5.2.2 Bat Mistnet Survey

Scouting efforts to identify suitable mist net sites were conducted on 6 August 2014, and mist netting began on 6 August and continued through 8 August 2014. A total of 21 bats representing three species were caught during these surveys (Table 5). Species captured included the eastern red bat (*Lasiurus borealis*), southeastern myotis (*Myotis austroriparius*), and evening bat (*Nyctecius humeralis*). There is a significant lack of diversity in the bat species identified during the survey. This could be due to any number of rationale, including the previously discussed WNS die-off, geographic location, or even moon phase.

Records for southeastern myotis occur in surrounding counties, but this species has not been documented in large numbers in southeastern Virginia. Eastern red bats are common throughout Virginia, and evening bats are common in the state’s lower elevations.

While not detected during this effort, another mist net survey completed at NASO DNA in 2015 identified the presence of Rafinesque’s big-eared bat (*Corynorhinus rafinesquii macrotis*) south of Site 3 location (Natural Resource Manager, NASO DNA, 14 January 2016). Details of this record the State endangered species will be available pending completion of that effort’s report in 2016.

Although all the habitats on site are generally high quality, with many standing dead trees and foraging areas, NASO DNA is located directly on the coast and generally has high levels of wind. Bats are generally not strong fliers, and the wind may drive individuals into the sheltered forests – or, there may be a relatively low number of bats present in the area overall.

Table 5. Mist Net Survey Results at NASO DNA, Virginia Beach, Virginia.

Site ID	Date ¹	Rafinesque’s Big-eared Bat	Eastern Red Bat	Southeastern Myotis	Evening Bat	Total Captures
1	8/6/14	-	6	-	-	6
2	8/7/14	-	13	-	1	14
3	8/8/14	-	-	1	-	1
Total		0	19	1	1	21

¹ Sampling periods proceeded past midnight and survey date refers to the date sampling began (e.g., a bat captured at 1 a.m. on 8/02/2014 in real time will be discussed as a bat caught at 1 a.m. on 8/01/2014 because sampling began around 8 p.m. on 8/01/2014).

5.3 BIRDS: PIPING PLOVER, RED KNOT, AND ROSEATE TERN

Three two-day survey events were conducted; 5-6 August 2014, 15-16 September 2014, and on 12 and 14 May 2015. Although no target species were observed during these efforts, two state threatened avian species listed by the VDGIF (VDGIF 2015a) were observed. A state threatened peregrine falcon (*Falco peregrinus*) was observed near point R1-9 during the May 2015 survey,

and state threatened gull-billed tern (*Gelochelidon nilotica*) was observed near point R1-6 during the August 2015 survey.

According to the VDGIF (VDGIF 2015b), the Virginia peregrine falcon population is heavily managed and not yet self-sustaining. Management recommendations include the repair, replacement and creation of new towers and nesting structures on the coast, parasite control and other actions as necessary to ensure the continued nesting success of Virginia's falcons and to maintain a stable coastal population. The peregrine falcon was not observed on NASO DNA during an avian species list study prepared in 2014 (Navy 2014a). The peregrine falcon observation was incidental for birds passing through the Virginia Beach area.

The gull-billed tern was not observed on NASO DNA during an avian species list study prepared by Tetra Tech in 2014, though it is listed on the checklist of birds likely to occur on the facility (Navy 2014a).

No piping plovers (*Charadrius melodus*) were observed during these surveys, or during surveys in conducted in 2010 or 2001; however, the Landing Craft Air Cushion (LCAC) Area of NASO DNA may contain suitable (though not-ideal) beach habitat. Piping plovers were observed in 2013 and 2014 during Navy staff and contractor surveying efforts at NASO DNA. In 2013 there was a pair of plovers in breeding plumage; however, after careful observation no nesting locations were identified. One plover was observed in 2014 that had been banded with its original banding location being Big Island. Again, additional survey efforts were conducted in 2014 that resulted in no nests being identified. It is recommended that yearly checks be conducted for piping plover during nesting season between late April and early August (Navy 2014a, Evans and Belden 2010, Alstine et al 2001).

Roseate tern (*Sterna dougallii dougallii*) was not observed on the facility during these surveys, or previous surveys in 2014 (Navy 2014a). Roseate terns nest on small barrier islands, in hollows or under dense vegetation, debris or rocks hidden from predators. They arrive in breeding areas on the Northeast coast at the end of April, and migrate south in August and September (USFWS 2011a). While potential habitat is present on the facility, it is not ideal, and this species is not likely to utilize the facility.

Red knot (*Calidris canutus rufa*) was not observed on the facility during these surveys. Red knots winter and migrate in large flocks, and require stopover habitats rich with food sources such as spawning invertebrates and juvenile shellfish (USFWS 2013). While potential habitat exists on the facility, it is not ideal, and red knot are not likely to utilize this facility.

The king rail and Virginia rail are considered imperiled (S2) in Virginia and were the focus of the R2 transect surveys. Point count locations were placed in likely habitats for recording the presence of rails on NASO DNA; however, no rails were observed or heard during the three survey seasons.

Other notable observations included immature bald eagles (*Haliaeetus leucocephalus*) fighting on the beach with an osprey (*Pandion haliaetus*). Bald eagles are protected under the Bald Eagle

Protection Act. The Act prohibits taking or possession of bald eagles or any parts including feathers, eggs, and nests.

There are 275 avian species listed as occurring or likely to occur on the facility (Navy 2014a). During the 2014-2015 surveys, 48 species were observed, 47 of which were documented on the previous NASO DNA bird list (Navy 2014a), and are listed in Appendix A.

5.4 INSECTS: BRIMLEY'S ASSASSIN BUG

Very little information is available concerning the distribution and biology of this secretive species, and only a handful of specimens have been collected or reported in the literature since this species was first described in 1926 (Blatchley 1926, Asquith 1992). According to available records, single specimens were collected in Raleigh, North Carolina in 1926; Vernon, Missouri in 1980; Baldwin, Alabama in 1994; Gainesville, Florida in 1966; Virginia Beach, Virginia in 1990; and Columbus, Texas in 1930 (Discover Life Global Mapper 2012, Asquith 1992).

During background research on the species, it was discovered that a single specimen of Brimley's assassin bug was collected in a pitfall trap placed in a grassy interdunal swale at NASO DNA by Dr. Kurt Buhlmann in September 1990 (personal communication, 15 October 2015). The unidentified specimen, along with many others collected during the 1990 field survey, was submitted to the Virginia Museum of Natural History in Martinsville, Virginia. These specimens were not prioritized and it wasn't until later (between 1992 and 2006) that Dr. Richard Hoffman at the Virginia Museum of Natural History identified one of them as Brimley's assassin bug. This finding extended the known range of this species 160 miles northeast of Raleigh, North Carolina (Hoffman 2006). This insect is listed as a species of special concern in the Mid-Atlantic Coastal Plain Focal Area (USFWS 2012b), and is globally ranked G2, and state ranked S1S3 (VDCR-DNH 2013).

The findings show that the Brimley's assassin bug was documented on the facility. Although this finding should be considered an historical record, it is recommended that this species be added to the NASO DNA INRMP, and that future surveys for this species be conducted on NASO DNA. While the 1990 surveys that resulted in capture of the assassin bug were focused on the southern section of NASO DNA, future surveys should target all grassy, interdunal areas of NASO DNA. According to the NASO DNA natural heritage report from 2010, crews surveyed for the Brimley's assassin bug at the northern end of NASO DNA via sweeping vegetation, which involves inspecting flowers with the aid of forceps or a respirator. However, no specimens of Brimley's assassin bug were collected (Evans and Belden 2010). As such, future survey methods should include a combination of sweeping and pitfall trap methods.

5.5 PLANTS AND SIGNIFICANT COMMUNITIES

Two, three-day meander surveys were conducted at different times of the growing season to facilitate identification of the target species: 17, 23, 24 September 2014, and 20-22 April 2015. (Figure 7). Survey areas and periods were selected to target species that would be flowering or

identifiable during the appropriate times, though as much prime habitat as possible was covered during each survey. One targeted plant, Florida thoroughwort¹, was found, and two non-target species, beach pinweed (*Lechea maritima*) and tall horned beaksedge (*Rhynchospora macrostachya*) were observed (Figure 8a and 8b). Beach pinweed and horned beaksedge are considered vulnerable and tracked by DCR-DNH (Towsend 2015). Incidental observations of non-target species are included in Appendix A.

5.5.1 Target Plant Species: Virginia Least Trillium, Blue Witch Grass, Long Beach Seedbox, and Florida Thoroughwort

Seabeach amaranth is a federally threatened plant species that has the potential to occur at NASO DNA, based on the presence of suitable habitat; however, no federally listed plants were identified at NASO DNA. Seabeach amaranth is an annual plant that grows on sandy beaches along the Mid-Atlantic coast of the U.S. (USFWS 2003). Between 2001 and 2005 populations identified from Maryland and Virginia steadily declined due to habitat destruction, poor timing of beach nourishment projects, beach raking, and outdoor recreational vehicle use (USFWS 2007a). In 2001, nine plants were found on the portion of Assateague Island that lies in Virginia, which is approximately 90 miles northeast of NASO DNA.

No occurrences of Virginia least trillium were found during the spring surveys in 2015. The meander surveys in mid-April targeted trillium during its peak season. Given the regional distribution occurring in Virginia Beach, along with the habitat preference of hummocks and bottomland hardwood forests dominated by red maple and tulip poplar, the South Parcel and Camp Pendleton Annex locations were considered suitable habitat. The Digital Atlas of Virginia Flora indicates that the Virginia least trillium occurs in Virginia Beach. However, surveys revealed no observations of Virginia least trillium.

No occurrences of blue witch grass or long beach seedbox were observed in the September 2014 surveys. The meander surveys included the preferred habitats of interdunal swales, wet flatwoods, ditches, and borrow ponds on NSAO DNA. A 2010 Virginia Natural Heritage Program study (Evans and Belden 2010) reported the presence of long beach seedbox (S2); the small colony (0.01 ha) was being encroached by common reed. The 2010 location of long beach seedbox was searched in September 2014 and found to be covered in common reed, which eliminated other species. The installation contracted a common reed removal effort that started in the fall of 2014 in this area (and elsewhere on the installation).

Florida thoroughwort was found on NASO DNA during the fall survey of 2014 (Figure 8a and 8b). The target species is considered a federal Species of Concern. While it is not listed on Virginia's 2015 list of rare plants (Towsend 2015), NatureServe lists it as critically imperiled (S1) in Virginia, known to inhabit wet depressional dunes and savannahs (NatureServe 2015). Location of the targeted species included low lying wet depressions and margins between access

¹ Digital Atlas of the Virginia Flora, <http://vaplantatlas.org/index.php?do=plant&plant=2066>

roads and adjacent dunes, on the transition from scrub shrub to dune and intertidal swale habitats.

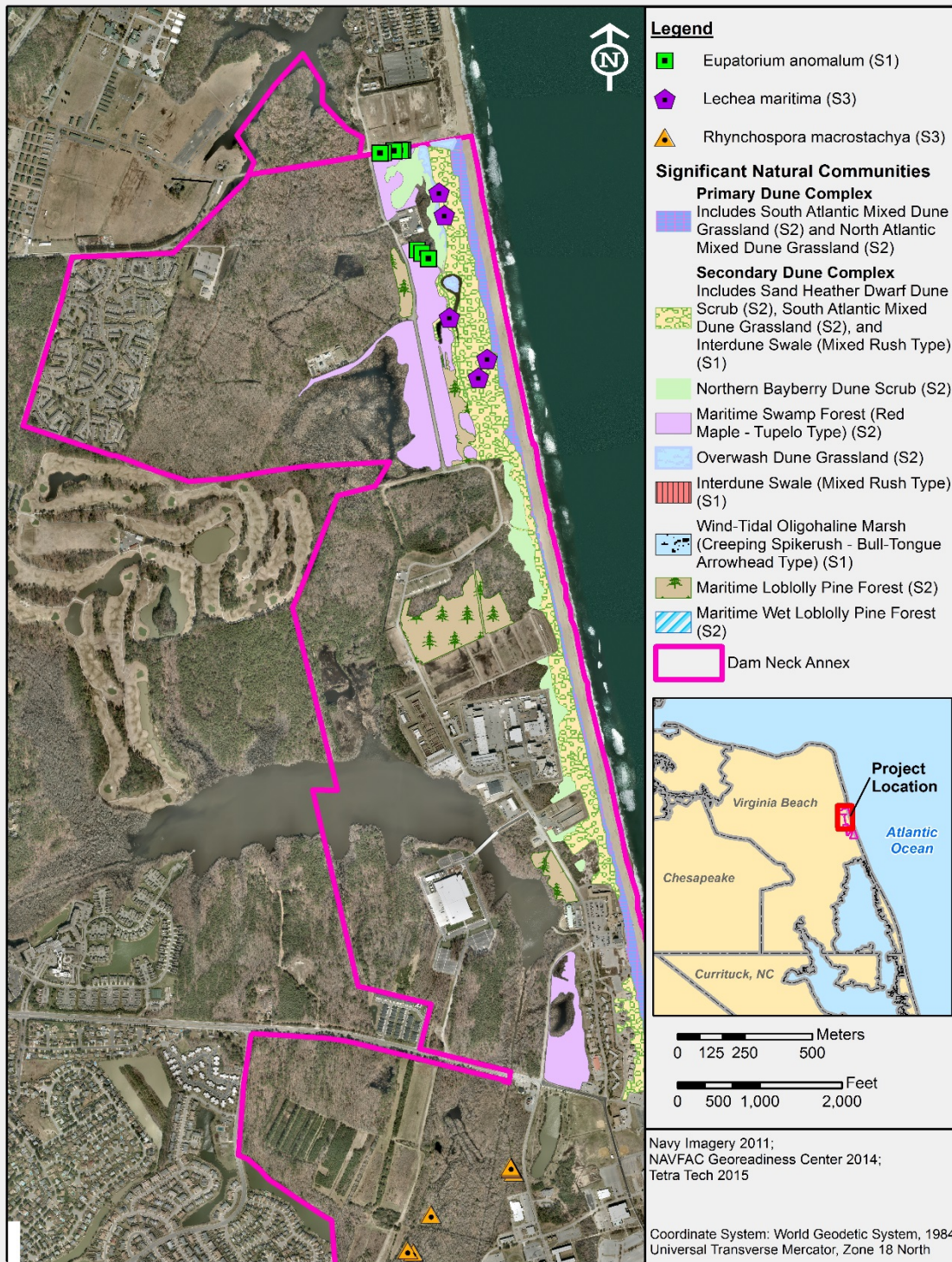


Figure 8a. Plant Survey Results - North, NASO DNA, Virginia Beach, Virginia.

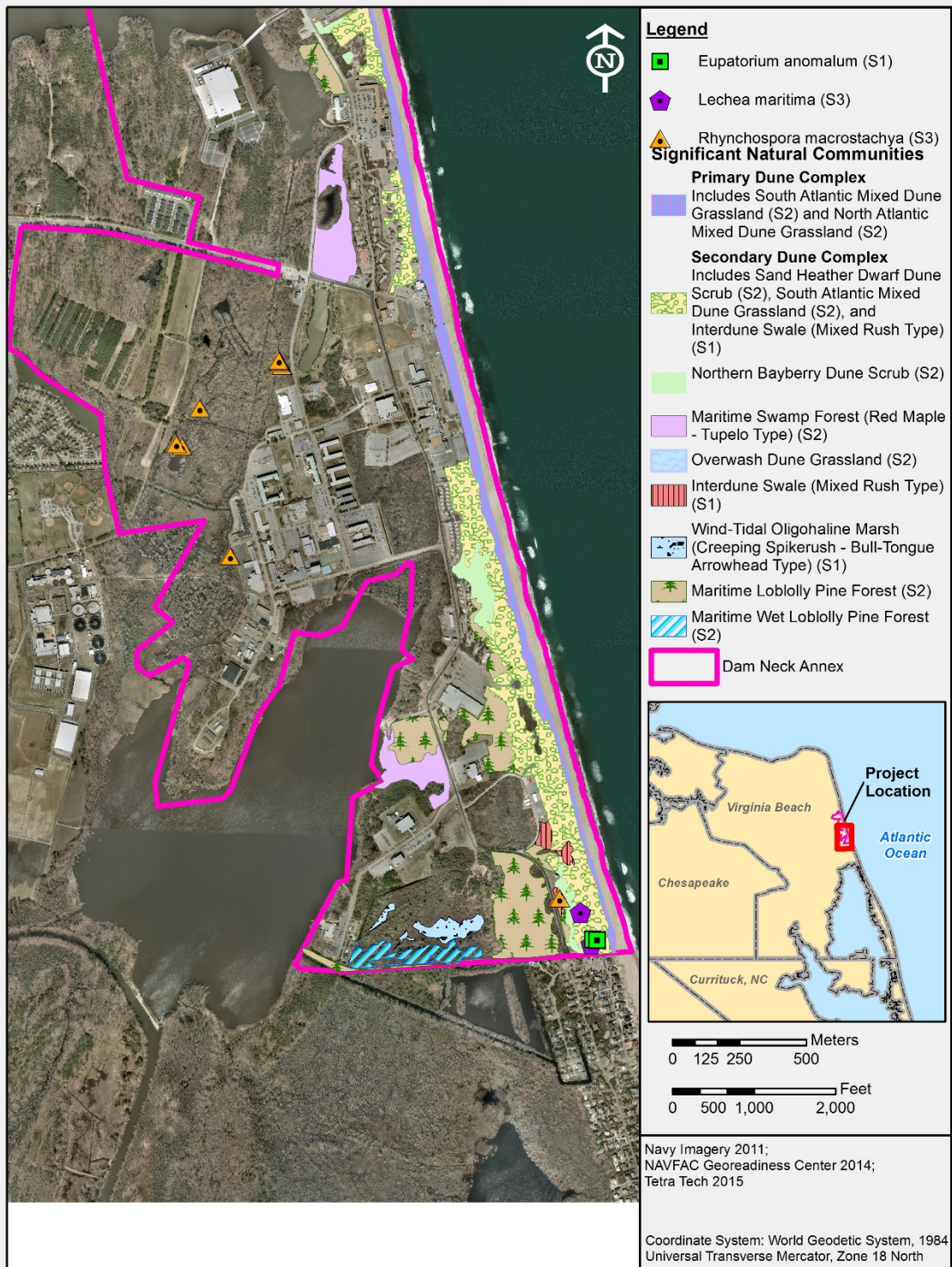


Figure 8b. Plant Survey Results - South, NASO DNA, Virginia Beach, Virginia.

5.5.2 Non-Target Plant Species: Beech Pinweed and Tall Horned Beaksedge

Scattered plants of beach pinweed were observed in the secondary sand dunes, Beach-heather Dune Shrubland community, where large patches of sparsely vegetated or unvegetated sand are common at NASO DNA. This community is locally common on coastal dunes from New Jersey to northern North Carolina. Associated plants included *Hudsonia tomentosa*, *Morella pensylvanica*, *Morella cerifera*, *Schizachyrium littorale*, *Ammophila breviligulata*, and *Panicum amarum*.

Individual plants and small clumps of tall horned beaksedge were observed (Figure 8a and 8b) in the Bald Cypress Swamp community type at NASO DNA. One community was mapped on the eastern portion of NASO DNA, an emergent wetland between an access road and a scrub shrub dune. Tall horned beaksedge is on the Watch List Species List (S3) for the Virginia Natural Heritage Program (Townsend 2015). The seasonally to semipermanently flooded swamp forests occur throughout the Coastal Plain from Delaware south to Florida. Associated plants included *Persicaria arifolia*, *Juncus canadensis*, *Scirpus cyperinus*, *Taxodium distichum*, and *Acer rubrum*. A 2010 Virginia Natural Heritage Program study (Evans and Belden 2010) reported the presence of tall horned beakrush (S3).

5.5.3 Significant Natural Communities

There are 12 significant communities (S1-S3 ranks) at NASO DNA (Table 6). The communities are represented in six ecological systems. Brief descriptions of each community from *Nature Serve Explorer* (NatureServe 2015) are presented below.

The Northern Bayberry Dune Scrub community occupies the intermediate areas between the very unstable oceanward portions of the dunes and the more protected backdunes, where it forms partially open to dense shrub thickets. The Sand Heather Dwarf Dune Scrub community is a maritime beach heather community of mid-Atlantic sand dunes and is locally common on coastal dunes from New Jersey to northern North Carolina. The South Atlantic Mixed Dune Grassland consists primarily of grasslands and related shrublands of Atlantic Coastal Plain barrier islands and related coastal areas from Virginia south to northern and central Florida.

The North Atlantic Mixed Dune Grassland community is a maritime dune grassland from southern New Jersey (Cape May) south to the Chesapeake Bay, Virginia, as well as on the northern North Carolina coast. The Maritime Swamp Forest community is a forested basin swamp of dune swales on barrier islands and other mid-Atlantic coastal areas. The Overwash Dune Grassland community is an upland dune grassland or overwash area of Atlantic barrier islands on dunes or back sides of beaches forming from wave-deposited sand during spring tides or storms. The Interdune Swale community occurs in small, shallow, saturated depressions of the Eastern Shore of Maryland and Virginia. The North Atlantic Upper Beach/Overwash Flat community is a sparsely vegetated upper beach community occurring on unstable sands and often gravels and cobbles just above mean high tide on maritime beaches and foredunes along the middle and northern Atlantic Coast. The Wind-Tidal Oligohaline Marsh community of Maryland, Virginia, and North Carolina occurs on the interior of extensive marshes, well away from tidal channels or guts and is inundated primarily by wind tides and, less commonly, lunar tides.

The Maritime Loblolly Pine Forest community occurs on the Outer Coastal Plain and on barrier islands in sheltered backdunes protected from salt spray and overwash. The Maritime Wet Loblolly Pine Forest community occurs in backdune depressions with high water tables and fringing estuaries from Delaware to North Carolina. The Coastal Plain/Piedmont Floodplain Swamp community of the Mid-Atlantic Coastal Plain of the Chesapeake Bay and Piedmont regions occurs on poorly drained to very poorly drained soils on flats and along watercourses that are seasonally to semipermanently flooded.

Table 6. Significant Natural Communities at NASO DNA, Virginia Beach, Virginia.

Ecological System	Common Name	State Rank
Northern Atlantic Coastal Plain Dune and Swale	Northern Bayberry Dune Scrub	S2
Northern Atlantic Coastal Plain Dune and Swale	Sand Heather Dwarf Dune Scrub	S2
Southern Atlantic Coastal Plain Dune and Maritime Grassland	South Atlantic Mixed Dune Grassland	S2
Northern Atlantic Coastal Plain Dune and Swale	North Atlantic Mixed Dune Grassland	S2
Central Atlantic Coastal Plain Maritime Forest	Maritime Swamp Forest (Red Maple - Tupelo Type)	S2
Northern Atlantic Coastal Plain Dune and Swale	Overwash Dune Grassland	S2
Northern Atlantic Coastal Plain Dune and Swale	Interdune Swale (Mixed Rush Type)	S1
Central Atlantic Coastal Plain Sandy Beach	North Atlantic Upper Beach/Overwash Flat	S3
Atlantic Coastal Plain Embayed Region Tidal Freshwater Marsh	Wind-Tidal Oligohaline Marsh (Creeping Spikerush - Bull-Tongue Arrowhead Type)	S1
Northern Atlantic Coastal Plain Maritime Forest	Maritime Loblolly Pine Forest	S2
Central Atlantic Coastal Plain Maritime Forest	Maritime Wet Loblolly Pine Forest	S2
Northern Atlantic Coastal Plain Basin Swamp and Wet Hardwood Forest	Coastal Plain/Piedmont Floodplain Swamp (Green Ash - Red Maple Type)	S3/S4

6.0 SPECIAL INTEREST AREA BACKGROUND AND RECOMMENDATIONS

Because of the intense level of development in the region, NASO DNA and the other coastal military installations with large areas of undeveloped land are extremely important to the region's ecology. These installations, along with First Landing State Park (formerly Seashore State Park) to the north and BBNWR and False Cape State Park to the south, support the few remaining tracts of undeveloped dune ecosystems along the southeastern Virginia coast. NASO DNA contains approximately 4.0 continuous mi (6.4 km) of primary and secondary coastal dune habitat.

Previous natural heritage surveys resulted in the establishment of six ecologically significant areas at NASO DNA (VDCR-DNH 1990 and Buhlmann et. al. 1992). This section provides a brief overview of these ecologically significant areas—collectively referred to as SIAs—and provides descriptions of proposed modifications to their current boundaries as well as recommendations for additional protection areas. Base on a review of historic information and data gathered during this study, a modification to one existing SIA and the addition of two SIAs are recommended (Figure 9).

6.1.1 Existing Special Interest Areas

In 1990 at the request of the Navy, DCR-DNH conducted rare, threatened and endangered species surveys at Camp Pendleton (VDCR-DNH 1990). In the resultant report, DCR-DNH biologists identified and described two ecologically significant areas at NASO DNA referred to as Dune and Swale SIA and Lovetts Marsh SIA. The report for a similar survey of the rest of NASO DNA in 1992 provided recommendations to extend both the Dune and Swale SIA and Lovetts Marsh SIA south and described four additional SIAs, Helicopter Pad Wetlands, Southeast Redwing Lake Wetlands, Interdunal Swale, Dune and Freshwater Marsh, and Middle Beach Dunes (Buhlmann et. al. 1992) (Figure 9). Subsequent natural heritage survey reports maintained root names of these protection areas but alternated referring to them as resource protection areas or conservation sites.

DCR-DNH tracks conservation sites via their Land Conservation database and makes the data available through a subscription service to licensed public and private partners of the Virginia Natural Heritage Program (VDCR 2013). DCR-DNH describes conservation sites as follows:

“Conservation sites are a tool for representing key areas of the landscape worthy of protection and stewardship action because of the natural heritage resources and habitat they support. Terrestrial conservation sites are boundaries that contain one or more rare plant, animal or natural community. Sites are designed to include the element and, where possible, its associated habitat and buffer or other adjacent land needed for the element's conservation.”

The following sections describe each of the existing SIAs at NASO DNA. Descriptions of each area are taken from the most recent installation INRMP (Navy 2014). Additional information including management recommendations for each SIA can be found in the INRMP as well.

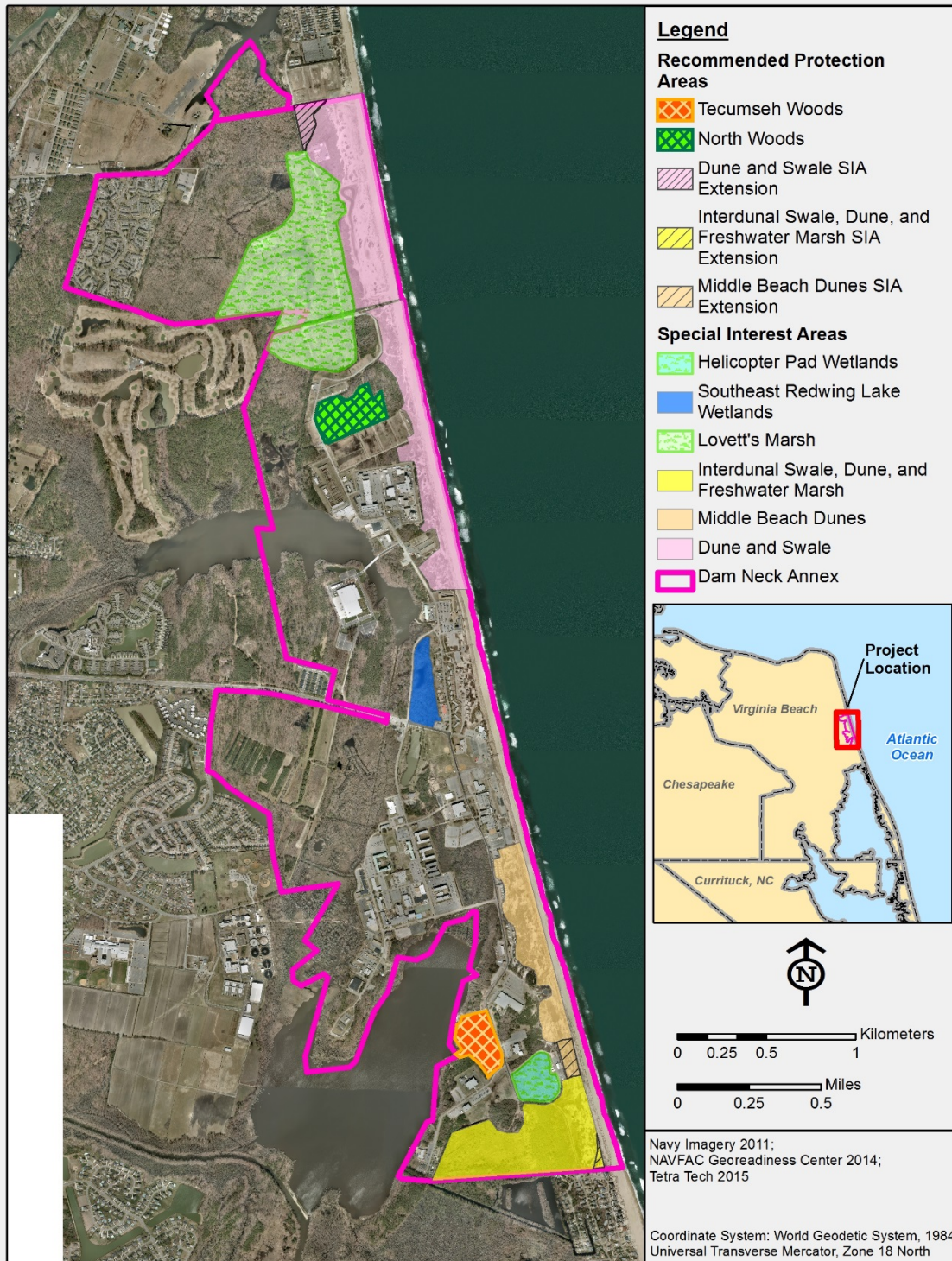


Figure 9. Special Interest Areas and Recommended Protection Areas at NASO DNA, Virginia Beach, Virginia.

Dune and Swale Special Interest Area

The Dune and Swale SIA at NASO DNA contains the Installation's most significant maritime forest community, a small interdunal swale, and includes a number of sensitive plant species, including bluejack oak, American halfchaff sedge, Long Beach primrose-willow, fasciculate beaksedge, and early white-top fleabane. Bluejack oak, Long Beach primrose-willow, and early white-top fleabane are both imperiled (S2) and fasciculate beaksedge and American halfchaff sedge are critically imperiled (S1) in Virginia (Townsend 2015). The current extent encompasses approximately 135 ac (54 ha), and consists of an approximately 1.75-mi (1.2-km) long, approximately 0.2-mi (0.3 km) wide section of beach, dunes, and interdune. An interdune pond, which is a significant natural community, occurs immediately south of the Marine Air Control Squadron 24 radar station. The pond, although apparently altered by dredging and impoundment by a road, supports an interesting assemblage of native vascular plant species.

During the 2014-2015 plant surveys, several occurrences of Florida thoroughwort were documented just outside the SIA boundary at the northern end of the SIA (Figure 8a). Similarly, a portion of an imperiled natural community, Maritime Swamp Forest (Red Maple – Tupelo Type) (S2) extends north to this location as well. Therefore, it is recommended that the boundary of the Dune Swale SIA is extended west to Regulus Avenue at its north end in order to encompass this population of Florida thoroughwort and the section of Maritime Swamp Forest (Figure 9).

Lovetts Marsh Special Interest Area

The Lovetts Marsh SIA is approximately 124 ac (50 ha) and contains what remains of an isolated emergent marsh documented on 1891 topographic maps as the only site of its kind from Cape Henry to the North Carolina border. The VDCR-DNH report (Van Alstine et al. 2001) states that open areas of marsh were evident on aerial photographs as late as 1965, and that later ditching and development lowered the water table, increased the drainage rate, and resulted in the succession from open marsh to forested wetland. State-rare plants fasciculate beaksedge and saltmarsh umbrella-sedge as well as a significant interdune pond community also have been reported to occur within the boundaries of this SIA (Van Alstine et al. 2001). The boundary of the SIA includes the significant community, rare plants, and the surrounding buffer area needed to protect the hydrology of the site.

Southeast Redwing Lake Wetlands Special Interest Area

The Southeast Redwing Lake Wetlands SIA provides habitat for the greater siren, a former state watch list species and a Tier IV (Moderate Conservation Need) species identified in the Virginia State Wildlife Action Plan (SWAP).

Middle Beach Dunes Special Interest Area

The Middle Beach Dunes SIA encompasses an extensive area of vegetated primary and secondary dunes and areas of interdunal swale wetlands. The dune system in this protected area is relatively undisturbed and supports a large area of maritime dune woodland, which is considered a significant natural community by the VDCR-DNH.

Helicopter Pad Wetlands Special Interest Area

The Helicopter Pad Wetlands SIA was designed to protect a wetland community that contains American spongeplant and greater siren habitat. The greater siren is currently a Tier IV (Moderate Conservation Need) species in the Virginia SWAP, and is a former state watch list species. The American spongeplant is no longer tracked by the VDCR-DNH; however, it is in the Navy's best interest to continue to protect the habitats of these fairly rare species in order to maintain their current population levels and prevent them from becoming state or federally protected.

Interdunal Swale, Dune, and Freshwater Marsh Special Interest Area

The Interdunal Swale, Dune, and Freshwater Marsh SIA in the southern portion of NASO DNA contains the most significant example of interdunal swale wetlands at the installation. Although this swale is bisected by Regulus Avenue and has been partially filled, it is a unique habitat type that supports two state-rare plant species: the early white-top fleabane, imperiled (S2), and fasciculate beaksedge, critically imperiled (S1). The swale wetland and its unique vegetation extend to the west side of Regulus Avenue to an area that was planted with loblolly pines during the 1970s.

6.1.2 Proposed Special Interest Areas

Analysis of the locations of rare species and significant natural communities indicates that a majority of these sensitive resources occur within the boundary of an existing SIA. However, approximately five small to medium-sized tracts of forest that are classified as Loblolly Maritime Pine Forest do not (Figure 8a and 8b). Maritime Pine Forest communities are considered Imperiled (S2) and for this reason, the two most extensive occurrences of this natural community at NASO DNA are recommended for protection (Figure 9). These areas are referred to as Tecumseh Woods and North Woods SIAs.

Furthermore, the boundary of three existing SIAs were extended to include relatively small but contiguous areas of similar habitat. It appears that small areas were arbitrarily excluded from the original SIA boundaries during the mapping process. These areas are identified as Dune and Swale SIA Extension, Interdunal Swale, Dune, and Freshwater Marsh SIA Extension, and Middle Beach Dunes SIA Extension in Figure 9.

7.0 CONCLUSION

The purpose of this study was to conduct field surveys to determine the presence of state or federally listed threatened or endangered species, or species of concern that may occur at NASO DNA and Camp Pendleton and to review existing ecological significant area designations and identify the need for modifications. This Project is a continuation of other natural heritage surveys conducted approximately 5 and 15 years prior and is part of the Navy's program for the conservation of endangered and threatened species on its properties.

The overall project objectives were met through the successful implementation of field surveys to document the presence of state and federally listed threatened or endangered species, or rare species with the potential for occurring at the installations. In summary, two state listed threatened species, one targeted species, and two rare species were documented across the installation. These include two state listed threatened birds (peregrine falcon and gull billed turn), one targeted state listed critically imperiled plant (Florida thoroughwort), and two rare plant species (beach pinweed and tall horned beaksedge). In addition, 12 significant ecological communities were identified at NASO DNA and their locations mapped. Finally, a review of the installation's ecologically significant areas was completed and recommendations provided that include modifications to an existing SIA as well as the addition of two new SIAs at NASO DNA.

The results and recommendations presented herein provide a better understanding of the sensitive species that inhabit these installations, knowledge that is critical for guiding habitat management decisions, and guidance towards improving natural resource inventories. This information will be used to contribute to management plans designed to provide a sustainable, integrated management strategies for sensitive species support of the Navy's mission of ensuring healthy lands for long-term use of installations for military training and readiness activities.

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APPENDIX A

Project Species List

Fauna and Flora Observed at NASO DNA (2014-2015), Virginia.

Common Name	Scientific Name
Amphibians and Reptiles	
<i>Salamanders</i>	
Slimy salamander	<i>Plethodon chlorobryonis</i>
<i>Frogs and Toads</i>	
American bull frog	<i>Lithobates catesbeianus</i>
Easter narrow-mouthed toad	<i>Gastrophryne carolinensis</i>
Green treefrog	<i>Hyla cinerea</i>
Northern green frog	<i>Lithobates clamitans</i>
Pickerel frog	<i>Lithobates palustris</i>
Pine woods treefrog	<i>Hyla femoralis</i>
Southern leopard frog	<i>Lithobates sphenoccephalus</i>
Southern toad	<i>Anaxyrus terrestris</i>
Squirrel treefrog	<i>Hyla squirella</i>
<i>Lizards</i>	
Southeastern Five-lined skink	<i>Plestiodon inexpectatus</i>
<i>Snakes</i>	
Black racer	<i>Coluber constrictor</i>
Eastern kingsnake	<i>Lampropeltis getula</i>
Eastern worm snake	<i>Carphophis amoenus</i>
Red-bellied watersnake	<i>Nerodia erythrogaster</i>
<i>Turtles</i>	
Eastern box turtle	<i>Terrapene carolina carolina</i>
Eastern mud turtle	<i>Kinosternon subrubrum</i>
Eastern painted turtle	<i>Chrysemys picta</i>
Musk turtle	<i>Sternotherus odoratus</i>
Red-bellied cooter	<i>Pseudemys rubriventris</i>
Snapping turtle	<i>Chelydra serpentina</i>
Yellow-bellied slider	<i>Trachemys scripta scripta</i>
Mammals	
Eastern red bat	<i>Lasiurus borealis</i>
Evening bat	<i>Nyctecius humeralis</i>
Southeastern myotis	<i>Myotis austroriparius</i>
Birds	
Bald eagle	<i>Haliaeetus leucocephalus</i>
Black backed gull	<i>Larus fuscus</i>
Black skimmer	<i>Rynchops niger</i>
Brown pelican	<i>Pelecanus occidentalis</i>
Brown thrasher	<i>Toxostoma rufum</i>
Canada goose	<i>Branta canadensis</i>
Cardinal	<i>Cardinalis cardinalis</i>

Common Name	Scientific Name
Carolina chickadee	<i>Poecile carolinensis</i>
Chimney swift	<i>Chaetura pelagica</i>
Common crow	<i>Corvus brachyrhynchos</i>
Common grackle	<i>Quiscalus quiscula</i>
Common tern	<i>Sterna hirundo</i>
Double crested cormorant	<i>Phalacrocorax auritus</i>
Downey woodpecker	<i>Picoides pubescens</i>
Forester's tern	<i>Sterna forsteri</i>
Glossy ibis	<i>Plegadis falcinellus</i>
Great blue heron	<i>Ardea herodias</i>
Great egret	<i>Ardea alba</i>
Green heron	<i>Butorides virescens</i>
Gull-billed tern	<i>Gelochelidon nilotica</i>
Hairy woodpecker	<i>Leuconotopicus villosus</i>
Herring gull	<i>Larus smithsonianus</i>
Laughing gull	<i>Leucophaeus atricilla</i>
Least sandpiper	<i>Calidris minutilla</i>
Least tern	<i>Sternula antillarum</i>
Long billed dowitcher	<i>Limnodromus scolopaceus</i>
Mallard	<i>Anas platyrhynchos</i>
Osprey	<i>Pandion haliaetus</i>
Peregrine falcon	<i>Falco peregrinus</i>
Pie billed grebe	<i>Podilymbus podiceps</i>
Pileated woodpecker	<i>Hylatomus pileatus</i>
Pileated woodpecker	<i>Hylatomus pileatus</i>
Purple martin	<i>Progne subis</i>
Red bellied woodpecker	<i>Melanerpes carolinus</i>
Red breasted murganser	<i>Mergus serrator</i>
Ring billed gull	<i>Larus delawarensis</i>
Robin	<i>Turdus migratorius</i>
Rock dove	<i>Columba livia</i>
Royal tern	<i>Thalasseus maximus</i>
Ruby throated hummingbird	<i>Archilochus colubris</i>
Ruddy turnstone	<i>Arenaria interpres</i>
Sanderling	<i>Calidris alba</i>
Semi palmated plover	<i>Charadrius semipalmatus</i>
Semi palmated sandpiper	<i>Calidris pusilla</i>
Spotted sandpiper	<i>Actitis macularius</i>
Virginia rail	<i>Rallus limicola</i>
Whimbrel	<i>Numenius phaeopus</i>
Willet	<i>Tringa semipalmata</i>
Yellow shafted flicker	<i>Colaptes auratus auratus</i>

Common Name	Scientific Name
Plants	
Red maple	<i>Acer rubrum</i>
Green dragon	<i>Arisaema dracontium</i>
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>
Giant cane	<i>Arundinaria gigantea</i>
Asiatic sand sedge	<i>Carex kobomugi</i>
Centella	<i>Centella asiatica</i>
Florida thoroughwort	<i>Eupatorium anomalum</i>
Manyflower marshpennywort	<i>Hydrocotyle umbellata</i>
Canada rush	<i>Juncus canadensis</i>
Beach pinweed	<i>Lechea maritima</i>
Sweetgum	<i>Liquidambar styraciflua</i>
Southern twayblade	<i>Listera australis</i>
Marsh seedbox	<i>Ludwigia palustris</i>
creeping primrose-willow	<i>Ludwigia repens</i>
Asian dayflower	<i>Murdannia keisak</i>
Blackgum	<i>Nyssa sylvatica</i>
Halberd-leaf tearthumb	<i>Persicaria arifolia</i>
Longleaf pine	<i>Pinus palustris</i>
Pond pine	<i>Pinus serotina</i>
Loblolly pine	<i>Pinus taeda</i>
Common reed	<i>Phragmites australis</i>
Mayapple	<i>Podophyllum peltatum</i>
Tall horned beaksedge	<i>Rhynchospora macrostachya</i>
Woolgrass	<i>Scirpus cyperinus</i>
Bald cypress	<i>Taxodium distichum</i>
Poison ivy	<i>Toxicodendron radicans</i>
Highbush blueberry	<i>Vaccinium corymbosum</i>

APPENDIX B

Photographic Log

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: Northern Long-eared Bat Investigation
Mist Net Survey



Photographer: P. Green
Date: 08/06/2014
Photo No.: 1
Direction: N
Comments: Site 1 Net A



Photographer: P. Green
Date: 08/06/2014
Photo No.: 2
Direction: S
Comments: Site 1 Net A

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: NASO DNA
Mist Net Survey



Photographer: P. Green
Date: 08/06/2014
Photo No.: 3
Direction: N
Comments: Site 1 Net B



Photographer: P. Green
Date: 08/06/2014
Photo No.: 4
Direction: S
Comments: Site 1 Net B

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: NASO DNA
Mist Net Survey



Photographer: P. Green
Date: 08/06/2014
Photo No.: 5
Direction: W
Comments: Site 1 Net C



Photographer: P. Green
Date: 08/06/2014
Photo No.: 6
Direction: E
Comments: Site 1 Net C

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: NASO DNA
Mist Net Survey



Photographer: P. Green
Date: 08/07/2014
Photo No.: 7
Direction: W
Comments: Site 2 Net A



Photographer: P. Green
Date: 08/07/2014
Photo No.: 8
Direction: E
Comments: Site 2 Net A

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: NASO DNA
Mist Net Survey



Photographer: P. Green
Date: 08/07/2014
Photo No.: 9
Direction: E
Comments: Site 2 Net B



Photographer: P. Green
Date: 08/07/2014
Photo No.: 10
Direction: W
Comments: Site 2 Net B

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: NASO DNA
Mist Net Survey



Photographer: P. Green
Date: 08/07/2014
Photo No.: 11
Direction: E
Comments: Site 2 Net C



Photographer: P. Green
Date: 08/07/2014
Photo No.: 12
Direction: W
Comments: Site 2 Net C

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: NASO DNA
Mist Net Survey



Photographer: P. Green
Date: 08/08/2014
Photo No.: 13
Direction: S
Comments: Site 3 Net A



Photographer: P. Green
Date: 08/08/2014
Photo No.: 14
Direction: N
Comments: Site 3 Net A

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: NASO DNA
Mist Net Survey



Photographer: P. Green
Date: 08/08/2014
Photo No.: 15
Direction: S
Comments: Site 3 Net B



Photographer: P. Green
Date: 08/08/2014
Photo No.: 16
Direction: N
Comments: Site 3 Net B

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: NASO DNA
Mist Net Survey



Photographer: P. Green
Date: 08/08/2014
Photo No.: 17
Direction: E
Comments: Site 3 Net C



Photographer: P. Green
Date: 08/08/2014
Photo No.: 18
Direction: W
Comments: Site 3 Net C

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: NASO DNA
Mist Net Survey



Photographer: P. Green
Date: 08/07/2014
Photo No.: 19
Direction: N

Comments: Male eastern red bat (*Lasiurus borealis*) caught during surveys. This is a non-reproductive juvenile male.



Photographer: P. Green
Date: 08/07/2014
Photo No.: 20
Direction: S

Comments: Female eastern red bat caught during surveys. This is a non-reproductive juvenile female.

PHOTOGRAPHIC LOG

Company: U.S. Navy
Project: NASO DNA
Mist Net Survey



Photographer: P. Green
Date: 08/07/2014
Photo No.: 21
Direction: N

Comments: Male evening bat (*Nycticeus humeralis*) caught during surveys. This is a non-reproductive juvenile male.



Photographer: P. Green
Date: 08/08/2014
Photo No.: 22
Direction: S

Comments: Male southeastern myotis (*Myotis austroriparius*) caught during surveys. This is a non-reproductive juvenile male.

APPENDIX C

Field Data

Barking Treefrog survey for May 12, 2015 at CDSA Dam Neck

Kory Steele

Notes for each site are included on the second page.

Site #	01	03	05	06	07	08	11	12	13	14	22
Wind Scale	1	0	2	1	0	2	1		2	1	2
Sky Code	1	1	1	0	1	1	1		1	1	1
Air Temperature (F)	80	79	81	76	78	77	77		77	77	76
Time	8:55	9:14	8:33	10:45	9:34	9:43	9:53		10:11	10:01	10:21
Species	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index
<i>Anaxyrus terrestris</i> Southern Toad		3								3	2
<i>Gastrophryne carolinensis</i> Eastern Narrow-mouthed Toad			1								
<i>Hyla cinerea</i> Green Treefrog	2	3	3	2	2					2	
<i>Hyla femoralis</i> Pinewoods Treefrog									1		
<i>Hyla squirella</i> Squirrel Treefrog					2		2		1		3
<i>Lithobates catesbeianus</i> American Bullfrog		1	1								
<i>Lithobates clamitans</i> Green Frog	1			1							
<i>Lithobates sphenoccephalus</i> Southern Leopard Frog	1		2	1					1		1
<i>Lithobates palustris</i> Pickerel Frog				1			1		2		
No species heard calling						0		NA			
Noise Interference:	Road Traffic				Building HVAC						

Comments:

01) None

03) None

05) More frogs were calling from the adjacent pond than the wetland. Frogs were calling from approximately 100 feet away in the wetland.

06) A strong Southern Toad chorus heard across Terrier Ave to the west. Nesting Yellowbelly Slider and roadkilled cottonmouth found near the monitoring point (floating dock).

07) None

08) No frogs calling. Water depth ~6 inches, plenty of graminoid growth. Southern Leopard frog observed in wetland.

11) None

12) Regulus Ave was closed to traffic. Site was not accessible.

13) A strong Green Treefrog chorus heard to the southwest.

14) Calls were relatively distant, most frogs were >100ft away from the road.

22) New site added opportunistically based audible chorus from 400 ft away and easy access.

General: May 12, 2015 was an unusually hot day, and this altered the species composition of the frog choruses. The conditions were in line with acceptable weather for breeding frogs, including the Barking Treefrog. This is support by species composition mostly consisted of typically summer breeders.

Weather

Prior to the survey: 0.47 inches of precipitation fell in the morning. A strong storm was forecasted, as of 5:30pm on the day of the survey, to hit the installation around 7 pm. However, no precipitation occurred during the survey. The high temperature for the day was 95.2F, low temperature around 69.6F. Lightening was persistent over the ocean.

Barking Treefrog survey for June 2, 2015 at CDSA Dam Neck

Kory Steele

Notes for each site are included on the second page.

Site #	01	03	05	06	07	08	11	12	13	14	22
Wind Scale	1	2	3	1	3	2	2		3	2	2
Sky Code	2	2	2	2	2	2	2		2	2	2
Air Temperature (F)	70.3	70.3	69.8	72.1	65.1	65.1	70.3		68.1	67.8	68.1
Time	9:25	9:15	8:47	10:41	9:42	9:52	10:02		10:16	10:09	10:26
Species	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index	Calling Index
<i>Anaxyrus terrestris</i> Southern Toad					2		1			1	1
<i>Gastrophryne carolinensis</i> Eastern Narrow-mouthed Toad					1		2				
<i>Hyla cinerea</i> Green Treefrog		2	2	3	2					2	3
<i>Hyla femoralis</i> Pinewoods Treefrog									1		
<i>Hyla squirella</i> Squirrel Treefrog					2		3				3
<i>Lithobates catesbeianus</i> American Bullfrog	1		1								
<i>Lithobates clamitans melanota</i> Northern Green Frog	1	1									
No species heard calling						0		0			
Noise Interference:										Surf from nearby ocean	

Comments:

01) None

03) None

05) More frogs were calling from the adjacent pond than the wetland. Frogs are calling from approximately 100 feet away in the wetland.

06) None

07) Minnows and a medium sized snapping turtle were observed in the water. Toad calling could possibly be an American toad and not a Southern toad. Confirmation is pending.

08) No frogs calling. Water depth ~6 inches, plenty of graminoid growth.

11) None

12) Regulus Ave was closed to traffic. Site was not accessible.

13) None

14) Calls were relatively distant, most frogs were >100ft away from the road.

22) None

Weather

Prior to the survey, 2.6 inches of precipitation fell in the afternoon of the survey. A cold front associated with the storm dropped the temperatures by 20F. The temperature at any site was heavily influenced by a lack of trees and wind from the ocean. Despite cooler temperatures, choruses were strong and with typical summer breeders. Site 07 had the coldest temperature but had choruses consistent with the May 12, 2015 survey when it was 10F warmer. Temperatures during the survey were above the minimum required temperature for the date in the Virginia Frog and Toad Survey Training Manual (page 14).

Bat Capture Form

State: VA County: VA Beach City Town: N/A Lat.: 36° 45' 37.924" Long.: -75° 57' 14.780"

Site Name: Site 1 - Dam Neck Site ID: N/A Recorder: P. Green Datum: NAD83

Date: 8/6/2014 Start Time: 2015 End Time: 0130 % Clouds: 100 Wind: N/A Precip.: lt. rain

Staff: D. Meately Start Temp.: 72 End Temp.: 72 Capture Technique: Single m; 1 Double 9 m

Habitat: Pocosin/immature pine - old forested overgrown road 2 Triple ¹²/₉ m; Other _____

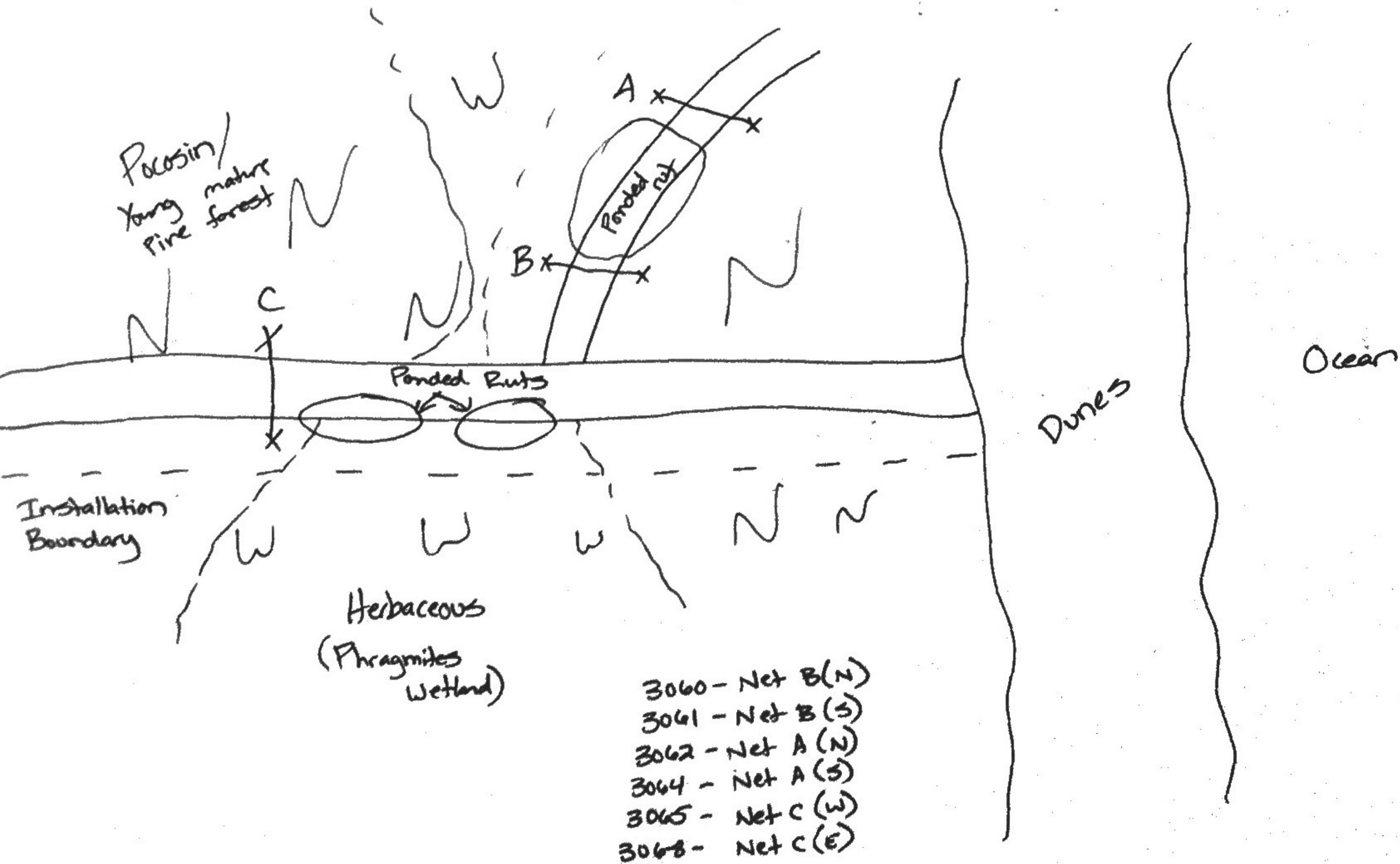
Set near water: Yes/ No

Notes on Back: Yes/ No

Diagram of Setup on Back: Yes/ No

TIME	SPECIES	SEX (M/F)	AGE (J/A)	REPRO. (P/L/PL/NR/PA)	RS (0-5)	FA (MM)	WEIGHT (G)	Net BAND #	Height SAMPLE ID	SAMP. TYPE (F, B, G, L, Ect.)
1. 2030	LABO	F	J	NR	0	39.2	17.0	B	2	N/A
2. 2035	LABO	F	A	PL	0	40.7	11.4	B	2	N/A
3. 2040	LABO	F	J	NR	0	39.1	13.4	B	2.5	N/A
4. 2040	LABO	F	A	PL	0	42.1	14.4	B	2.5	N/A
5. 2100	LABO	F	J	NR	0	40.9	11.0	C	4	N/A
6. Nets A & B closed 2045 to 2100 due to rain										
6. 2135	LABO	F	J	NR	0	39.2	12.1	C	4	N/A
8.										
9.										
10.										
11.										
12.										
13.										
14.										
15.										

Net A - 9m
 Net B - 12m
 Net C - 9m



- 3060 - Net B(N)
- 3061 - Net B(S)
- 3062 - Net A(N)
- 3064 - Net A(S)
- 3065 - Net C(W)
- 3068 - Net C(E)

Bat Capture Form

State: VA County: VA Beach City Town: N/A Lat.: 36°47'53.015" Long.: -75°58'20.601"

Site Name: Site 2 - Dam Neck (DEVGRU) Site ID: N/A Recorder: P. Green Datum: NAD83

Date: 8/7/14 Start Time: 2000 End Time: 0100 % Clouds: 60 Wind: N/K Precip.: N/A

Staff: D. Meately Start Temp.: 78 End Temp: 73 Capture Technique: Single m; 1 Double 6 m

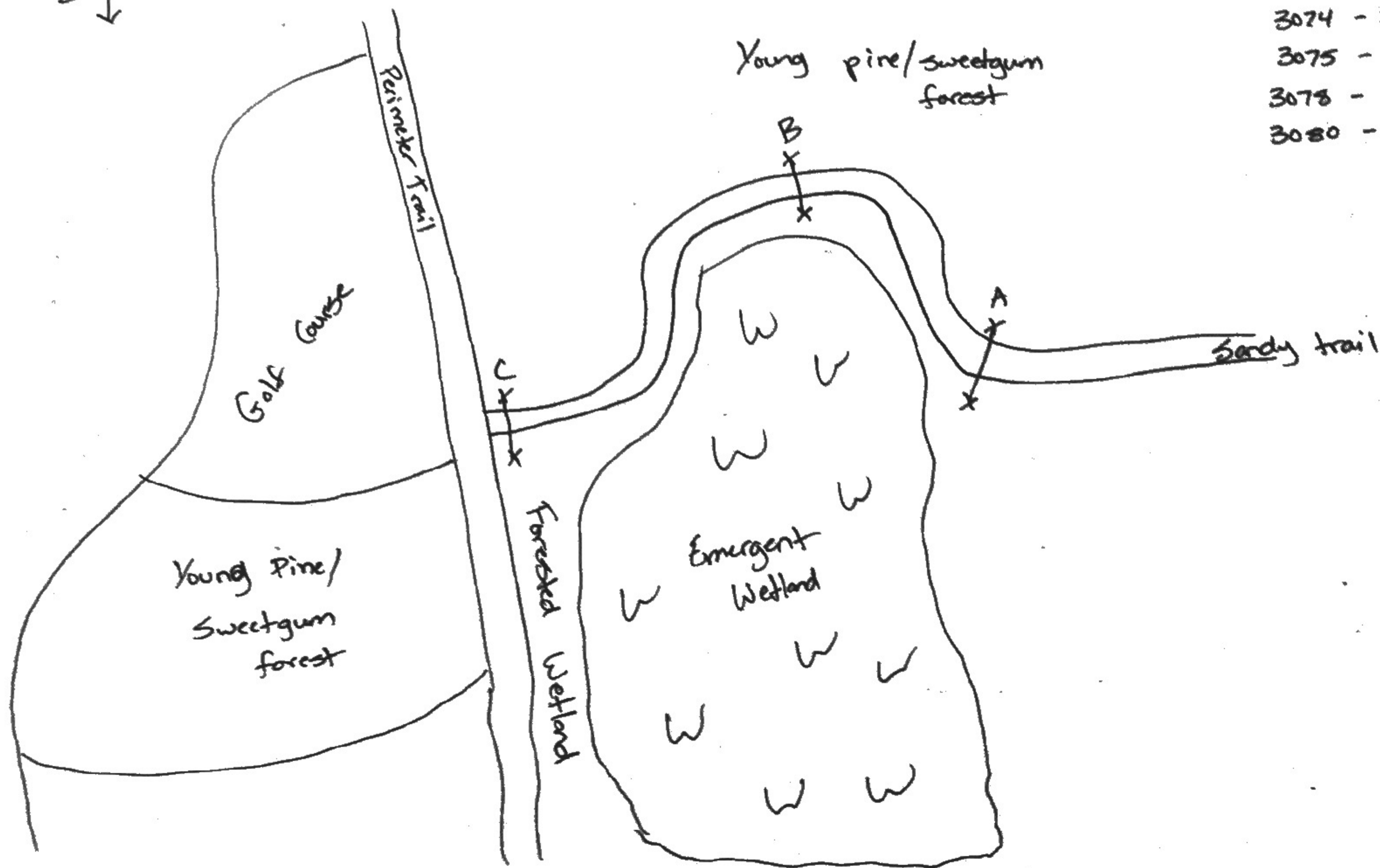
Habitat: Sandy road adjacent to golf course and emergent inundated wetland 2 Triple 6 m; Other _____
Sweetgum/pine

Set near water: Yes/No Notes on Back: Yes/No Diagram of Setup on Back: Yes/No

TIME	SPECIES	SEX (M/F)	AGE (J/A)	REPRO. (P/L/PL/NR/PA)	RS (0-5)	FA (MM)	WEIGHT (G)	Net BAND#	Height SAMPLE ID	SAMP. TYPE (F, B, G, L.Ect..)	
1.	2015	LABO	M	J	NR	0	40.2	9.1	B	2	N/A
2.	2015	LABO	F	J	NR	0	42.1	10.1	B	1.5	N/A
3.	2030	LABO	F	J	NR	0	40.3	11.3	C	25	N/A
4.	2110	LABO	F	J	NR	0	40.6	11.1	A	4	N/A
5.	2130	LABO	F	J	NR	0	42.1	10.8	A	5	N/A
6.	2205	NYHU	M	J	NR	0	35.7	8.1	B	3.5	N/A
7.	2330	LABO	F	J	NR	0	40.0	11.1	B	3.5	N/A
8.	2330	LABO	M	Escaped Net					B	3.5	N/A
9.	0005	LABO		Escaped Net					A	2.5	N/A
10.	0005	LABO		Escaped Net					A	2.5	N/A
11.	0015	LABO		Escaped Net					C	5	N/A
12.	0030	LABO	M	A	SCR	0	38.3	10.0	B	1	N/A
13.	0030	LABO		Escaped Net					B	1	N/A
14.	0055	LABO	F	J	NR	0	40.6	10.9	B	1	N/A
15.											

Moon - 90% full

- 3069 - Net A (W)
- 3070 - Net A (E)
- 3071 - Net B (E)
- 3072 - Net B (W)
- 3073 - Net C (E)
- 3074 - Net C (W)
- 3075 - LABO 1
- 3078 - LABO 3
- 3080 - NYHU 1



Bat Capture Form

State: VA County: VA Beach City Town: N/A Lat.: 36° 46' 53.625" Long.: -75° 59' 12.737"

Site Name: Site 3 - Dam Neck Site ID: N/A Recorder: P. Green Datum: NAD 83

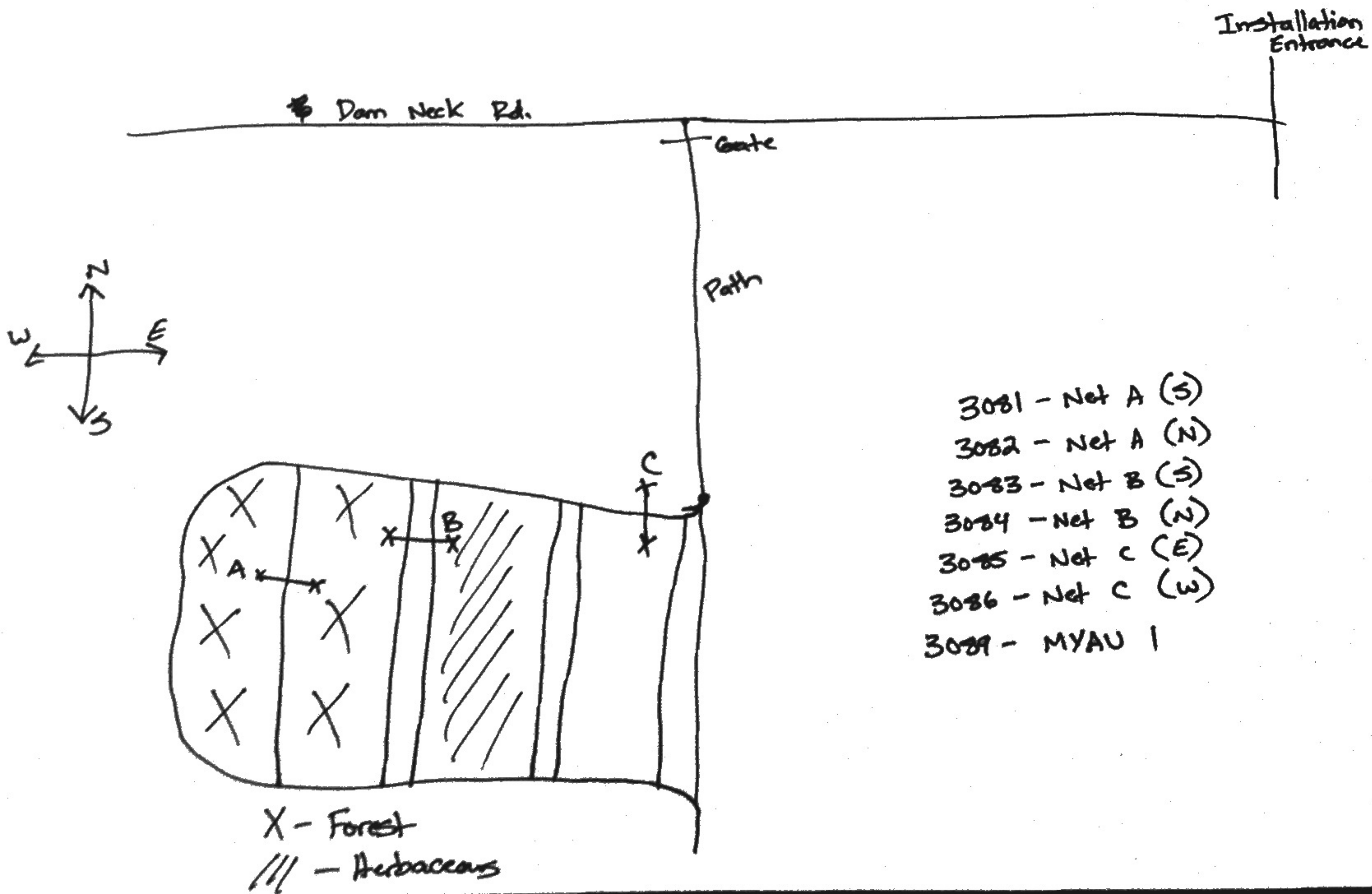
Date: 8/8/14 Start Time: 2000 End Time: 0100 % Clouds: 10 Wind: N/A Precip.: N/A

Staff: D. Meathen Start Temp.: 77 End Temp: 72 Capture Technique: Single m; 1 Double 9 m

Habitat: Young Successional sweetgum/pine with maintained trails and clearings 2 Triple 6 m; Other _____

Set near water: Yes/ No Notes on Back: Yes/No Diagram of Setup on Back: Yes/No

TIME	SPECIES	SEX (M/F)	AGE (J/A)	REPRO. (P/L/PL/NR/PA)	RS (0-5)	FA (MM)	WEIGHT (G)	Net BAND #	Height SAMPLE ID	SAMP. TYPE (F, B, G, L.Ect..)	
1.	0025	MYAU	M	J	NR	0	38.1	8.1	B	1	N/A
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											



AVIAN SURVEY DATA FORM

DATE: 8/5/2014 OBSERVER(s): Jcampo SITE LOCATION: NASO DNA CALLS USED: Y / (N)
 SURVEY PERIOD: Winter / Breeding / (Summer) / Fall REPLICATE #: 1 SURVEY TYPE: (Point) / Hawk / Area / Incidental / (Shorebird) / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-1 START TIME: 0600 END TIME: _____ PRECIP: X WIND: B-2 OTHER: B1-B2
 WEATHER: TEMP (F): 74 CLOUDS: (Cloudy) / Mostly Cloudy / Partly Cloudy / Mostly Clear / Clear NOISE: H / M / L / N N

Point	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
<u>1-1</u>	<u>0600</u>	<u>Common Crow</u>	<u>2</u>	<u>VIS</u>					<u>Rain overnight</u>
		<u>Ring-billed Gull</u>	<u>1</u>	<u>VIS</u>					
		<u>Common Crow</u>	<u>4</u>	<u>VIS</u>					
<u>1-2</u>	<u>0620</u>	<u>Brown Pelican</u>	<u>3</u>	<u>VIS</u>					<u>sprinkle</u>
		<u>Ring-billed Gull</u>	<u>1</u>	<u>VIS</u>					
		<u>Osprey</u>	<u>1</u>	<u>VIS</u>					
		<u>Common Tern</u>	<u>3</u>	<u>VIS</u>					
		<u>Laughing Gull</u>	<u>2</u>	<u>VIS</u>					
		<u>Br Pelican</u>	<u>3</u>	<u>VIS</u>					
		<u>Common Tern</u>	<u>2</u>	<u>VIS</u>					
		<u>Sanderling</u>	<u>4</u>	<u>VIS</u>					
		<u>Royal Tern</u>	<u>2</u>	<u>VIS</u>					
<u>1-4</u>	<u>0647</u>	<u>Osprey</u>	<u>3</u>	<u>VIS</u>					<u>NO RAIN</u>
		<u>Brn Pelican</u>	<u>4</u>	<u>VIS</u>					
		<u>Ring-billed Gull</u>	<u>1</u>	<u>VIS</u>					
		<u>Com Tern</u>	<u>2</u>	<u>VIS</u>					
		<u>Willet</u>	<u>1</u>	<u>VIS</u>					
		<u>Royal Tern</u>	<u>3</u>	<u>VIS</u>					

AVIAN SURVEY DATA FORM

DATE: 8/5/2014 OBSERVER(s): J Campo SITE LOCATION: NASA DNA CALLS USED: Y / N
 SURVEY PERIOD: Winter / Breeding / Summer / Fall REPLICATE #: _____ SURVEY TYPE: Point / Hawk / Area / Incidental / Shorebird / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-1 START TIME: 0600 END TIME: _____ PRECIP: 10% WIND: B-2 OTHER: B1-B2
 WEATHER: TEMP (F): 74 CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / Mostly Clear / Clear NOISE: H / M / L / N

 Point
 1-3

TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
0700	Sanderling	2	VIS					
	Herring Gull	1	VIS	JUV				
	Royal Tern	1	VIS					
	DC Cormorant	1	VIS					
	Brn Pelican	1	VIS					
	Com Tern	2	VIS					end time in restricted Area = 0710
0730	Br Pelican	4	VIS					light sprinkle
	Osprey	2	VIS					
	Royal Tern	6	VIS					~ 50 people nearby
	Sanderling	6	VIS					on the beach
	Willet	6	VIS					
	Laughing Gull	4	VIS					
	Com Tern	3	VIS					

1-5

AVIAN SURVEY DATA FORM

DATE: 8/5/2014 OBSERVER(s): J Campo SITE LOCATION: NASO DNA CALLS USED: Y / N / N
 SURVEY PERIOD: Winter / Breeding / Summer / Fall REPLICATE #: 1 SURVEY TYPE: Point / Hawk / Area / Incidental / Shorebird / Nocturnal
 ROUTE/LOCATION/POINT NAME: R1 START TIME: 0730 END TIME: _____ PRECIP: 5% WIND: B-3 OTHER: B-4
 WEATHER: TEMP (F): 74 CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / Mostly Clear / Clear NOISE: H / M / L / N / N

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
1-6	0747	Gull-billed Tern	3	vis (close)					
		Ring-billed Gull	2	vis					
		Sanderling	2	vis					
		Common Tern	8	vis					
		Br Pelican	7	vis					
1-7	0802	osprey	2	vis					B-4, light sprinkle
		Br Pelican	2	vis					
		Ring-billed Gull	2	vis					
		Sanderling	6	vis					
		Forsters Tern	2	vis					
1-8	NO survey - beach closed for drone ops								
1-9	0830	Br Pelican	7	vis					
		Least Tern	2	vis					
		Com Tern	7	vis					
		Sanderling	5	vis					
		Ring-billed Gull	2	vis					

AVIAN SURVEY DATA FORM

DATE: 8/6/2014 OBSERVER(S): Jcampo SITE LOCATION: NASO DNA CALLS USED: Y / N N
 SURVEY PERIOD: Winter / Breeding / Summer / Fall REPLICATE #: 1 SURVEY TYPE: Point / Hawk / Area / Incidental / Shorebird / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-2 START TIME: _____ END TIME: _____ PRECIP: N WIND: B1 OTHER: _____
 WEATHER: TEMP (F): 71 CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / Mostly Clear / Clear NOISE: H / M / L / N N

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
<u>2-5</u>	<u>0605</u>	<u>Cardinal</u>	<u>1</u>	<u>Aud</u>					
		<u>Humming Bird</u>	<u>1</u>	<u>vis</u>					
		<u>Chimney Swift</u>	<u>4</u>	<u>vis</u>					
		<u>Osprey</u>	<u>1</u>	<u>vis</u>					
		<u>Com Crow</u>	<u>1</u>	<u>Aud</u>					
<u>2-4</u>	<u>0620</u>	<u>Osprey</u>	<u>1</u>	<u>vis</u>					
		<u>Com Crow</u>	<u>3</u>	<u>Aud/vis</u>					
		<u>Laughing Gull</u>	<u>1</u>	<u>vis</u>					
		<u>GBH</u>	<u>2</u>	<u>vis</u>					
		<u>Eastern Kingbird</u>	<u>1</u>	<u>vis</u>					
		<u>Humming Bird</u>	<u>1</u>	<u>vis</u>	<u>F</u>				<u>Phrag on borders of marsh</u>
<u>2-6</u>	<u>0640</u>	<u>Purple Martin</u>	<u>2⁺</u>	<u>vis</u>					<u>B-2</u>
		<u>Com Crow</u>	<u>1+1</u>	<u>vis</u>					
		<u>Osprey</u>	<u>1</u>	<u>vis</u>					

AVIAN SURVEY DATA FORM

DATE: 8/6/14 OBSERVER(s): J Camps SITE LOCATION: NASODR/A CALLS USED: Y / N N
 SURVEY PERIOD: Winter / Breeding / Summer / Fall REPLICATE #: 1 SURVEY TYPE: Point / Hawk / Area / Incidental / Shorebird / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-2 START TIME: _____ END TIME: 0740 PRECIP: N WIND: B-2 OTHER: _____
 WEATHER: TEMP (F): 75 CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / Mostly Clear / Clear NOISE: H / M / L / N N

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
<u>2-3</u>	0700	Hummingbird	1	vis	F/A	1m			
		Downy Woodpecker	2	vis					
		Robin	2	vis					
		Osprey	2	vis					
		Ys Flicker	2	vis					
		Brn Thrasher	1	vis					
		Cardinal	1	vis/Aud					
<u>2-1</u>	0916	Com Crow	1	Aud					fill tower site, mostly clear
		Car Chickadee	1	vis					
		Cardinal	1	Aud	M				
		Downy Woodpecker	2	vis					
<u>2-2</u>	0730	Pileated WP.	1+1	Aud/vis					
		Cardinal	1	vis					
		Com Grackle	1+1	vis/Aud					
		Mallard	3	vis					
		Com Crow	1	Aud					

End Restricted Area points 0740

DATE: 8/6/14 OBSERVER(S): J Campo SITE LOCATION: NASO DNA CALLS USED: Y / (N)
 SURVEY PERIOD: Winter / Breeding / (Summer) / Fall REPLICATE #: 1 SURVEY TYPE: (Point) Hawk / Area / Incidental / Shorebird / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-2 START TIME: 0803 END TIME: _____ PRECIP: N WIND: B-2 OTHER: _____
 WEATHER: TEMP (F): 83 CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / (Mostly Clear) / Clear NOISE: H / M / L / N L-M

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
<u>2-7</u>	<u>0803</u>	<u>Com Crow</u>	<u>1</u>	<u>Aud</u>					<u>Watchable wildlife site</u> <u>car noise, passing</u>
<u>2-8</u>	<u>0823</u>	<u>Osprey</u>	<u>1</u>	<u>vis</u>					
		<u>Com Crow</u>	<u>3+1</u>	<u>Aud/vis</u>					
		<u>Am Robin</u>	<u>1</u>	<u>vis/Aud</u>					
		<u>Green Back Heron</u>	<u>1</u>	<u>vis</u>					
		<u>Rock Dove</u>	<u>1</u>	<u>vis</u>					
<u>2-9</u>	<u>0840</u>	<u>Com Crow</u>	<u>1</u>	<u>Aud</u>					<u>thicket, disturbed area</u>
				<u>South Parcel Site</u>					
<u>2-10</u>	<u>0930</u>	<u>Com Crow</u>	<u>1</u>	<u>Aud</u>			<u>End Time 0940</u>		<u>85°F, B-2, Clear</u>

End R2 survey points 0850
Main Base # 1-9



TETRA TECH

AVIAN SURVEY DATA FORM

PAGE 1 OF 2

DATE: 9/16/2014 OBSERVER(S): JCAMP SITE LOCATION: NASODNA CALLS USED: Y / (N)
 SURVEY PERIOD: Winter / Breeding / Summer / (Fall) REPLICATE #: 2 SURVEY TYPE: Point / Hawk / Area / Incidental / (Shorebird) / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-1 START TIME: 0750 END TIME: _____ PRECIP: 0 WIND: B-0 OTHER: _____
 WEATHER: TEMP (F): 70 CLOUDS: Cloudy / Mostly Cloudy / (Partly Cloudy) / Mostly Clear / Clear NOISE: H / M / L / (N)

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
3-4	0750	Herring Gull	2	vis					Waiting on restricted area escort
		Ring Billed Gull	1	↓					
		Com Tern	1						
		Willet	1						
		Black Back Gull	2						
		D.C. Cormorant	13						
		Sanderling	1						
-3	0802	Willet	1						
		Sanderling	1						
		Black Back Gull	1						
		Com Tern	3						
		Least Tern	5						
		Royal Tern	2H						(3)
		Brn Pelican	3						
		Semi Palmated Sandpiper	4						small group moving together.
	Laughing Gull	1	↓						

AVIAN SURVEY DATA FORM

DATE: 9/16/14 OBSERVER(s): J Campo SITE LOCATION: NASO DNA CALLS USED: Y / (N) N
 SURVEY PERIOD: Winter / Breeding / Summer / (Fall) REPLICATE #: 2 SURVEY TYPE: Point / Hawk / Area / Incidental / Shorebird / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-1 START TIME: _____ END TIME: _____ PRECIP: Ø WIND: B-1 OTHER: _____
 WEATHER: TEMP (F): _____ CLOUDS: Cloudy / Mostly Cloudy / (Partly Cloudy) / Mostly Clear / Clear NOISE: H / M / L / N _____

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
R-2	0812	Sanderling	7						
		Willet	2						
		Royal Tern	3						
		Br Pelican	3						
		Ring Billed Gull	1						
R-2		Semi Palmeted Plover	1						Plover!
R-1	0829	Osprey	2						Bl ¹ / ₇ Sunny
		Com Crow	2						
		Gr Blue Heron	1						
		Royal Tern	2						

AVIAN SURVEY DATA FORM

DATE: 9/16/14 OBSERVER(S): J Camp SITE LOCATION: NASO DVA CALLS USED: Y / (N)
 SURVEY PERIOD: Winter / Breeding / Summer / (Fall) REPLICATE #: 2 SURVEY TYPE: (Point) / Hawk / Area / Incidental / Shorebird / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-2 START TIME: 0855 END TIME: _____ PRECIP: 0 WIND: B-2 OTHER: _____
 WEATHER: TEMP (F): 75 CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / (Mostly Clear) / Clear NOISE: H / M / L / (N)

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
R-6	0855	Green Back Heron	1	VIS					
		Osprey	1	VIS					
R-5	0912	Gr. Blue Heron	1	VIS					
		Com Crow	3+1+2	UV					(6)
		Osprey	1	VIS					
R-4	0930	Gr. Back Heron	1	VIS					
		Osprey	4+3	VIS					(7)
		yellow-shaft Flicker	1	VIS					
		D. Crested Cormorant	12	VIS					overflight
		Com Crow	4	VIS					
		Pileated Woodpecker	1	Aud					

AVIAN SURVEY DATA FORM

DATE: 9/15/2014 OBSERVER(s): J Campo SITE LOCATION: NASO DNA CALLS USED: Y / (N) N
 SURVEY PERIOD: Winter / Breeding / Summer / (Fall) REPLICATE #: 2 SURVEY TYPE: (Point) / Hawk / Area / Incidental / (Shorebird) / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-1 START TIME: 0635 END TIME: _____ PRECIP: N WIND: B-1 OTHER: _____
 WEATHER: TEMP (F): 67 CLOUDS: Cloudy / (Mostly Cloudy) / Partly Cloudy / Mostly Clear / Clear NOISE: H / M / L / (N) N

TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
R-5 0635	Blk Back Gull	1	VIS					Escort no show to the restricted area
	Herring Gull	1						
	Osprey	1						
	Laughing Gull	3						Completed R-1 points and R-2 points outside the restricted area
	Ring Billed Gull	1						
	Sanderling	24						
	Willet	2						
	Com Crow	1						
R-6 0654	Willet	3	VIS					
	Sanderling	7						
	Ring Billed Gull	3						
	Blk Back Gull	1						
	Com Tern	3H						
	Brn Pelican	2						
	Double Crest Cormorant	6						
	Royal Tern	3						
Least Tern	2							

AVIAN SURVEY DATA FORM

DATE: 9/15/2014 OBSERVER(s): JCAMPO SITE LOCATION: NASO DNA CALLS USED: Y / N / N
 SURVEY PERIOD: Winter / Breeding / Summer / Fall REPLICATE #: 2 SURVEY TYPE: Point / Hawk / Area / Incidental / Shorebird / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-1 START TIME: _____ END TIME: _____ PRECIP: WIND: B-0 OTHER: _____
 WEATHER: TEMP (F): 67 CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / Mostly Clear / Clear NOISE: H / M / L / N

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
R-7	0710	Brn Pelican	4						
		Willet	3						
		Sanderling	3						
		Rock Dove	12						
		Blk Back Gull	3						
		Laughing Gull	2						
R-8	0725	Sanderling	1+16						troop exercises nearby
		Willet	1						activity on beach
		Ring Billed Gull	1						no drone activity
		Osprey	1						
		Laughing Gull	1						
		Comm Tern	7						
		Brn Pelican	1						
R-9	0745	Herring Gull	1+4						B1-2 wind
		Willet	1						
		Sanderling	17						
		Comm Tern	2						

Blk Back Gull 1

(over to R-10)

AVIAN SURVEY DATA FORM

DATE: 9/15/2014 OBSERVER(s): Jcampo SITE LOCATION: NASO DNA CALLS USED: Y / (N)
 SURVEY PERIOD: Winter / Breeding / Summer (Fall) REPLICATE #: 2 SURVEY TYPE: (Point) / Hawk / Area / Incidental / Shorebird / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-2 START TIME: 0822 END TIME: _____ PRECIP: Ø WIND: B-1 OTHER: _____
 WEATHER: TEMP (F): 74 CLOUDS: Cloudy / (Mostly Cloudy) / Partly Cloudy / Mostly Clear / Clear NOISE: H / M / L / (N) N

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES	
R-9	0822	Comm Crow	1	Aud					no vis, phony, shrub-shrub	
R-8	0835	Pi-billed Grebe	1	vis						
		G. Blue Heron	1	vis						
		Ring-billed Gull	1	vis						
R-7	0854	Comm Crow	1	Aud					road noise, much construction at entrance	
R-10	0928	Comm Crow	3	Aud/vis						
				end time for R-2 route, points 7-10 = 0940						



TETRA TECH

AVIAN SURVEY DATA FORM

PAGE 1 OF 2

DATE: 5/12/2015 OBSERVER(S): Jcampo SITE LOCATION: NASO DNA CALLS USED: Y / (N)
 SURVEY PERIOD: Winter / (Breeding) / Summer / Fall REPLICATE #: 1 SURVEY TYPE: Point / Hawk / Area / Incidental / (Shorebird) / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-1 START TIME: 0555 END TIME: _____ PRECIP: 0-100% WIND: B-3 OTHER: _____
 WEATHER: TEMP (F): 70 CLOUDS: Cloudy / (Mostly Cloudy) / Partly Cloudy / Mostly Clear / Clear NOISE: H / M / L / (N)

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
1-4	0555	Bald Eagle	1	vis	im		on beach		5/11/2015 Survey Attempted but rain and no escort
	0710	double-crested Cormorant	1	vis					Light sprinkler, rain at 0600 (stop)
		Brn Pelican	3	vis					resumed after rain, no rain
		ring-billed gull	1	vis					
		Laughing Gull	3	vis					
1-3	0720	Osprey	2	vis					72°, no rain, B-3
		Great Blue Heron	1	vis					
		Brn Pelican	2	vis					no peeps on beach!
		Great Egret	3	vis					
		Common Crow	1	vis					
		Least Tern	2	vis					
1-2	0735	Brn Pelican	24	vis					
		Royal Tern	5	vis					
		Osprey	2	vis					
		Ring-billed Gull	7	vis					
		Laughing Gull	3	vis					
		Least Tern	2	vis					Sunny, Partly cloudy

AVIAN SURVEY DATA FORM

DATE: 5/12/2015 OBSERVER(S): J Campo SITE LOCATION: NASODINA CALLS USED: Y / (N)
 SURVEY PERIOD: Winter / Breeding / Summer / Fall REPLICATE #: 1 SURVEY TYPE: Point / Hawk / Area / Incidental / Shorebird / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-2 START TIME: 0845 END TIME: 10:15 PRECIP: WIND: B-3 OTHER: _____
 WEATHER: TEMP (F): 75° CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / Mostly Clear / Clear NOISE: H / M / L / (N)

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
2-6	0845	Osprey	1	vis			overhead		security clearance delay
		Common Crow	2	Accd					
2-5	0905	Glossy Ibis	1	vis					jet noise, gunfire
2-4	0920	Ruby-throat Hummingbird	1	vis					
		Canada Goose	2	vis					clear skies, 78°
		Osprey	2	vis					
		Great Blue Heron	1	vis					gunfire
		Bald Eagle	1	vis	im.				white head starting
2-3	0935	Common Crow	3	vis					
2-2	0950	Canada Goose	2	vis					
		Great Blue Heron	1	vis					
		Common Crow	1	vis					
2-1	1005	Great Blue Heron	1	vis					
		Common Crow	2	vis					

AVIAN SURVEY DATA FORM

DATE: 5/14/2015 OBSERVER(s): J Campo SITE LOCATION: NASODVA CALLS USED: Y / (N)
 SURVEY PERIOD: Winter / (Breeding) Summer / Fall REPLICATE #: 1 SURVEY TYPE: Point / Hawk / Area / Incidental / (Shorebird) / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-1 START TIME: 0545 END TIME: _____ PRECIP: (0) WIND: B-3 OTHER: B-4
 WEATHER: TEMP (F): 61 CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / (Mostly Clear) Clear NOISE: H / M / L / (N)

TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
1-5 0545	Osprey	1	VIS					
	Bald Eagle	1	VIS	im.				
	double-crested Cormorant	20	VIS					
	Least Sandpiper	50	VIS					
	Ring-billed Gull	2	VIS					
	Herring Gull	1	VIS					
	Black Skimmer	5	VIS					
	Laughing Gull	8	VIS					
1-6 0600	Rock Dove	6	VIS					
	Common Crow	8	VIS					
	Ring-billed Gull	7	VIS					
	Herring Gull	6	VIS					
	Laughing Gull	12	VIS					
	Least Sandpiper	50	VIS					Semipalmated and Sanderling
	Red-breasted Merganser	1	VIS					

DATE: 5/14/2015 OBSERVER(s): JCAMPO SITE LOCATION: NASODNA CALLS USED: Y / (N)

SURVEY PERIOD: Winter / (Breeding) / Summer / Fall REPLICATE #: 1 SURVEY TYPE: Point / Hawk / Area / Incidental / Shorebird / Nocturnal

ROUTE/LOCATION/POINT NAME: R-1 START TIME: _____ END TIME: _____ PRECIP: Ø WIND: B-3 OTHER: B-4

WEATHER: TEMP (F): 61 CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / (Mostly Clear) / Clear NOISE: H / M / L / (N)

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
1-7	0615	Herring Gull	217	VIS					Σ = 9 herring gulls
		Black Skimmer	2	VIS					
		Black-billed Gull	1	VIS					
		Double-crested Cormorant	5	VIS					
		Brown Pelican	11	VIS					
		Least Sandpiper	37	VIS				Plus semi-palmated	
1-8	0635	Black Skimmer	6	VIS					Plus semi-palmated and sandpiper
		Least Sandpiper	155	VIS					
		Brown Pelican	6	VIS					
		Ring-billed Gull	5	VIS					
1-9	0705	Black Skimmer	2	VIS					Plus semi-palmated and sandpiper
		Least Sandpiper	400	VIS					
		Long-billed dowitcher	5	VIS					
		Ruddy Turnstone	10	VIS					
		Ring-billed Gull	3	VIS					
		Herring Gull	3	VIS					
		Common Tern	2	VIS					

Brn Pelican 1 VIS
 Osprey 1 VIS
 Peregrine Falcon 1 VIS



TETRA TECH

AVIAN SURVEY DATA FORM

PAGE 1 OF 2

DATE: 5/12/2015 OBSERVER(S): Jcampo SITE LOCATION: NASO DNA CALLS USED: Y / (N)
 SURVEY PERIOD: Winter / (Breeding) / Summer / Fall REPLICATE #: 1 SURVEY TYPE: Point / Hawk / Area / Incidental / (Shorebird) / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-1 START TIME: 0555 END TIME: _____ PRECIP: 0-100% WIND: B-3 OTHER: _____
 WEATHER: TEMP (F): 70 CLOUDS: Cloudy / (Mostly Cloudy) / Partly Cloudy / Mostly Clear / Clear NOISE: H / M / L / (N)

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
1-4	0555	Bald Eagle	1	vis	im		on beach		5/11/2015 Survey Attempted but rain and no escort
	0710	double-crested Cormorant	1	vis					Light sprinkler, rain at 0600 (stop)
		Brn Pelican	3	vis					resumed after rain, no rain
		ring-billed gull	1	vis					
		Laughing Gull	3	vis					
1-3	0720	Osprey	2	vis					72°, no rain, B-3
		Great Blue Heron	1	vis					
		Brn Pelican	2	vis					no peeps on beach!
		Great Egret	3	vis					
		Common Crow	1	vis					
		Least Tern	2	vis					
1-2	0735	Brn Pelican	24	vis					
		Royal Tern	5	vis					
		Osprey	2	vis					
		Ring-billed Gull	7	vis					
		Laughing Gull	3	vis					
		Least Tern	2	vis					Sunny, Partly cloudy

AVIAN SURVEY DATA FORM

DATE: 5/12/2015 OBSERVER(S): J Campo SITE LOCATION: NASODINA CALLS USED: Y / (N)
 SURVEY PERIOD: Winter / Breeding / Summer / Fall REPLICATE #: 1 SURVEY TYPE: Point / Hawk / Area / Incidental / Shorebird / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-2 START TIME: 0845 END TIME: 10:15 PRECIP: WIND: B-3 OTHER: _____
 WEATHER: TEMP (F): 75° CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / Mostly Clear / Clear NOISE: H / M / L / (N)

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
2-6	0845	Osprey	1	VIS			overhead		security clearance delay
		Common Crow	2	Accd					
2-5	0905	Glossy Ibis	1	VIS					jet noise, gunfire
2-4	0920	Ruby-throat Hummingbird	1	VIS					
		Canada Goose	2	VIS					clear skies, 78°
		Osprey	2	VIS					
		Great Blue Heron	1	VIS					gunfire
		Bald Eagle	1	VIS	im.				white head starting
2-3	0935	Common Crow	3	VIS					
2-2	0950	Canada Goose	2	VIS					
		Great Blue Heron	1	VIS					
		Common Crow	1	VIS					
2-1	1005	Great Blue Heron	1	VIS					
		Common Crow	2	VIS					

AVIAN SURVEY DATA FORM

DATE: 5/14/2015 OBSERVER(s): J Campo SITE LOCATION: NASODVA CALLS USED: Y / (N)
 SURVEY PERIOD: Winter / (Breeding) Summer / Fall REPLICATE #: 1 SURVEY TYPE: Point / Hawk / Area / Incidental / (Shorebird) / Nocturnal
 ROUTE/LOCATION/POINT NAME: R-1 START TIME: 0545 END TIME: _____ PRECIP: (0) WIND: B-3 OTHER: B-4
 WEATHER: TEMP (F): 61 CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / (Mostly Clear) Clear NOISE: H / M / L / (N)

TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
1-5 0545	Osprey	1	VIS					
	Bald Eagle	1	VIS	im.				
	double-crested Cormorant	20	VIS					
	Least Sandpiper	50	VIS					
	Ring-billed Gull	2	VIS					
	Herring Gull	1	VIS					
	Black Skimmer	5	VIS					
	Laughing Gull	8	VIS					
1-6 0600	Rock Dove	6	VIS					
	Common Crow	8	VIS					
	Ring-billed Gull	7	VIS					
	Herring Gull	6	VIS					
	Laughing Gull	12	VIS					
	Least Sandpiper	50	VIS					Semi-palmated and Sanderling
	Red-breasted Merganser	1	VIS					

DATE: 5/14/2015 OBSERVER(s): JCAMPO SITE LOCATION: NASODNA CALLS USED: Y / (N)

SURVEY PERIOD: Winter / (Breeding) / Summer / Fall REPLICATE #: 1 SURVEY TYPE: Point / Hawk / Area / Incidental / Shorebird / Nocturnal

ROUTE/LOCATION/POINT NAME: R-1 START TIME: _____ END TIME: _____ PRECIP: Ø WIND: B-3 OTHER: B-4

WEATHER: TEMP (F): 61 CLOUDS: Cloudy / Mostly Cloudy / Partly Cloudy / (Mostly Clear) / Clear NOISE: H / M / L / (N)

	TIME	SPECIES	NUMBER	OBSERVATION TYPE	SEX/AGE	DISTANCE(m)	LOCATION	GPS	NOTES
1-7	0615	Herring Gull	217	VIS					Σ = 9 herring gulls
		Black Skimmer	2	VIS					
		Black-billed Gull	1	VIS					
		Double-crested Cormorant	5	VIS					
		Brown Pelican	11	VIS					
		Least Sandpiper	37	VIS				Plus semi-palmated	
1-8	0635	Black Skimmer	6	VIS					Plus semi-palmated and sandpiper
		Least Sandpiper	155	VIS					
		Brown Pelican	6	VIS					
		Ring-billed Gull	5	VIS					
1-9	0705	Black Skimmer	2	VIS					Plus semi-palmated and sandpiper
		Least Sandpiper	400	VIS					
		Long-billed dowitcher	5	VIS					
		Ruddy Turnstone	10	VIS					
		Ring-billed Gull	3	VIS					
		Herring Gull	3	VIS					
		Common Tern	2	VIS					

Brn Pelican 1 VIS
 Osprey 1 VIS
 Peregrine Falcon 1 VIS

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APPENDIX D

Permits for Species Surveys



Virginia Department of Game and Inland Fisheries

4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-1000 (V/TDD)

Under Authority of § 29.1-412, § 29.1-417, & § 29.1-568 of the Code of Virginia & DGIF Policy E-1-90



Threatened/Endangered Species Permit

Permit Type: New

Fee Paid: \$40.00

VADGIF Permit No. 053961

Permittee: **Rebecca Kipp**
Address: **Tetra Tech, Inc.**
234 Mall Boulevard, Suite 260
King of Prussia, PA 19406

Office: (302) 354-0529
City/County:

Contract Species Surveys

Authorized Collection Methods: By Hand/Nets-Traps (Fyke/Hoop/D-Frame)/Visual Encounter (turning over rocks/logs)
Authorized Waterbodies: All within Naval Facility NASO Dam Neck Annex
Authorized Marking Techniques: N/A

Authorized Counties / Cities:
Virginia Beach

Permittee MUST notify VDGIF within the 7 day period prior to each sampling event. Notification must be made via email to: collectionpermits@dgif.virginia.gov

Report Due: 31 January 2016

ALL PERMIT REPORTS MUST CONTAIN COORDINATES; PERMITTEE CAN USE THE VIRGINIA FISH AND WILDLIFE INFORMATION SERVICE (VAFWIS) TO OBTAIN COORDINATES BY VISITING:
[HTTP://VAFWIS.ORG/FWIS](http://VAFWIS.ORG/FWIS)

STANDARD CONDITIONS ATTACHED APPLY TO THIS PERMIT.

Authorized Species:

Description

Canebrake Rattlesnake
Eastern Chicken Turtle
Eastern Glass Lizard

ID Number

Scientific Name

Crotalus horridus
Deirochelys reticularia reticularia
Ophisaurus ventralis

Authorized Sub-Permittees:

Dr. Joseph Mitchell, Mitchell Ecological Research LLC

Approved by:

Title: James E. Husband - Permits Manager

Applicants may appeal permit decisions within 60 days of issuance. The appeal must be in writing to the Director, Department of Game and Inland Fisheries.

Date: 4/15/2015

20

Permit Effective

4/15/2015

through

12/31/2015

15



Virginia Department of Game and Inland Fisheries

4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-1000 (V/TDD)

Under Authority of § 29.1-412, § 29.1-417, & § 29.1-418 of the Code of Virginia



Scientific Collection Permit

Permit Type: New

Fee Paid: \$40.00

VADGIF Permit No. 052628

Permittee: **Dr. Robert K Rose**
Address: **Old Dominion University - Dept. of Biology**
Hampton Boulevard
Norfolk, VA 23529-0266

Office: (757) 343-4409
City/County:

Populations Studies using Capture/Mark and Re-Capture Methods/Biomonitoring/Contract Species

Authorized Collection Methods: Live-Traps (Box/Pitfall/Funnel/Bell/Pot)/Kill Traps (Pitfall/Snap Traps)
Authorized Waterbodies: N/A
Authorized Marking Techniques: Ear Tags

Authorized Counties / Cities:
Northampton
Chesapeake
Suffolk
Virginia Beach

PERMIT AMENDMENT 10/23/2014: This amendment adds the following:

Authorized Species: Southeastern Shrew
Authorized Method: Kill Traps (Pitfall/Snap Traps)
Authorized Subpermittees: Brent Ashley/Emily Marino

Permittee MUST notify VDGIF a minimum of 7 days prior to each sampling event.
Notification must be made via email to: collectionpermits@dgif.virginia.gov

Report Due: 31 January 2015, 31 January 2016

ALL PERMIT REPORTS MUST CONTAIN COORDINATES; PERMITTEE CAN USE THE VIRGINIA FISH AND WILDLIFE INFORMATION SERVICE (VAFWIS) TO OBTAIN COORDINATES BY VISITING:
[HTTPS://FWISWEB1.DGIF.VIRGINIA.GOV/FWIS/INDEX.HTML](https://fwisweb1.dgif.virginia.gov/fwis/index.html)

STANDARD CONDITIONS ATTACHED APPLY TO THIS PERMIT.

Authorized Species:

Description
Small Mammals
Southeastern Shrew
Annual Report Due End of Each Year

ID Number

Scientific Name

Sorex longirostris longirostris

Authorized Sub-Permittees:

Jana M Eggleston, Old Dominion University
Kathryn Rogers, Old Dominion University
Brent Ashley, Kerr Environmental
Emily Marino, Kerr Environmental



Virginia Department of Game and Inland Fisheries

4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-1000 (V/TDD)

Under Authority of § 29.1-412, § 29.1-417, & § 29.1-418 of the Code of Virginia



Scientific Collection Permit

Permit Type: New

Fee Paid: \$40.00

VADGIF Permit No. 052628

Approved by:

Applicants may appeal permit decisions within 60 days of issuance. The appeal must be in writing to the Director, Department of Game and Inland Fisheries.

Title: James E. Husband - Permits Manager

Date: 10/23/2014

20

Permit Effective

10/9/2014

through

12/31/2015

15



Virginia Department of Game and Inland Fisheries

4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-1000 (V/TDD)

Under Authority of § 29.1-412, § 29.1-417, & § 29.1-418 of the Code of Virginia



Scientific Collection Permit

Permit Type: New Fee Paid: \$40.00 VADGIF Permit No. **051933**

Permittee: **Dave Yates**
Address: **Biodiversity Research Institute**
19 Flaggy Meadow Road
Gorham, ME 04038

Office: (207) 839-7600
City/County: Out of State

Contract Species Surveys

Authorized Collection Methods: Harp Traps for Bats/Terrestrial Mist Nets
(Bats/Birds)
Authorized Waterbodies: N/A
Authorized Marking Techniques: N/A

Authorized Counties / Cities:
York
Norfolk

Permittee MUST notify VDGIF a minimum of 7 days prior to each sampling event.
Notification must be made via email to: collectionpermits@dgif.virginia.gov

Report Due: 31 January 2015, 31 January 2016

ALL PERMIT REPORTS MUST CONTAIN COORDINATES; PERMITTEE
CAN USE THE VIRGINIA FISH AND WILDLIFE INFORMATION SERVICE
(VAFWIS) TO OBTAIN COORDINATES BY VISITING:
[HTTPS://FWISWEB1.DGIF.VIRGINIA.GOV/FWIS/INDEX.HTML](https://fwisweb1.dgif.virginia.gov/fwis/index.html)

STANDARD CONDITIONS ATTACHED APPLY TO THIS PERMIT.

Authorized Species:

Description

ID Number

Scientific Name

Bats

Annual Report Due End of Each Year

Authorized Sub-Permittees:

Tim Divoll, Biodiversity Research Institute

Dustin Meattey, Biodiversity Research Institute

Carl Anderson, Biodiversity Research Institute

Lauren Gilpatrick, Biodiversity Research Institute

Approved by:

Applicants may appeal permit decisions within 60 days of
issuance. The appeal must be in writing to the Director,
Department of Game and Inland Fisheries.

Title: James E. Husband - Permits Manager

Date: 7/28/2014

20

Permit Effective

7/28/2014

through

12/31/2015

15

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APPENDIX E
Survey Location Coordinates

Survey Location Coordinates (2014-2015), NASO DNA, Virginia.

Station ID	Northing¹	Easting¹
<i>Barking Tree Frog Survey Sites</i>		
1	4071288.159	413531.874
3	4071166.267	413754.208
5	4070545.226	413580.130
6	4071532.784	414183.602
7	4070889.214	414237.819
8	4070716.414	414379.698
11	4069543.599	414744.297
12	4069403.865	414796.530
13	4068963.687	415035.635
14	4069172.382	414774.110
22	4069137.443	414589.178
<i>Chicken Turtle Trap Sites</i>		
A1	4071490.692	414185.035
A2	4071124.007	413798.636
A3	4070966.293	413759.207
A4	4070572.008	413621.207
B1	4072925.890	413353.094
C1	4074325.602	413337.322
C2	4073935.260	413408.293
<i>Reptile Search Areas (center points)</i>		
Area A	4069656.419	414929.2294
Area B	4071025.047	413614.6692
Area C	4073107.018	413490.847
Area D	4073947.662	413150.8087
Area E	4074553.086	413191.8942
Area F	4074865.443	413197.0766
Area G	4074633.147	413745.8036
Area H	4074073.061	413864.4902
Area I	4073233.505	414072.7439
<i>Shrew Survey Grid Locations</i>		
Site 1	4074785.292	413385.188
Site 2	4071132.738	413466.631
<i>Bat Mist Net Locations</i>		
Site 1a	4068803.936	414851.922
Site 1b	4068779.364	414839.456
Site 1c	4068742.642	414577.552
Site 2a	4072871.557	413248.895
Site 2b	4072935.637	413302.226
Site 2c	4072892.969	413352.457
Site 3a	4071104.487	413292.823
Site 3b	4071110.102	413349.932
Site 3c	4071113.721	413469.982
<i>Avian Survey Points</i>		
R1-1	4074760.458	413764.437
R1-2	4074152.433	413915.431

Station ID	Northing¹	Easting¹
R1-3	4073668.735	414035.345
R1-4	4073406.232	414063.293
R1-5	4071957.844	414424.560
R1-6	4071207.070	414583.308
R1-7	4070612.359	414737.53
R1-8	4070043.604	414885.834
R1-9	4069344.388	415096.85
R1-10	4068772.905	415249.13
R2-1	4072687.720	413319.837
R2-2	4072918.107	413276.838
R2-3	4073522.528	413519.563
R2-4	4074008.703	413485.982
R2-5	4074122.619	413701.399
R2-6	4074357.275	413428.031
R2-7	4071486.337	414138.232
R2-8	4069606.332	414364.660
R2-9	4068968.944	414670.418
R2-10	4071033.478	413705.974
<i>Plant Survey Routes (center points)</i>		
Survey Date	Northing¹	Easting¹
9/17/2014	4074617	413703.8
9/17/2014	4074132	413773.6
9/17/2014	4073622	413988.1
9/23/2014	4074884	413246.6
9/23/2014	4070910	414028.1
9/23/2014	4070502	413857.4
9/23/2014	4070238	413826.1
9/23/2014	4070709	413597.7
9/22/2014	4071922	414435.8
9/22/2014	4071589	414171.5
9/22/2014	4071562	414050.3
9/22/2014	4070069	414813.1
9/22/2014	4068950	415049
4/20/2015	4073223	413485.1
4/20/2015	4073840	413651.7
4/20/2015	4074615	413302.8
4/21/2015	4074879	413234.9
4/21/2015	4068850	414956.5
4/21/2015	4069999	414528.6
4/22/2015	4071230	413764.8
4/22/2015	4070834	413680.3
4/22/2015	4071198	413447.5

¹Coordinates are provided in WGS 84, UTM zone 18 N, meters

NAVFAC Atlantic Biological Resource Services

Contract: N62470-13-D-8016; Task Order: WE07, Option Task 12

Bat Baseline Survey Report

Naval Air Station Oceana Dam Neck Annex Virginia Beach, Virginia



Prepared for:

NAVFAC Mid-Atlantic

9742 Maryland Avenue

Norfolk, VA 23511

Prepared by:

Tetra Tech, Inc.

451 Presumpscot Street

Portland, Maine 04103

May 2016

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1.0 INTRODUCTION

Tetra Tech, Inc. was contracted to collect baseline information on all bat species at Naval Air Station Oceana Dam Neck Annex (NASO Dam Neck Annex; Installation), Virginia Beach, Virginia (Figure 2-1). The survey concentrated on areas of interest (i.e., future developments and expansions at the Installation) as identified by the Navy. The objectives of this project were to determine species composition, foraging distribution, and relative abundance of resident and migratory bat species. This survey included mist-net field capture and acoustic monitoring.

Optimal baseline surveys combine acoustic surveys along with mist-netting because species are variably detectable by each method (O'Farrell and Gannon 1999). Mist-netting allows a snapshot of what species, and in what abundance, are utilizing the areas of interest. Some species are rarely caught in mist-nets due to the height at which they forage, but are easily detected acoustically; in contrast, some species have very quiet calls that are difficult to detect acoustically (Barclay 1986). Acoustic monitoring can provide overall bat activity levels and temporal changes in activity. Information collected can be used by natural resource managers to make informed land-use decisions on the Installation.

2.0 SPECIES BACKGROUND

Eleven bat species expected to be present at the Installation based on habitat and range are listed in Table 2-1. Significant decreases in populations of myotis and tri-colored bats, have occurred over the last five years as a result of White-Nose Syndrome (WNS), a fungal pathogen responsible for over 5.5 million bat deaths since its emergence in the United States (USFWS 2015a). WNS was first discovered in eastern New York in February 2006 and has now been documented in 26 states and five Canadian provinces (Heffernan 2016). Other threats to myotis species include loss and fragmentation of forested habitat, alteration to traditional hibernacula, and anthropogenic sources of mortality including wind energy facilities (USFWS 2014).

Although big brown bats are hibernators and have been found with WNS, their survival rate with WNS is much higher (Frank *et al.* 2014). There may be two reasons for this with the first being that big brown bats select areas within caves that are colder and with less humidity, which inhibits the fungus' growth (Hayman *et al.* 2016). Second, their size allows for a greater amount of body fat during hibernation, which potentially mitigates the effects of WNS (Hayman *et al.* 2016).

Rafinesque's big-eared bats and southeastern bats have been found with the fungus, but have no diagnostic symptoms of WNS, and may have some resistance to the disease. Both species are known to occur only in the southeastern corner of Virginia and are listed as state endangered. The subspecies of Rafinesque's big-eared bats previously observed at the Installation is listed in Virginia's Wildlife Action Plan (WAP) as Tier I, critical conservation need, and southeastern bats are Tier IV, moderate conservation need (VDGIF 2005).

Long-distance migrators (Table 2-1) are bats who generally travel over 1000km south during the fall to southern states or even Mexico to find areas that support insects year round or are warm enough to sustain hibernation in tree foliage or cavity. They return to the Installation in the spring where females raise their young. Because they do not enter hibernation they are not susceptible to WNS, however, they are the species most often struck by wind turbines along their migration routes in the fall (Cryan 2003). Seminole bats are unique in that they do not hibernate or undergo long-distance migrations. They can remain in torpor, a state of decreased physiological activity, during cold winter periods and then wake up to forage during warmer winter periods. Evening bats gain enough fat reserves to either migrate shorter distances to warmer climates or over-winter.

Northern long-eared bats (NLEBs) are a species of special interest at the Installation. On April 2, 2015, the USFWS announced that the NLEB was listed as threatened with an interim section 4(d) rule. The intent of the 4(d) rule was to provide the USFWS flexibility in implementing the Endangered Species Act (ESA) by modifying regulations necessary to provide for the conservation of a threatened species while not overburdening private landowners, state agencies, and others with blanket regulations that do not further the conservation of the species. A final 4(d) rule for NLEB was released on January 14, 2016 (USFWS 2016a) and became effective February 16, 2016. USFWS determined that WNS is the primary threat to NLEB and regulating other sources of mortality or harm, such as habitat loss, will not effectively conserve this species.

The final 4(d) rule prohibits all *purposeful take*¹ within the range of NLEB except removal of NLEB from human structures, defense of human health (disease monitoring), or removal of hazardous trees for the protection of human life and property. All take incidental to otherwise lawful activities is allowed outside of the WNS zone. The WNS zone includes all counties affected by WNS and an additional 241 kilometer (150-mile) buffer around these counties which includes the Installation (USFWS 2016b). For areas within the WNS zone, *incidental take*² is prohibited only if it occurs within a hibernaculum³, if tree removal activities occur within a 0.4 kilometer (quarter-mile) of a known, occupied hibernaculum at any time of year or within 46 meters (150 feet) of a known, occupied maternity roost tree from June 1 through July 31 (USFWS 2016a). If a federal project may result in prohibited tree removal described above (or if a project is authorized, funded, or permitted by a federal agency), the final 4(d) rule provides a programmatic biological opinion and optional framework for streamlining section 7 consultations. However, the USFWS may advise federal agencies when project level consultation for NLEB is required (USFWS 2016a).

¹ "Purposeful take is when the reason for the activity or action is to conduct some form of take. For instance, conducting a research project that includes collecting and putting bands on bats is a form of purposeful take. Intentionally killing or harming bats is also purposeful take and is prohibited" (USFWS 2016c).

² "Incidental take is defined by the Endangered Species Act as take that is incidental to, and not the purpose of the carrying out of an otherwise lawful activity. For example, harvesting trees can kill bats that are roosting in the trees, but the purpose of the activity is not to kill bats" (USFWS 2016c).

³ NLEB hibernaculum include caves and abandoned mines with constant, cooler temperatures and high humidity in which they spend the winter in a state of metabolic depression (USFWS 2016c).



Figure 2-1. Regional Setting and Mist Netting Locations of NASO Dam Neck Annex, Virginia.

Table 2-1. Species Expected to Occur at NSAHR Northwest Annex, Virginia and North Carolina.

Life Strategy	Species Common Name	Scientific Name	Range in Virginia	Federal/ State Status	WNS Affects
Long-distance Migrants/ Tree roosting bats	Eastern red bat	<i>Lasiurus borealis</i>	Entire State		Fungus positive
	Hoary bat	<i>L. cinereus</i>	Entire State		
	Silver-haired bat	<i>Lasionycteris noctivagans</i>	Entire State		Fungus positive
Winter torpor/ short migration	Evening bat	<i>Nycticeius humeralis</i>	Eastern half		
	Seminole bat	<i>Lasiurus seminolus</i>	Two counties ⁴		
Cave Hibernators	Southeastern bat	<i>Myotis austroriparius</i>	Four counties ⁵	State Endangered WAP Tier IV	Fungus positive
	Little brown bat	<i>M. lucifugus</i>	Most of the state		WNS symptoms
	Northern long-eared bat (NLEB)		Entire State	Federally Threatened	WNS symptoms
	Tri-colored bat	<i>Perimyotis subflavus</i>	Entire State		WNS symptoms
	Rafinesque's eastern big-eared bat	<i>Corynorhinus rafinesquii macrotus</i>	Southeastern corner	State Endangered WAP Tier I	Fungus positive
	Big brown bat	<i>Eptesicus fuscus</i>	Entire State		WNS symptoms

(VDGIF 2005, Kays and Wilson 2009, Blehert *et al.* 2009, Harvey *et al.* 2011, IUCN 2015, Bernard *et al.* 2015, VDGIF 2016)

⁴ Chesapeake and Suffolk counties

⁵ Chesapeake, Suffolk, Isle of Wight, and Newport News counties

3.0 METHODS

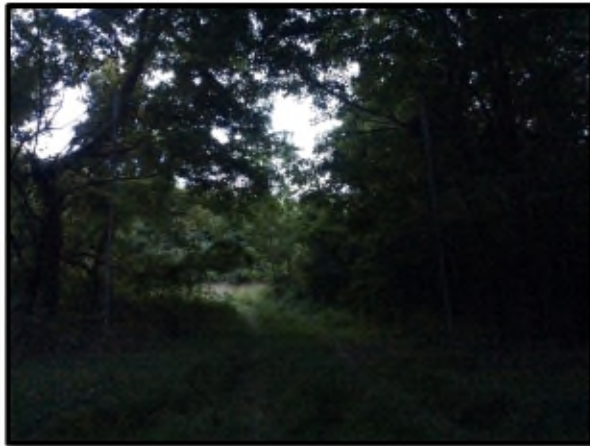
3.1 CAPTURE

Mist-net surveys were completed over two nights from 27 July 2015 to 28 July 2015, for a total of 8 net nights. The required federal (TE63633A-3) and state collection permits (VADGIF 051933) were obtained by a subcontractor, Biodiversity Research Institute (BRI), for completion of these tasks (Appendix B). During the two-night survey window, bats were captured at two locations (Figure 2-1) within the areas of interest. Mist-net survey sites were typically surrounded by mature trees that potentially provide good roosting habitat and a clear path to foraging areas for bats leaving their roosts. Two two-person teams, each operating two to three nets, conducted the mist-netting survey and one USFWS-approved biologist monitored all survey activities.

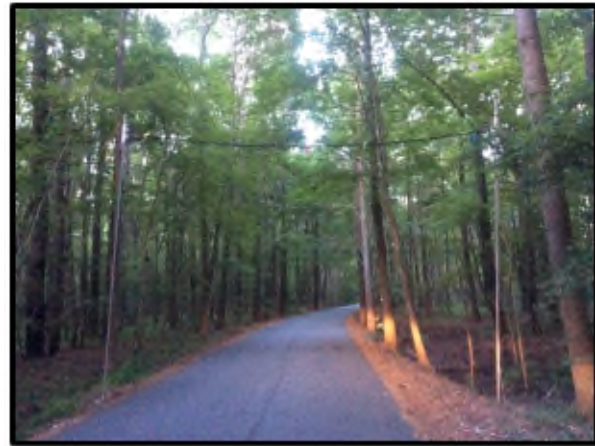
A combination of triple-high (three nets stacked upon another, 7.8 meters height) and double-high (two nets stacked upon another, 5.2 meters height) were set up each night (Figure 3-1). Depending on the site, nets varied in length from 6 to 9 meters and were positioned to maximize coverage of flight paths, including suitable travel corridors, foraging areas, and/or drinking areas. These areas act as natural corridors and funnel bats toward the nets. Nets were set at dusk and monitored until at least 00:15 hours, for a minimum of 5 hours. If bats continued to be captured, nets were left up until as late as 01:30 hours.

Bats were live-caught in mist-nets and released unharmed near the point of capture. Nets were checked at an interval of every 10 minutes and processing was completed within 30 minutes from the time the bat was removed from the net. Biological and morphometric data was recorded for each individual captured (e.g., time of capture, capture net, species, sex, age class, reproductive condition, mass, and forearm length). A juvenile bat is generally considered less than 1 year old and determined through the observation of a long smooth joint demonstrating incomplete epiphyseal ossification (fusion) of the metacarpal-phalangeal joint that are not present in the ossified knobby adult joints. Bats become reproductively active around 1 year old. Each bat was also banded on the forearm with a unique number for later identification (Figure 3-2). Time, weather, global positioning system location of each net site and hourly weather conditions also were recorded. To reduce human error, data was recorded in Chiro, an iPad application, for ease of tracking and compiling data. Mist-net information and capture data is provided in Appendix C.

Caution was taken during mist-net activities to minimize the potential for transmission of WNS by following the most recent decontamination protocols of the USFWS (2008). For example, bats were held in paper bags until processed, and holding bags were disposed of after each use. Bats were evaluated for potential WNS infection following the *Wing-Damage Index Used for Characterizing Wing Condition of Bats Affected by White-nose Syndrome* by Reichard (no date).



DNA 1 Net B



DNA 2 Net A

Figure 3-1. Representative Photos of Net Sites at NASO Dam Neck Annex – 2015.

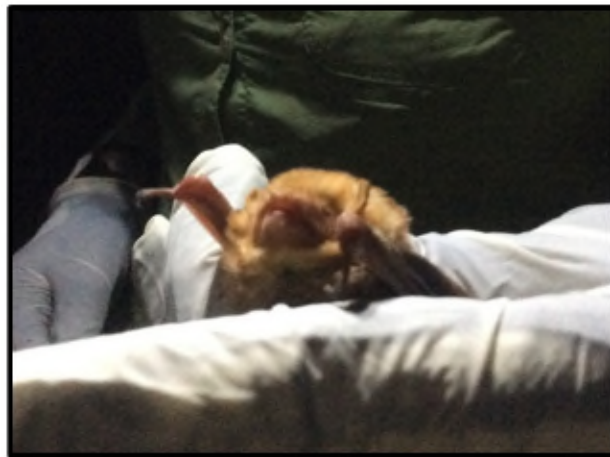


Photo Credit: Biological Diversity Research Institute

Figure 3-2. Photo of an Eastern Red Bat (*Lasiurus borealis*) Captured at NASO Dam Neck Annex – 2015.

3.2 ACOUSTIC SURVEYS

3.2.1 Bat Detectors

Tetra Tech used Wildlife Acoustic Song Meter SM2 Monitoring Systems (bat detectors, Appendix D) for the duration of the acoustic monitoring survey, 475 detector nights from spring to fall in 2015, 11 March to 17 November, 2015. Each bat detector station consisted of a 25–50 watt solar panel, a 12-volt DC battery encased in a waterproof housing, and the acoustic detector. The SMX-U1 microphone was attached to the recording unit by a high-quality, low-loss microphone cable.

Each bat detector was manually checked by trained technicians approximately monthly during the survey period.

Two ground-based bat detectors (VADM-1 and VADM-2) with microphones 1.5 meters from the ground were deployed. Sampling locations were based on representative habitats within the Installation. Preference was given to areas with potential for high bat activity and areas available for access (Figure 3-3). Each detector was powered by a battery that is charged during the day with solar panels, thus the locations were limited by solar availability. VADM-1 (Site 1) was located in a small periodically mowed clearing along a jogging trail south of Regulus Ave. The clearing contained an early successional community dominated by a variety of herbaceous vegetation, including invasive species such as Chinese lespedeza (*Lespedeza cuneata*) and common reed (*Phragmites australis*). Immediately surrounding the clearing was a dense scrub-shrub community dominated by loblolly pine (*Pinus taeda*), wax myrtle (*Morella cerifera*), and greenbrier (*Smilax* sp.), with palustrine forested wetlands to the south. VADM-2 (Site 2) was located on a regularly mowed strip of lawn along a perimeter fence on the southeast edge of the Marine Corps Reserve Facility on South Birdneck Rd. A pond and palustrine forested wetland community dominated by red maple (*Acer rubrum*) and sweetgum (*Liquidambar styraciflua*) was located directly east, outside of the fence.

To ensure that the greatest period of bat activity was surveyed, bat detectors were programmed to begin recording at sunset and stop recording approximately at sunrise each day. The Installation was continuously surveyed from 11 March to 17 November 2015, to sample the spring and fall migration and maternity periods for the majority of North American bat species, including federally protected species. All bat detectors remained in their designated locations throughout the study period.

Tetra Tech implemented quality assurance and quality control measures during all stages of data collection, analysis, and report preparation. Bat detector data were downloaded at least once every month. The incoming echolocation calls were recorded onto high-capacity SD data storage cards. The data from the SD data storage cards were then backed up to an external hard drive and sent to a Tetra Tech biologist for analysis. Field biologists submitted data within 7 business days, and data were immediately reviewed to confirm the operational status of the bat detectors.

3.2.2 Bat Call Analysis

There are three parts to bat call data analysis that, when synthesized, produce the most accurate final tally of bat species activity. First, Tetra Tech used Kaleidoscope Pro v 3.1.4b (Wildlife Acoustics Inc. (WA) software to filter and analyze all recordings. All recorded data files were filtered to identify data files containing potential bat calls⁶ or passes. The software analysis, therefore, included only files of suitable quality and duration, defined as individual call pulses exhibiting the full spectrum of frequency modulation produced by a bat (i.e. sonogram consisting of sharp, distinct lines) between 8 and 120 kHz with at least two call pulses. The Kaleidoscope

⁶ Each recorded event including a bat vocalization consists of individual “call pulses” that comprise a “bat call sequence” or “bat passes”.

classifier was set to include species occurring in or near Virginia Beach, Virginia, and at the “-1 More Sensitive” setting, per USFWS recommendations (USFWS 2015b). This generates a summary of the number of bat calls of each species and a maximum likelihood estimate (MLE) report. Seminole bats are acoustically indistinguishable from eastern red bats and not offered as a classifier within Kaleidoscope Pro. Townsends big-eared bat and Rafinesque’s big-eared bat are also almost identical acoustically so although Rafinesque’s is not a Kaleidoscope Pro classifier, Townsend’s is an appropriate proxy and offered as a classifier.

The second step is to examine the MLE report that is generated by the Kaleidoscope Pro software. Many species have significant overlap in call frequency and shape and for each species there is a known error rate for misclassifications of each species by the software. Therefore, the MLE report provides statistical probability values (p -values) to help determine if a species is likely present ($p = \leq 0.05$) or absent at each location given the known error rate of classification. A subset of calls from species with high MLE values (indicated absence) are then manually vetted in an attempt to confirm presence or absence.

SonoBat 4.0.6 NE (SonoBat, Inc.), with its superior spectrogram platform, was chosen for manual review so classifications could be cross-validated with an additional software program. All calls classified as NLEB were manually reviewed by Tetra Tech in full spectrum format to confirm the automated classifications due to NLEB’s status as a federally threatened species. Calls classified as “High Frequency” (frequency center above 40 kHz) or “Low Frequency” (frequency center below 40 kHz) during manual review lacked detail to be identified at the species level (e.g., too far from the microphone or noise interference). To positively confirm an NLEB call there must be 3–5 call pulses that exceed 120 kHz that are not broken in the middle or oversaturated. Those calls that were determined through manual vetting as probable NLEB calls, but did not meet the stringent standards stated above, were labelled as “Possible NLEB.” Manual review can confirm species that were not considered to have probable presence, indicated by a high MLE, due to error rate of software automatic classification. Representative samples of each of the remaining species were checked for software accuracy by manual vetting until 10 calls for each detector were positively identified.

Manual vetting showed that half of the hoary bat calls manually vetted ($n=20$) were noise files. Low frequency electronic or insect noise can trigger the detector and be classified as a hoary bat call. The approach phase and feeding buzzes of eastern red bats are often misclassified as myotis sp. by software programs due to their steeper slope and toes at the end of the calls that mimic myotis sp call pulses. Manual vetting showed high percentages of incorrect classifications of eastern red bat calls as southeastern bats, little brown bats, and NLEB. The high activity rates of little brown bats may be misleading, and are most likely eastern red bats, especially because of the high activity rates of eastern red bats in the area.



VADM-1



VADM-2

Figure 3-3. Photos of Detector Placement at NASO Dam Neck Annex – 2015.

4.0 RESULTS

4.1 MIST-NET CAPTURE

Eight bats were captured over 8 net nights between 27 July and 28 July in 2015 (Table 4-1). Eastern red bats represented 75 percent of the bats captured. Of the remaining 25 percent, 13 percent were big brown bats and 13 percent were Rafinesque’s big-eared bat. Four bats escaped the net before metrics were able to be taken, leaving the remaining four bats for processing. Two of the bats processed were non-reproductive males. The other two were females: one was non reproductive and one was a post-lactating eastern red bat. In addition, two of the processed bats were adults and two were juvenile eastern red bats.

Table 4-1. Nightly Summary of bats captured at NASO Dam Neck Annex, Virginia - 2015.

Species	DNA 1: Red Maple, Sweet Gum, Loblolly Pine, Long Leaf Pine		DNA 2: Short Leaf Pine, Sweet Gum, Thorny Olive, Live Oak		Species Total
	27 July 2015	28 July 2015	27 July 2015	28 July 2015	
Rafinesque's big-eared bat			1		1
Big brown bat		1			1
Eastern red bat	3	2		1	6
Site Total	6		2		8

4.2 ACOUSTIC SURVEY RESULTS

During the 2015 survey, 475 detector-nights were sampled over the course of 251 calendar nights between 11 March and 16 November 2015 (Table 4-2). A total of 94,261 bat calls were detected, resulting in an overall activity rate of 198 bat calls/detector night (Table 4-2). VADM-1 was fully functional during the operation period, VADM-2 had an extremely high call volume and filled up the cards before they were switched out leading to four small data gaps.

Table 4-2. Acoustic Effort and Summary at NASO Dam Neck Annex, Virginia - 2015.

Detector	Level of Effort				Call Sequence Summary		
	Operational Period (2015)	Detector Nights	Survey Nights Available	Percentage of Survey Period Detectors were Functional	Total # of Bat Calls	Min, Max # of Calls per Night	Activity Rate: bat calls/detector night (SE)
VADM-1	Mar 11–Nov 17	251	251	100%	6,032	0, 373	24 (3.2)
VADM-2	Mar 11–May 9 May 14–May 28 June 5–Jul 13 Jul 22–Jul 28 Aug 6–Nov 16	224	251	89%	88,229	0, 2,367	394 (32.2)
Overall*		475	502	95%	94,261	0, 2,367	198 (17.5)

* Represents cumulative values for detector nights and total number of calls and pooled range and activity rates across all detectors in the Project area.

4.2.1 Species Presence and Activity Rates

Nine species and three groups were detected acoustically (Table 4-3). Eastern red bats/Seminole bats were the most commonly recorded (76 percent of the total calls recorded), followed by evening bats (13 percent), tri-colored bats (5 percent), and little brown bats (4 percent). Species with less than 1 percent of the total calls included NLEB, possible NLEB, big brown bats, hoary bats, silver haired bats, southeastern bat, high frequency, and low frequency (Table 4-3). High and low frequency groups contain calls that are not clear enough to distinguish a specific species and can only be designated as high or low frequency type calls. Eastern red bats and Seminole bats were placed in the same group because their echolocation calls are indistinguishable from each other. MLE values show probable presence at the Installation of eastern red bats/ Seminole bats and tri-colored bats, but manual review confirms presence of all species listed above.

Activity rates were calculated for each detector and for each species by detector (Table 4-4). Activity rates are calculated by dividing the total number of calls by detector nights, which normalizes the data among differing survey efforts or detector functionality. Normalizing the data allows comparison across detectors, species, and other Installations. Average activity rates among all detectors was 198 bat calls/detector night, with the highest rate occurring at VADM-2, 394 calls per night compared to only 24 at VADM-1 (Table 4-4). Compared to other Navy bases in Virginia, the Installation had lower activity rates than average (Table 4-5). In addition, there were lower activity rates of big brown bats, silver-haired bats, and tri-colored bats than would be expected compared to the following Navy bases: Joint Expeditionary Base Fort Story, Naval Support Activity Hampton Roads Northwest Annex, and Naval Weapons Station Yorktown/ Naval Supply Center Cheatham Annex (Table 4-5).

Table 4-3. Bat Calls Recorded per Species at Each Detector Before and After Manual Vetting

		Rafinesque's big-eared bat	Big brown bat	Eastern red/Seminole bat	Hoary bat	Silver-haired bat	Southeastern bat	Little brown bat	NLEB	Possible NLEB	Evening bat	Tri-colored bat	High Frequency	Low Frequency	Total
Before Manual Vetting	VADM-1	1	53	4,167	20	57	420	715	54	N/A	371	178	N/A	N/A	6,036
	VADM-2	1	231	67,432	81	350	3	3,415	3	N/A	11,909	4,811	N/A	N/A	88,236
	Total	2	284	71,599	101	407	423	4,130	57	N/A	12,280	4,989	N/A	N/A	94,272
	MLE	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	N/A	1.00	0.00	N/A	N/A	
After Manual Vetting	VADM-1	0	52	4,219	14	55	405	704	1	3	369	178	27	5	6,032
	VADM-2	0	230	67,450	74	349	1	3,399	0	0	11,909	4,811	6	0	88,229
	Total	0	282	71,669	88	404	406	4,103	1	3	12,278	4,989	33	5	94,261

Table 4-4. Average Activity Rates (Bat Calls/Detector Night) Recorded per Species at Each Detector

	Rafinesques big-eared bat	Big brown bat	Eastern red/Seminole bat	Hoary bat	Silver-haired bat	Southeastern bat	Little brown bat	NLEB	Possible NLEB	Evening bat	Tri-colored bat	High Frequency	Low Frequency	Total (SE)
VADM-1	0	<1	17	<1	<1	2	3	<1	<1	1	1	<1	<1	24 (3.2)
VADM-2	0	1	301	<1	2	0	15	0	0	53	21	<1	0	394 (32.2)
Total	0	1	151	0	1	1	9	0	0	26	11	0	0	198 (17.5)

⁷ Townsend's big eared bat is used as a proxy classifier for Rafinesque's big eared bats by the acoustic software analysis program Kaleidoscope Pro

Table 4-5. Mean Activity Rate Comparison Across Coastal Navy Bases of Virginia - 2015

	NAS Oceana Dam Neck Annex	JEB Fort Story	NSAHR Northwest Annex	NWS Yorktown and NSC Cheatham Annex	Mean Activity Rates
Number of Detectors	2	2	2	5	
Detector Nights	475	481	472	1,145	
Rafinesque's big-eared bat	0	1	0	0	0
Big brown bat	1	23	25	13	15
Eastern red bat	151	134	136	39	115
Hoary bat	0	2	4	0	2
Silver-haired bat	1	24	14	13	13
Southeastern bat	1	0	1	1	1
Little brown bat	9	8	24	5	12
NLEB	0	0	0	0	0
Possible NLEB	0	0	0	0	0
Evening bat	26	32	44	10	28
Tri-colored bat	11	184	77	19	73
Min, Max Activity Rate per Detector	24, 394	96, 752	293, 358	34, 252	
Installation Activity Rate	198 (17.5)	410 (22.9)	324 (18.0)	99 (6.3)	258

Data Source: Tetra Tech 2016a, 2016b, 2016c

4.2.2 Timing of Activity

Bat activity was first detected on 11 March (first day of recording) and calls were recorded until the detectors were removed on 16 November 2015. First and last acoustic detection is available for each species in Table 4-6. Bat activity peaked in mid-August, over 1,500 call per night weekly average for all detectors combined (Figure 4-1). Two smaller spikes occurred in late May and late July with weekly averages of almost 1,000 calls per night and over 1,400 calls per night respectively. Periods of low activity following 9 May, 28 May, 13 July, and 28 July were due to detector data gaps and not actual low bat activity.

Eastern red/Seminole bats accounted for the majority of migratory bat activity and were most active during May, July, and late October, with two large spikes in late July and early August (Figure 4-2). Evening bats mirrored this activity pattern, but at lower activity rates. Hoary bats and silver-haired bats were at too low of activity rates to observe patterns.

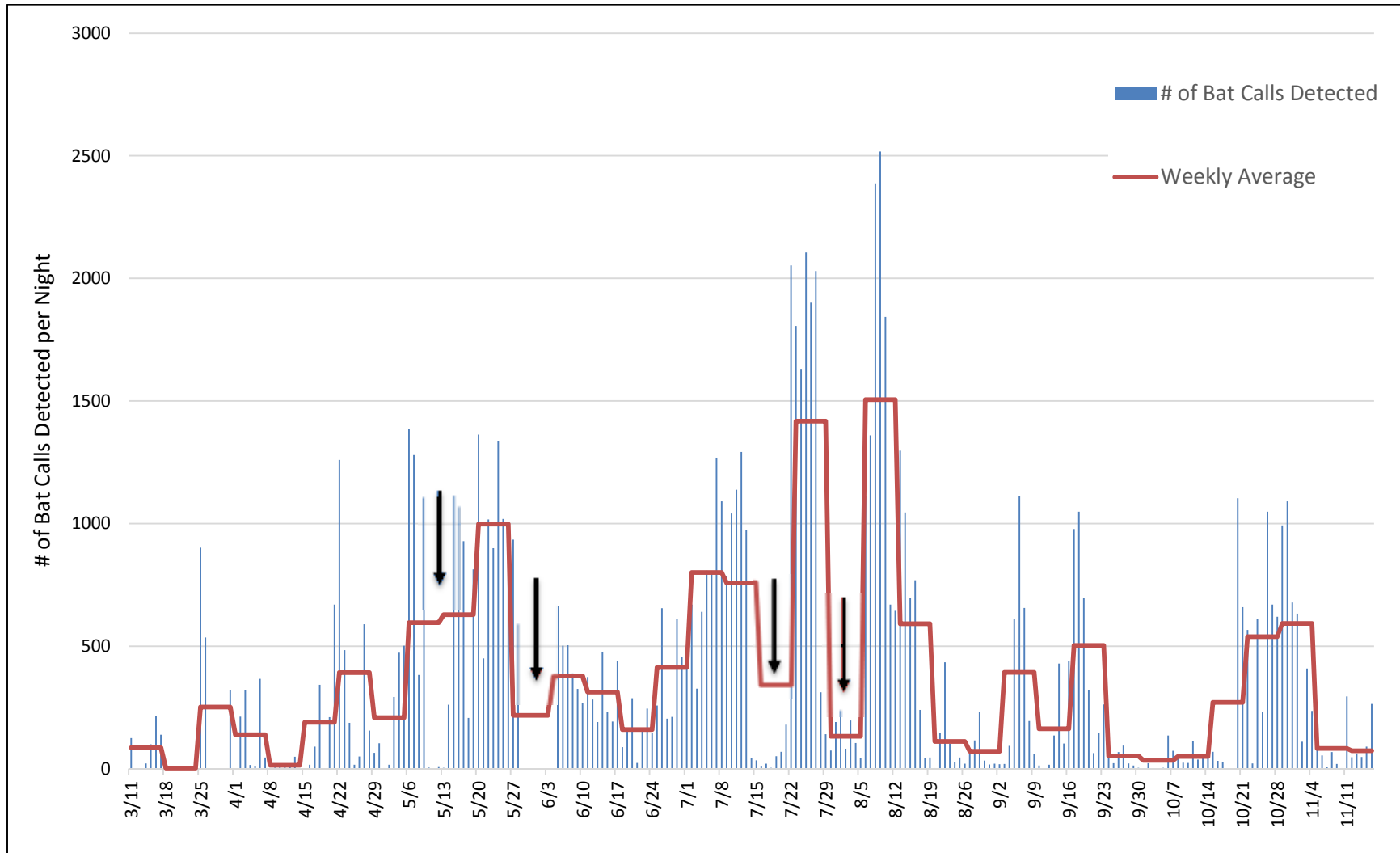
Tri-colored bats were the most active hibernating species with activity in April and July, there was low activity during May and June (Figure 4-3). Southeastern bats were largely absent until late July and were active through the end of the survey period. Big brown bats had steady, but low activity from April through November, with the peak of activity reaching over 20 calls per night

on 11 June. Little brown bats appeared to have steady activity through the spring and summer and then again before hibernation. Manual vetting, however, showed that the majority of these calls are most likely misclassified eastern red bats and southeastern myotis calls.

Table 4-6. First and Last Acoustic Detection per Species

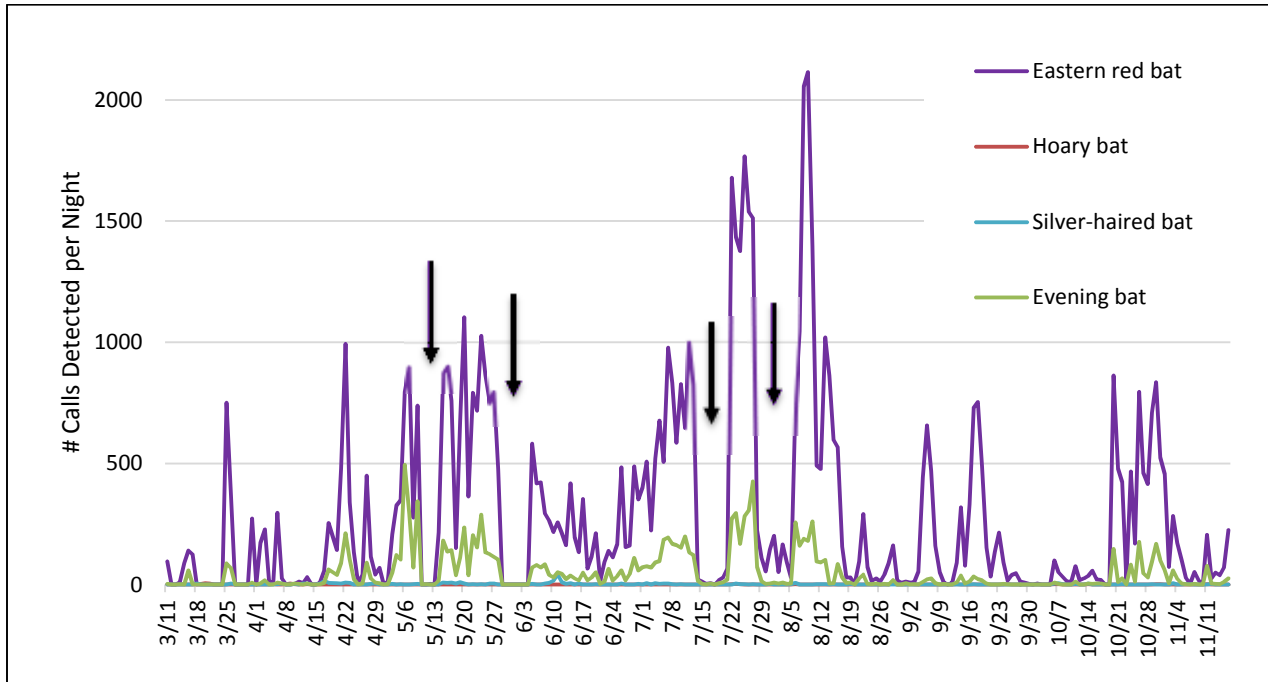
Species	First Detection Acoustically	Last Detection Acoustically
Big brown bat	3/16/2015	11/12/2015
Eastern red bat	3/11/2015	11/16/2015
Hoary bat	3/18/2015	11/15/2015
Silver-haired bat	3/16/2015	11/13/2015
Southeastern bat	7/22/2015	11/12/2015
Little brown bat	3/11/2015	11/16/2015
NLEB	10/13/2015	10/13/2015
Possible NLEB	9/15/2015	10/13/2015
Evening bat	3/11/2015	11/16/2015
Tri-colored bat	3/11/2015	3/11/2015

Figure 4-1. Total Number of Calls Recorded by Date at all Detectors



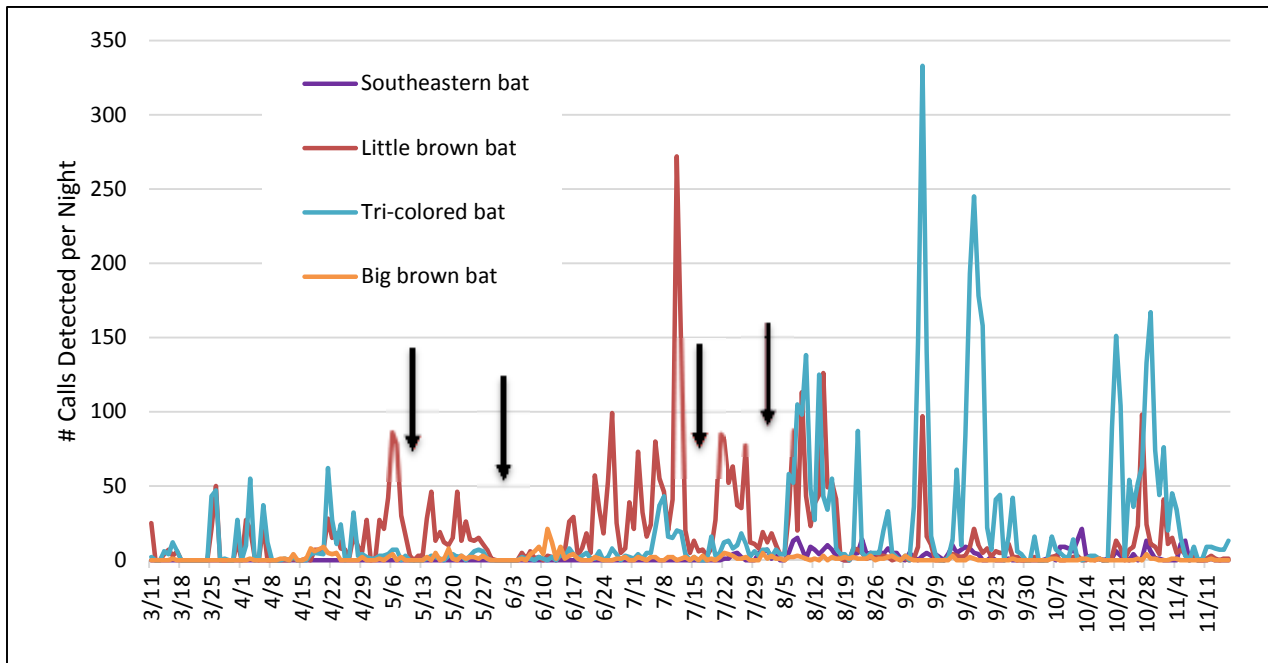
Arrows indicate data gaps in VADM-2 due to exceeding memory card storage capacity (9-14 May, 28 May-5 Jun, 13-22 Jul, 28 Jul- Aug 6)

Figure 4-2. Total Number of Calls Recorded by Date and Migrating Species at All Detectors



Arrows indicate data gaps in VADM-2 due to exceeding memory card storage capacity (9-14 May, 28 May- 5 Jun, 13-22 Jul, 28 Jul- Aug 6

Figure 4-3. Total Number of Calls Recorded by Date and Hibernating Species at All Detectors



Arrows indicate data gaps in VADM-2 due to exceeding memory card storage capacity (9-14 May, 28 May- 5 Jun, 13-22 Jul, 28 Jul- Aug 6

5.0 DISCUSSION

The baseline survey at NASO Dam Neck Annex acoustically documented activity of at least nine different species of bat including big brown bat, eastern red/Seminole bat, hoary bat, silver-haired bat, little brown bat, evening bat, southeastern bat, NLEB, and tri-colored bat. Due to the inability to distinguish between eastern red bat and Seminole bat calls, it is not possible to determine presence of both of these species acoustically. Eastern red bats, however, are very common and Seminole bats only occur occasionally in Virginia. Mist-net surveys further confirmed the presence of big-brown bats and eastern red bat, as well as the presence of Rafinesque's big-eared bat that has a quiet call that is not often observed in acoustic surveys. In a previous survey in 2014, mist-netting also captured evening bats and southeastern bats, which confirms their presence at the Installation (Tetra Tech unpublished data). Species composition at NASO Dam Neck was similar to other Virginia Navy Bases, however, there were lower activity rates than average for big brown bats, silver-haired bats, and tri-colored bats (Table 4-5). The overall activity rate at NASO Dam Neck was also lower than the average activity rate of other Virginia Navy bases (Table 4-5).

The majority of bats recorded at the Installation were eastern red/Seminole bat and evening bat, which is typical for white-nose affected areas. WNS is a fungal pathogen caused by the fungus *Pseudogymnoascus destructans*. It is responsible for unprecedented mortality of hibernating bats and has killed an estimated 5.5 -5.7 million bats since its 2006 discovery in eastern New York (USFWS 2012, USFWS 2015a, Veilleux 2008). WNS has hit hibernating species like myotis species and tri-colored bats the hardest, which could explain why myotis are found in small numbers at the Installation. Tri-colored bats were detected at relatively high rates compared to myotis species, however, a study in New York showed no statistical differences between acoustic detection of tri-colored bats before and after WNS (Ford *et al.* 2011). In contrast, caves surveyed in Virginia found a decline of almost 90 percent of tri-colored bats (388 individuals in 2009 to 42 in 2012) (VADGIF 2012).

Federally listed NLEB are present, but at very low rates likely due to the lack of contiguous mature forest at the Installation. However, the forested North Landing River corridor (5 miles away) leads to the Great Dismal Swamp National Wildlife Refuge (25 miles away) providing 112,000 acres of important forest habitat. Precipitous declines have been documented for NLEB over the last three years. Sampled populations of NLEB in New York, Massachusetts, and Vermont declined 93 percent overall between the first year of exposure to WNS in 2006 and 2009 (Langwig *et al.* 2009). Thus, it is expected that NLEB represents less than 1 percent of all bat call sequences in this survey.

Southeastern bats are also found in low activity rates, however, the Installation is beyond the northern boundary of their commonly published range (Harvey 2011, Kays and Wilson 2009). They have been detected and captured at multiple Navy bases in Virginia, so they may be expanding their ranges to fill the niche that myotis species declining from WNS have left vacant or may have been detected due to increased survey effort in the area.

Little brown bats have had one of the highest mortality rates from WNS and are estimated to have a population decrease of 91 percent in the east (Turner *et al.* 2011). Little brown bats have deceptively high activity rates and are likely much lower due to eastern red bat calls mimicking little brown bat calls. Historically, however, little brown bats were one of the most common bats in this area.

Big brown bats are less affected by WNS (Frank *et al.* 2014) and red bats, hoary bats, and silver-haired bats are migrators rather than hibernators, which allow them to avoid hibernacula that harbor this fungus. Big brown bats select areas of caves for hibernation that are colder with less humidity, which inhibits the fungus' growth (Hayman *et al.* 2016). Their body size also allows for a greater amount of body fat during hibernation which mitigates the effects of WNS (Hayman *et al.* 2016). Therefore, it is unexpected to see the low activity rates of big brown bats at the Installation as they are usually extremely common across the landscape in Virginia (Table 4-5). Hoary bats and silver-haired bats similarly had low activity rates that are uncharacteristic for Virginia. Both detectors were placed in open habitats that would attract both hoary bats and silver-haired bats for foraging.

In addition to high activity rates, both post-lactating and juvenile individuals of eastern red bats were captured, suggesting breeding populations in the area. Even during the maternity season, however, they remain solitary and do not form colonies. Eastern red bats tend to forage in the same areas each night and circle for long periods of time, so often the same bat will trigger the detector multiple times leading to high activity rates that do not necessarily equate to abundance.

5.1 DETECTOR HABITAT DIFFERENCES

Although all local bats are aerial insectivores, each species specializes in or prefers certain habitats for foraging and roosting. Detectors were placed in differing, but highly suitable habitats to get a picture of the bat community at the Installation. Overall the detectors recorded large variations in activity between habitats and for each separate species.

There were large differences in activity between the two detector sites at the Installation (374 call per night activity rate difference). VADM-1 had the lowest activity rates and was located near a jogging trail within a mowed clearing whereas VADM-2 was also in a mowed field, but near a pond. The pond could be the closest large water source for bats inhabiting many different habitats. Bats, particularly reproductive females, spend the day in roosts with high temperatures causing them to lose water during the hot summer months (Johnson and Gates 2008). Species require drinking water to replenish evaporated water in addition to water provided in their insect prey (Hayes 2003). Proximity to water is often associated with better foraging habitat and therefore more frequent bat use (Carter *et al.* 2003, Grindal *et al.* 1999). Therefore, a large water source may have drawn in many different species and at high activity rates.

Southeastern bats were the only species detected more often in VADM-1 than VADM-2. This species is usually associated with foraging over water and catching insects just above the water's surface (Harvey 2011, Kays and Wilson 2009). Therefore this result is unexpected because we would expect them to be near the pond and detected more often at VADM-2.

5.2 NIGHTLY ACTIVITY

There were weekly average spikes in call rates during each life history event throughout the seasons surveyed. The first spike occurred during late May when bats typically return to the area from their hibernacula and winter ranges, or migrate through the area heading for more northern summer ranges. The bats remained active during the maternity periods of June and July. When maternity colonies are present, females often forage near their roosts so they can return to nurse their young throughout the night, leading to high localized activity (Swift 1980). This was followed by a spike in late July and the peak in early August when bat pups become volant (able to fly) and increase the number of bats out foraging. In late August and September maternity colonies disperse leading to a decrease in activity. Finally, activity spiked in late October when bats gather to enter hibernaculum and migrate south for the winter.

The spikes in activity among species often occurred on the same nights. When spikes of different species coincide it indicates periods of high insect abundance or good weather, such as high temperatures, low wind, and no precipitation. An example of this is late in October when eastern red/ Seminole bats, evening bats, tri-colored bats, and little brown bats all had activity spikes. Eastern red bats and evening bats may be migrating during favorable weather conditions. Little brown bats and tri-colored bats may be foraging to build up fat reserves before hibernation or swarming before traveling to a nearby hibernaculum. Swarming behavior brings male and female bats together, who largely roost separately through the summer, to choose mates, breed, and locate suitable hibernacula (Fenton 1969). Eastern red/ Seminole bats, however, had two large spikes in activity, over 2,000 calls per night, after the volancy period that did not coincide with other species. In conjunction with the juveniles caught it suggests large breeding populations near the Installation that became volant and were out foraging.

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APPENDIX A
PHOTO LOGS OF MIST-NETS AND BATS CAPTURED

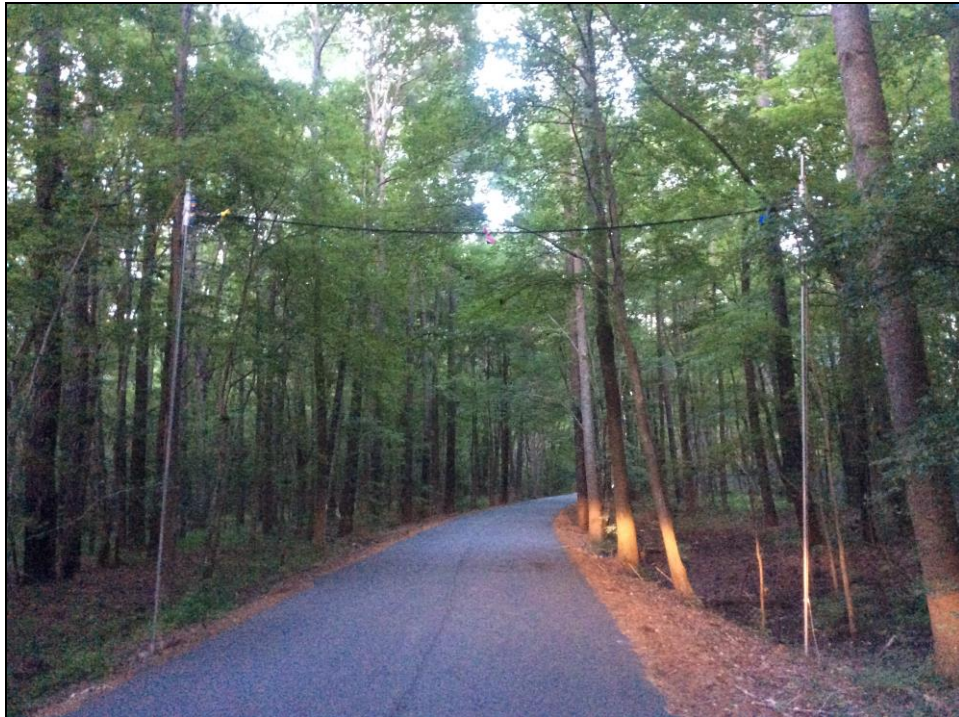
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Base: Dam Neck	Site # 1	Net # A	Lat: 36.77862	Long: -75.96925
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Base: Dam Neck	Site # 1	Net # B	Lat: 36.77848	Long: -75.97043
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Base: Dam Neck	Site # 2	Net # A	Lat: 36.81203	Long: -75.97197
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Base: Dam Neck	Site # 2	Net # B	Lat: 36.81206	Long: -75.97078
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Eastern red bat <i>Lasiurus borealis</i>	Date Photo Taken: 7/24/2015	Base: Dam Neck	Site # 2	Lat: 36.77862
		Band # DEY2753	Net # A	Long: -75.96925

APPENDIX B
RESUMES AND PERMITS FOR FIELD CREWS

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DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

BIODIVERSITY RESEARCH INSTITUTE
652 MAIN STREET
GORHAM, ME 04038
U.S.A.

2. AUTHORITY-STATUTES
16 USC 1539(a)

REGULATIONS
50 CFR 17.22

50 CFR 13

3. NUMBER
TE63633A-2 AMENDMENT

4. RENEWABLE
 YES
 NO

5. MAY COPY
 YES
 NO

6. EFFECTIVE
07/12/2013

7. EXPIRES
07/31/2015

8. NAME AND TITLE OF PRINCIPAL OFFICER *(If #1 is a business)*
DAVID C EVERS
EXECUTIVE DIRECTOR

9. TYPE OF PERMIT
NATIVE ENDANGERED SP. RECOVERY - E WILDLIFE

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
OHIO, GEORGIA, ALABAMA, LOUISIANA, MISSISSIPPI, KENTUCKY, TENNESSEE, NEW YORK AND NEW JERSEY

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL, TRIBAL, OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE

C. CONTINUED: THE FOLLOWING INDIVIDUALS ARE AUTHORIZED TO CONDUCT ACTIVITIES AS AUTHORIZED BY THIS PERMIT: TIMOTHY DIVOLL, DAVID YATES, DUSTIN MEATTEY, CARL ANDERSON AND FOR INDIANA BATS ONLY: JONATHAN FIELY.

TRAINED ASSISTANTS NOT NAMED ON THIS PERMIT MAY WORK ON PERMITTED BAT ACTIVITIES UNDER THE DIRECT AND ON-SITE SUPERVISION OF THE INDIVIDUALS NAMED ABOVE. HOWEVER, TRAINED ASSISTANTS MAY NOT WORK INDEPENDENTLY AT A SITE. TRAINED ASSISTANTS ARE INDIVIDUALS WHO ARE CONSIDERED QUALIFIED BY THE PERMITTED BIOLOGIST(S) TO SELECT SAMPLING SITES, DEPLOY SAMPLING EQUIPMENT AND NETS, AND HANDLE BATS IN THE FIELD AS STATED IN CONDITION F, BELOW.

D. THE FOLLOWING CONDITIONS APPLY WHEN WORKING IN THE FOLLOWING STATES; TENNESSEE, GEORGIA, ALABAMA, LOUISIANA, MISSISSIPPI AND KENTUCKY :

PERMITTEE IS AUTHORIZED TO TAKE (ACOUSTICAL MONITORING, ENTER HIBERNACULA OR MATERNITY ROOST CAVES, SALVAGE DEAD BATS, CAPTURE WITH MIST NETS OR HARP TRAPS, HANDLE, IDENTIFY, COLLECT HAIR SAMPLES, BAND, TRANSMITTER, LIGHT-TAG, WING-PUNCH, AND SELECTIVELY EUTHANIZE FOR WHITE NOSE SYNDROME TESTING) INDIANA BATS (MYOTIS SODALIS) AND GRAY BATS (MYOTIS GRISESCENS) WHILE CONDUCTING PRESENCE/ABSENCE SURVEYS, STUDIES TO DOCUMENT HABITAT USE, AND POPULATION

ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS

REPORTS WILL BE PROVIDED TO THE U.S. FISH AND WILDLIFE SERVICE OFFICES APPEARING IN CONDITIONS L, M AND N OF THIS PERMIT. REPORTING CONTENT, FORMAT, SUFFICIENCY AND FREQUENCY ARE OUTLINED IN CONDITION K OF THIS PERMIT.

ISSUED BY

TITLE *Acting*
CHIEF, DIVISION OF ENDANGERED SPECIES

DATE

07/12/2013

MONITORING, AS CONDITIONED BELOW.

1. FOR ALL ACTIVITIES CONSIDERED WITHIN THIS PERMIT, THE **DISINFECTION PROTOCOL FOR BAT FIELD STUDIES** SHALL BE FOLLOWED. YOU ARE REQUIRED TO USE THE MOST RECENT PROTOCOLS AVAILABLE. YOU SHALL CONTACT THE SERVICE'S OFFICE LISTED IN M., BELOW FOR A COPY OF THE PROTOCOL EACH YEAR AND TO DETERMINE IF ANY SITE SPECIFIC MODIFICATIONS ARE REQUIRED.
2. UPON DETERMINATION THAT ENDANGERED BATS ARE PRESENT, THE PERMITEE SHALL NOTIFY THE SERVICE FIELD OFFICE IN THE STATE IN WHICH THE SITE IS LOCATED AND THE CORRESPONDING REGIONAL OFFICE.
3. DEAD BATS MAY BE SALVAGED AND IDENTIFIED (INCLUDING PHOTOGRAPHIC DOCUMENTATION), AND SENT TO THE APPROPRIATE LAB FACILITIES FOR THE PURPOSES OF EVALUATING IMPACTS FROM THE CAUSE OF DEATH (WHITE-NOSE SYNDROME, WIND ENERGY OPERATIONS, ETC.). ANY DISCOVERY OF FEDERALLY LISTED SPECIMENS SHALL BE REPORTED, WITHIN 48 HOURS OF DISCOVERY, TO THE USFWS FIELD SUPERVISOR IN THE STATE IN WHICH THE SALVAGE OCCURS. YOUR REPORT MUST BE IN WRITING AND MUST INCLUDE INFORMATION ON THE SPECIES, SEX, LOCATION, DATE, TIME, AND ANY OBSERVATIONS ON THE CONDITION OF THE SPECIMEN. SPECIMENS MUST BE CHILLED AND SURRENDERED TO THE OFFICE IN CONDITION M., BELOW, UNLESS OTHERWISE INSTRUCTED BY THAT OFFICE.
4. BATS MAY BE CAPTURED WITH MIST NETS AND HARP TRAPS. THE MONITORING INTERVAL FOR MIST NETS MAY NOT EXCEED 10 MINUTES. BATS MAY BE CAPTURED WITH HARP TRAPS ONLY WITH WRITTEN CONCURRENCE FROM THE FIELD SUPERVISOR IN THE STATE IN WHICH TRAPPING IS PROPOSED. HARP TRAPS MUST BE CONTINUALLY MONITORED. CAPTURED BATS MAY NOT BE HELD FOR MORE THAN 30 MINUTES, UNLESS INJURED. FOR ESA COMPLIANCE PROJECTS INVOLVING SURVEY WORK FOR THE INDIANA BAT IN KENTUCKY, INDIVIDUALS REFERENCED IN CONDITION C. ABOVE MUST FOLLOW THE INDIANA BAT SURVEY GUIDANCE ISSUED BY THE U.S. FISH AND WILDLIFE SERVICE, KENTUCKY FIELD OFFICE AND KENTUCKY DEPARTMENT OF FISH AND WILDLIFE RESOURCES (ATTACHED). FOR INDIANA BAT SURVEY WORK CONDUCTED IN KENTUCKY, THIS GUIDANCE SUPERCEDES OTHER CONDITIONS LISTED IN THIS PERMIT; THE GUIDANCE MUST BE CURRENT FOR THE YEAR IN WHICH THE SURVEY IS CONDUCTED/REQUIRED.
5. PERMITEES MAY CARRY OUT NON-INTRUSIVE MEASUREMENTS ON CAPTURED BATS.
6. UNIQUELY NUMBERED, MODERN, LIPPED, CORRECTLY SIZED ALUMINUM BAT BANDS SHALL BE USED. SPLIT-RING, PLASTIC BANDS SHALL BE AVOIDED.
7. PRIOR TO CONDUCTING ACTIVITIES WRITTEN APPROVAL SHALL BE RECEIVED FROM THE PERMIT COORDINATOR AND/OR APPROPRIATE FIELD OFFICE LISTED IN CONDITION M AND N., BELOW.
8. COPIES OF ALL REQUEST AND APPROVAL LETTERS, WITH THE PERMIT NUMBER INCLUDED, SHALL BE FORWARDED TO THE PERMITS COORDINATOR LISTED IN CONDITION L, M AND N., BELOW.
9. RADIO TRANSMITTERS (TOTAL PACKAGE WEIGHT NOT TO EXCEED 7.5 PERCENT (5 PERCENT RECOMMENDED) OF BODY WEIGHT OR 0.45 GRAM, WHICHEVER IS LESS) MAY BE ATTACHED TO BATS DURING THE SPRING, SUMMER, AND FALL ROOSTING PERIODS BY NONTOXIC SKIN BOND ADHESIVE. BATS CARRYING TRANSMITTERS SHOULD BE MONITORED DAILY FOR AT LEAST FIVE DAYS, OR UNTIL THE TRANSMITTER FALLS OFF, WHICHEVER OCCURS FIRST. RADIO TRANSMITTERS SHALL NOT BE PLACED ON NEWLY VOLANT JUVENILES WITHOUT PRIOR APPROVAL OF THE APPROPRIATE FIELD OFFICE.
10. SURVEYS OF GRAY BAT MATERNITY ROOSTS AND THEIR OTHER KNOWN SUMMER ROOST SITES SHALL BE CONDUCTED BY OBSERVING THE BATS WITH NIGHT VISION EQUIPMENT AND INFRARED LIGHT SOURCE AS THEY EMERGE FROM THEIR CAVES AND MINE ROOSTS. AT SITES THAT ARE NOT CURRENTLY KNOWN TO SUPPORT THESE SPECIES THE ACCEPTED METHOD TO DETERMINE IF THEY ARE PRESENT IS TO CAREFULLY AND SLOWLY ENTER THE POTENTIAL ROOST SITE AND VISUALLY CHECK FOR EVIDENCE OF THE PRESENCE OF BATS, SUCH AS SIGNIFICANT QUANTITIES OF GUANO, A STRONG SMELL OF GUANO OR THE AUDIBLE SOUNDS PRODUCED BY BATS ROOSTING AT THE SITE. ONCE ANY OF THE INDICATORS ARE OBSERVED, SURVEY TEAM MEMBERS SHALL EXIT THE ROOST SITE AND MAKE FURTHER OBSERVATIONS FROM OUTSIDE THE ENTRANCE TO THE ROOST. ALL FURTHER OBSERVATIONS (WITH AQUOSTICS AND/OR NIGHT VISION EQUIPMENT AND A SUPPLEMENTAL INFRARED LIGHT SOURCE) SHALL BE MADE FROM THE CAVE OR MINE ENTRANCE DURING THE EVENING EMERGENCE. FOR CAVE ENTRY ACTIVITIES, WRITTEN

APPROVAL IS REQUIRED FROM THE U.S. FISH AND WILDLIFE SERVICE FIELD SUPERVISOR FOR THE STATE IN WHICH THE ACTIVITIES ARE PROPOSED.

11. AT SOME SITES, ESPECIALLY ABANDONED MINES, IT IS NOT ADVISABLE TO ENTER A POTENTIAL ROOST BECAUSE OF THE PHYSICAL HAZARDS PRESENT IN THE SITE. ACOUSTICAL MONITORING, MIST NETS, OR HARP TRAPS MAY BE USED OUTSIDE THE ENTRANCE OF THESE SITES TO DETERMINE THE IDENTITY, SEX AND REPRODUCTIVE CONDITION OF BATS USING THE SITE. NETS AND HARP TRAPS SHALL BE CHECKED REGULARLY AND THE MONITORING INTERVAL FOR MIST NETS MAY NOT EXCEED 10 MINUTES. CAPTURED BATS SHALL NOT BE HELD FOR MORE THAN 30 MINUTES, UNLESS INJURED. DATA SHALL BE RECORDED FOR ALL BATS REMOVED FROM THE NET AND/OR TRAP. THESE DATA SHALL INCLUDE SPECIES, SEX, REPRODUCTIVE CONDITION, AND PHYSICAL MEASUREMENTS SUCH AS FOREARM LENGTH, FOOT LENGTH, PRESENCE/ABSENCE OF A KEEL ON THE CALCAR, ETC. BATS MAY BE PHOTOGRAPHED BEFORE RELEASE TO DOCUMENT THEIR PRESENCE AT THE ROOST SITE.
12. IF IT IS DETERMINED TO BE NECESSARY TO DOCUMENT REPRODUCTIVE LEVELS WITHIN A GRAY BAT MATERNITY ROOST THE ROOST MAY BE ENTERED AFTER THE EVENING EMERGENCE OF ADULTS HAS BEEN COMPLETED. ENTRY SHALL BE LIMITED TO SMALLEST NUMBER OF PEOPLE THAT CAN SAFELY ACCOMPLISH THE SURVEY AND ALL SURVEY TEAM MEMBERS WILL EXIT THE ROOST SITE PRIOR TO THE RETURN OF ADULTS TO THE ROOST. THIS ACTIVITY REQUIRES WRITTEN APPROVAL FROM THE U.S. FISH AND WILDLIFE SERVICE FIELD SUPERVISOR FOR THE STATE IN WHICH ACTIVITIES ARE PROPOSED.
13. SURVEYS CONDUCTED DURING THE WINTER HIBERNATION SEASON SHALL FOLLOW THE GUIDELINES ESTABLISHED IN THE RECOVERY PLANS FOR THESE SPECIES. BATS MAY BE HANDLED DURING WINTER SURVEYS IN ORDER TO COLLECT BAND INFORMATION AND CONFIRM THE IDENTIFICATION OF LISTED SPECIES. DETAILED PHOTOGRAPHS MAY BE TAKEN TO DOCUMENT THE PRESENCE OF LISTED SPECIES. ONLY ONE TRIP TO THE HIBERNATION AREA OF EACH CAVE OR ABANDONED MINE IS AUTHORIZED DURING THE HIBERNATION SEASON. INDIANA BAT AND GRAY BAT HIBERNATION SITES SHALL ONLY BE SURVEYED ONCE EVERY TWO YEARS. THIS ACTIVITY REQUIRES WRITTEN APPROVAL FROM THE U.S. FISH AND WILDLIFE SERVICE FIELD SUPERVISOR FOR THE STATE IN WHICH ACTIVITIES ARE PROPOSED.
14. WHEN CONDUCTING INDIANA BAT SURVEYS, THE CURRENT MINIMUM SURVEY GUIDANCE CONTAINED IN THE 2007 DRAFT INDIANA BAT RECOVERY PLAN SHALL BE FOLLOWED; HOWEVER, THE PERMITTEE MUST ADHERE TO ANY ADDITIONAL, SPECIFIC GUIDANCE DEVELOPED FOR THE STATE IN WHICH THEIR PROJECT IS LOCATED. DEVIATION FROM THESE GUIDELINES IS NOT AUTHORIZED VIA THIS PERMIT AUTHORIZATION. HOWEVER, IT IS ENCOURAGED THAT ECHOLOCATION DETECTION EQUIPMENT BE USED TO SUPPLEMENT THE INFORMATION GAINED DURING MIST NET SURVEYS. AT THIS TIME ECHOLOCATION DETECTION CAN NOT BE USED TO POSITIVELY IDENTIFY ALL SPECIES OF BATS THAT MAY BE ENCOUNTERED DURING SUMMER SURVEYS AND THEREFORE IT CAN NOT BE USED TO POSITIVELY ESTABLISH PRESENCE WITHIN THE SURVEY AREA. NO TRAPPING ACTIVITIES SHALL OCCUR WITHIN 20 METERS OF AN INDIANA BAT MATERNITY ROOST SITE, UNLESS PERMITTEE RECEIVES WRITTEN APPROVAL FROM THE U.S. FISH AND WILDLIFE SERVICE FIELD SUPERVISOR FOR THE STATE IN WHICH ACTIVITIES ARE PROPOSED.
15. FECAL MATERIAL MAY BE COLLECTED AFTER A BAT IS CAPTURED BY PLACING IT IN A CLOTH BAG FOR A SHORT TIME (NOT TO EXCEED 30 MINUTES) BEFORE IT IS CAREFULLY EXAMINED AND KEY PHYSICAL CHARACTERS DOCUMENTED. FECAL MATERIAL CAN THEN BE REMOVED FROM THE BAG OR COLLECTED OFF THE FUR OF THE BAT.
16. LIGHT TAGS MAY BE ATTACHED TO THE DORSAL FUR OF A BAT WITH A NONTOXIC ADHESIVE THAT WILL QUICKLY DEGRADE AND LOOSE ITS ADHESIVE QUALITIES. THE SMALLEST AND LIGHTEST CYALUME CAPSULES THAT WILL MEET THE PROJECT OBJECTIVES SHALL BE USED.
17. WING PUNCHES MAY BE TAKEN IN SPRING/SUMMER BY PUNCHING A HOLE IN THE WING MEMBRANE, AVOIDING BONES AND MAJOR BLOOD VESSELS. A SEPARATE BIOPSY TOOL MUST BE USED FOR EACH INDIVIDUAL LISTED BAT.
18. UNDER THE FOLLOWING SPECIFIC CONDITIONS RELATED TO WHITE-NOSE SYNDROME, LISTED BATS MAY BE EUTHANIZED: (A) THE SITE OF COLLECTION HAS NOT BEEN PREVIOUSLY DEMONSTRATED TO CONTAIN WNS-INFECTION OR WNS-INFECTED BATS (LISTED AND/OR NON-LISTED), (B) NO OTHER NON-LISTED BATS ARE PRESENT THAT ALSO SHOW SYMPTOMS OF WNS, AND (C) NO OTHER METHOD OF WNS SAMPLE COLLECTION IS POSSIBLE. IN ADDITION, ONLY ONE LISTED BAT OF ANY SPECIES WILL BE COLLECTED AT A SINGLE ROOST SITE AND ONLY IF CRITERIA (A), (B), AND (C) ARE MET AND THOSE CIRCUMSTANCES

DOCUMENTED BY THE PERMITTEE IN WRITING TO THE SERVICE.

WHEN MORE THAN ONE LISTED BAT SPECIES IS PRESENT WITHIN A SITE AND SHOWING SYMPTOMS OF WNS, THE FOLLOWING ORDER SHOULD BE USED IN SELECTING WHICH INDIVIDUAL TO SELECTIVELY EUTHANIZE FOR WNS TESTING: GRAY BAT BEFORE INDIANA BAT.

19. THE ATTACHED LETTER OF INSTRUCTION, BAT CAVE ADVISORY, AND DISINFECTION PROTOCOL - AND ANY SUBSEQUENT VERSIONS OF THESE ATTACHMENTS SHALL BE FOLLOWED.

D. THE FOLLOWING CONDITIONS APPLY WHEN WORKING IN OHIO, NEW JERSEY AND NEW YORK:

PERMITTEE IS AUTHORIZED TO TAKE (CAPTURE, HANDLE, RADIO-TAG, AND RELEASE) THE INDIANA BAT (*MYOTIS SODALIS*) AND GRAY BAT (*M. GRISESCENS*) FOR SCIENTIFIC RESEARCH AIMED AT RECOVERY OF THE SPECIES: PRESENCE/ABSENCE SURVEYS, STUDIES TO DOCUMENT HABITAT USE, POPULATION MONITORING, AND TO EVALUATE POTENTIAL IMPACTS. THIS PERMIT DOES NOT AUTHORIZE THE COLLECTION OF VOUCHER SPECIMENS.

1. PERMITTEE SHALL NOTIFY THE USFWS FIELD SUPERVISOR FOR THE STATE IN WHICH ACTIVITIES ARE PROPOSED TO OCCUR AT LEAST 15 DAYS PRIOR TO CONDUCTING ANY ACTIVITIES. CONTACT INFORMATION IS CONDITION N., BELOW. YOUR REQUEST MUST BE IN WRITING AND MUST INDICATE:

LOCATION OF PROPOSED ACTIVITIES, INCLUDING PROJECT SITE, COUNTY, AND STATE.

A DESCRIPTION OF THE ACTIVITIES (I.E., SURVEYS, RADIO-TELEMETRY STUDIES, ETC.).

DATES WHEN THE PROJECT IS PROPOSED TO TAKE PLACE.

EVIDENCE THAT PERMITTEE HAS RECEIVED ANY REQUIRED CONTRACTS TO COMPLETE THE ACTIVITIES.

YOU MAY PROCEED WITH ACTIVITIES ONLY UPON RECEIPT OF WRITTEN CONCURRENCE FROM THE APPLICABLE USFWS FIELD SUPERVISOR. *YOUR CONCURRENCE LETTER MUST BE CARRIED WITH THIS PERMIT TO AUTHORIZE SITE-SPECIFIC ACTIVITIES.*

2. PERMITTEE SHALL ADHERE TO THE FOLLOWING CONDITIONS INVOLVING CAPTURE AND HANDLING OF BATS:

A. BATS MAY BE CAPTURED WITH MIST NETS FOLLOWING THE PROTOCOL "INDIANA BAT MIST-NETTING GUIDELINES" (USFWS 2007 DRAFT INDIANA BAT RECOVERY PLAN). THE MONITORING INTERVAL FOR MIST NETS MAY NOT EXCEED 15 MINUTES. CAPTURED BATS MAY BE HELD FOR A MAXIMUM OF 30 MINUTES, UNLESS INJURED. IN EXTENUATING CIRCUMSTANCES, BATS SHALL BE HELD FOR NO LONGER THAN 45 MINUTES.

B. BATS MAY BE CAPTURED WITH HARP TRAPS WITH WRITTEN CONCURRENCE FROM THE FIELD SUPERVISOR IN THE STATE IN WHICH TRAPPING IS PROPOSED. HARP TRAPS MUST BE CONTINUALLY MONITORED. CAPTURED BATS MAY BE HELD FOR A MAXIMUM OF 30 MINUTES, UNLESS INJURED. IN EXTENUATING CIRCUMSTANCES, BATS SHALL BE HELD FOR NO LONGER THAN 45 MINUTES.

C. PERMITTEES MAY CARRY OUT NON-INTRUSIVE MEASUREMENTS ON CAPTURED BATS. LIPPED METAL BANDS HAVING A UNIQUE IDENTIFIER MAY BE APPLIED TO THE FOREARM OF CAPTURED BATS PRIOR TO RELEASE. NO MORE THAN ONE BAND PER BAT MAY BE USED.

D. RADIO TRANSMITTERS MAY BE APPLIED DURING SUMMER ROOSTING PERIOD VIA NONTOXIC SKIN BOND ADHESIVE SUCH AS COLOSTOMY GLUE. THE TOTAL WEIGHT OF THE TRANSMITTER MAY NOT EXCEED 5% OF THE BAT'S BODY WEIGHT AND THE TOTAL WEIGHT OF THE PACKAGE (TRANSMITTER AND ADHESIVE) MAY NOT EXCEED 6% OF THE BAT'S BODY WEIGHT. THE LIGHTEST PACKAGE (BOTH TRANSMITTER AND ADHESIVE) CAPABLE OF ACCOMPLISHING THE REQUIRED TASK SHOULD BE USED, ESPECIALLY WITH PREGNANT FEMALES AND NEWLY VOLANT JUVENILES. BATS CARRYING TRANSMITTERS MUST BE MONITORED DAILY FOR AT LEAST THREE DAYS, OR UNTIL THE TRANSMITTER FALLS OFF, WHICHEVER OCCURS FIRST.

- E. NO TRAPPING ACTIVITIES SHALL OCCUR WITHIN 20 METERS OF A KNOWN INDIANA BAT MATERNITY ROOST SITE, EITHER NATURAL OR ARTIFICIAL ROOSTS, UNLESS PERMITTEE RECEIVES PRIOR WRITTEN APPROVAL FROM THE U.S. FISH AND WILDLIFE SERVICE FIELD SUPERVISOR FOR THE STATE IN WHICH THE ACTIVITIES ARE PROPOSED TO OCCUR.
- F. PERMITTEE MAY COLLECT DORSAL HAIR SAMPLES, WING BIOPSY TISSUE SAMPLES, FUNGAL LIFT TAPE AND SWAB SAMPLES FROM CAPTURED BATS FOR SCIENTIFIC STUDY. HAIR SAMPLES SHALL BE OBTAINED VIA CLIPPING FUR FROM BETWEEN SCAPULA FROM FEMALES AND JUVENILE MALES. THE CLIPPED AREA IS THE SAME AREA FREQUENTLY CLIPPED FOR RADIO TRANSMITTER ATTACHMENT. WING TISSUE SAMPLES MAY BE TAKEN USING A NEW, STERILE BIOPSY PUNCH (2MM) FOR EACH ENDANGERED BAT SAMPLED. NO MORE THAN TWO SAMPLES, ONE FROM EACH WING, MAY BE OBTAINED PER INDIVIDUAL. ALL BOARDS AND EQUIPMENT USED TO OBTAIN SAMPLES MUST BE DISINFECTED ACCORDING TO THE PROTOCOL CITED IN CONDITION H.8.
- G. CYALUME LIGHT TAGS MAY BE AFFIXED TO THE BACK OF UNMARKED BATS DURING SUMMER ROOSTING PERIOD VIA NON-TOXIC SKIN BOND ADHESIVE TO AID IN IDENTIFICATION OF INDIVIDUALS FOR ECHOLOCATION RECORDINGS. LIGHT TAGS SHALL **NOT** BE AFFIXED TO BATS CARRYING RADIO TRANSMITTERS. LIGHT TAG CANNOT EXCEED 2 CM IN LENGTH OR 0.15 G IN WEIGHT. ANY TAG THAT HAS THE POTENTIAL TO EXPOSE BATS TO THE CYALUME COMPOUND IS PROHIBITED. THE LIGHT TAG MUST BE RESISTANT TO TOOTH PUNCTURE AND SEALED TO PREVENT BAT FROM INGESTING CYALUME COMPOUND.
- H. EQUIPMENT USED TO CAPTURE AND HANDLE BATS SHALL BE CLEANED AND DECONTAMINATED ACCORDING TO THE MOST RECENT USFWS APPROVED DECONTAMINATION PROTOCOL AVAILABLE ON THE USFWS WEBSITE AT: [HTTP://WWW.FWS.GOV/WHITENOOSYNDROME/RESEARCH.HTML](http://www.fws.gov/whitenoosesyndrome/research.html).
- I. CAVES, MINES, OR OTHER SUITABLE HIBERNATION SITES MAY BE QUIETLY SEARCHED IN A MANNER THAT MINIMIZES DISTURBANCE BY UTILIZING THE MINIMUM NUMBER OF PEOPLE AND TIME REQUIRED TO COMPLETE THE SURVEY. SURVEYS SHOULD NOT BE REPEATED MORE OFTEN THAN ONCE EVERY OTHER YEAR IN ANY GIVEN HIBERNACULUM THAT IS OCCUPIED BY INDIANA BATS. WHERE HIBERNACULA AREA AND SAFETY CONDITIONS ALLOW, INDIVIDUALS ENTERING CAVES ARE RECOMMENDED TO UTILIZE NIGHT VISION GOGGLES OR RED-FILTERED LIGHT AND TO REMAIN IN THE CAVE NO MORE THAN 90 MINUTES TO COMPLETE THE WORK.

3. UPON DETERMINATION THAT ENDANGERED BATS ARE PRESENT AT PREVIOUSLY UNDOCUMENTED SITES, PERMITTEE SHALL NOTIFY THE FOLLOWING OFFICES WITHIN 48 HOURS: THE U.S. FISH AND WILDLIFE SERVICE REGION 3 OFFICE (CONDITION L.), AND THE U.S. FISH AND WILDLIFE SERVICE FIELD OFFICE WITHIN THE GEOGRAPHIC LOCATION OF STUDY AREAS (CONDITION M.).
4. ACCIDENTAL MORTALITY MAY NOT EXCEED TWO SPECIMENS. IN THE EVENT THAT THIS NUMBER IS MET, ALL ACTIVITIES MUST CEASE. ANY BAT MORTALITY OR SERIOUS INJURY MUST BE REPORTED WITHIN 5 CALENDAR DAYS TO THE APPLICABLE OFFICE LISTED IN CONDITION M. AND TO THE NEAREST U.S. FISH AND WILDLIFE SERVICE LAW ENFORCEMENT OFFICE ([HTTP://WWW.FWS.GOV/OFFICES/DIRECTORY](http://www.fws.gov/offices/directory)). DEAD OR MORIBUND BATS MAY BE RETAINED FOR FURTHER STUDY ONLY WITH THE WRITTEN PERMISSION OF THE U.S. FISH AND WILDLIFE SERVICE. ANY BATS THAT ARE NOT AUTHORIZED FOR RETENTION ARE TO BE CHILLED AND PROMPTLY TRANSFERRED TO THE U.S. FISH AND WILDLIFE SERVICE FOR POTENTIAL NECROPSY AND/OR CONTAMINANTS ANALYSIS (CONDITION L.6.).

E. NO BAT INJURY OR MORTALITY IS ANTICIPATED AS A RESULT OF THE IMPLEMENTATION OF THE AUTHORIZED ACTIVITIES, EXCEPT AS EXPLICITLY STATED IN CONDITION D22 ABOVE. IF ANY INJURY OR MORTALITY DOES OCCUR, THE PERMITTEE SHALL IMMEDIATELY NOTIFY THE APPROPRIATE U.S. FISH AND WILDLIFE SERVICE OFFICES NOTED IN CONDITION M., BELOW. NOTIFICATION SHALL ALSO BE MADE WITHIN 24 HOURS TO THE REGIONAL PERMITS BIOLOGIST, AT THE ADDRESS AND TELEPHONE NUMBER NOTED IN CONDITION L., BELOW. BASED ON DISCUSSIONS WITH THESE OFFICES, A DECISION WILL BE MADE AS TO WHETHER ANY OF THE AUTHORIZED ACTIVITIES CAN CONTINUE. DECISIONS WILL ALSO BE MADE CONCERNING THE DISPOSITION OF ANY DEAD OR INJURED BATS. THE PERMITTEE SHALL PROVIDE A WRITTEN STATEMENT TO THE U.S. FISH AND WILDLIFE SERVICE OFFICES NOTED IN CONDITIONS L. AND M., BELOW, WHICH DOCUMENTS THE CAUSE OF THE INJURY/MORTALITY, AND IDENTIFIES THE REMEDIAL MEASURES EMPLOYED BY THE PERMITTEE TO ELIMINATE FUTURE MORTALITY/INJURY EVENTS. THE FINAL DECISION ON REMEDIAL MEASURES RESTS WITH THE U.S. FISH AND WILDLIFE SERVICE.

F. THIS PERMIT IS NON-TRANSFERABLE, BUT OTHER QUALIFIED PERSONNEL MAY ASSIST IN THE AUTHORIZED

ACTIVITIES, SUBJECT TO THE REQUIREMENTS OF §13.25. WHEN ANY SUCH ASSISTANCE IS TO BE PROVIDED, THOSE DESIGNATIONS ARE TO BE MADE BY LETTER FROM THE PERMITTEE TO EACH AGENT. THE LETTER(S) MUST IDENTIFY THE SCOPE AND DURATION OF THE ASSISTANCE TO THE PERMITTEE. COPIES OF SUCH LETTERS WILL BE PROVIDED IMMEDIATELY TO THE U.S. FISH AND WILDLIFE SERVICE'S REPORTING ADDRESSES LISTED IN CONDITIONS L, M, AND N., BELOW, AS APPROPRIATE. THE PERMITTEE MUST BE PRESENT ON SITE AT ALL TIMES WHILE ACTIVITIES AUTHORIZED UNDER THIS PERMIT ARE BEING CARRIED OUT.

G. PERMITTEE MUST CARRY A COPY OF THIS PERMIT AT ALL TIMES WHEN CONDUCTING THE AUTHORIZED ACTIVITIES. SHIPMENTS OF COLLECTED BIOLOGICAL MATERIALS SHOULD ALSO BE ACCOMPANIED BY A COPY OF THIS PERMIT. NOTE THAT THIS PERMIT IS LIMITED TO THE ABOVE ACTIVITIES AND IDENTIFIED SPECIES.

H. ISSUANCE OF THIS PERMIT DOES NOT CONSTITUTE PERMISSION TO CONDUCT THESE ACTIVITIES ON NATIONAL WILDLIFE REFUGES OR ANY OTHER PUBLIC OR PRIVATE LANDS; SUCH PERMISSION MUST BE OBTAINED SEPARATELY FROM THE APPROPRIATE LANDOWNER OR LAND MANAGER BEFORE BEGINNING THESE AUTHORIZED ACTIVITIES. THIS PERMIT, NEITHER DIRECTLY OR BY IMPLICATION, GRANTS THE RIGHT OF TRESPASS.

I. ACCEPTANCE OF THIS PERMIT SERVES AS EVIDENCE THAT THE PERMITTEE AND ITS AUTHORIZED AGENTS UNDERSTAND AND AGREE TO ABIDE BY THE TERMS OF THIS PERMIT AND ALL SECTIONS OF TITLE 50 CODE OF FEDERAL REGULATIONS, PARTS 13 AND 17, PERTINENT TO ISSUED PERMITS. SECTION 11 OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED, PROVIDES FOR CIVIL AND CRIMINAL PENALTIES FOR FAILURE TO COMPLY WITH PERMIT CONDITIONS.

J. UPON LOCATING A DEAD, INJURED, OR SICK BAT, OR ANY OTHER THREATENED OR ENDANGERED SPECIES, UNDER CIRCUMSTANCES NOT ADDRESSED IN THIS AUTHORIZATION, INITIAL NOTIFICATION MUST BE MADE IMMEDIATELY TO THE U.S. FISH AND WILDLIFE SERVICE FIELD OFFICE IDENTIFIED IN CONDITION N., BELOW. NOTIFICATION SHOULD ALSO BE MADE BY THE NEXT WORK DAY TO THE U.S. FISH AND WILDLIFE SERVICE OFFICE IDENTIFIED IN CONDITION L., BELOW. CARE SHOULD BE TAKEN IN HANDLING SICK, INJURED, OR DEAD SPECIMENS TO ENSURE EFFECTIVE TREATMENT OR TO PRESERVE BIOLOGICAL MATERIALS FOR LATER ANALYSIS. IN CONJUNCTION WITH THE CARE OF SICK OR INJURED ENDANGERED OR THREATENED SPECIES, AND THE PRESERVATION OF BIOLOGICAL MATERIALS FROM A DEAD ANIMAL, THE FINDER SHOULD TAKE RESPONSIBLE STEPS TO ENSURE THAT THE SITE IS NOT UNNECESSARILY DISTURBED.

K. AN ANNUAL REPORT SUMMARIZING AUTHORIZED ACTIVITIES MUST BE SUBMITTED BY DECEMBER 31 OF EACH YEAR THIS PERMIT IS VALID. EACH REPORT SHOULD INCLUDE, AT A MINIMUM, THE FOLLOWING INFORMATION:

1. TOTAL NUMBER OF SURVEYS CONDUCTED AND LOCATIONS OF THE TRAPPING AND SURVEY SITES. LOCATIONS SHALL BE NOTED USING FIGURES, MAPS, AND BY REFERENCING THE NAD83 COORDINATE SYSTEM (E.G., DEGREES, MINUTES, SECONDS).
2. A DESCRIPTION OF SAMPLING METHODS, INCLUDING A DESCRIPTION OF AREA SAMPLED AND NOTES ON BIOTIC AND ABIOTIC FEATURES THAT MIGHT INFLUENCE SAMPLE COMPOSITION.
3. A SPECIES LIST FROM EACH COLLECTION SITE, INCLUDING SPECIES ABUNDANCE AND RICHNESS, CONDITION, AGE, AND SEX OF CAPTURED BATS.
4. THE RESULTS OF THE SURVEYS AND RESEARCH, WITH DISCUSSIONS AND INTERPRETATIONS OF THE DATA IN CONTEXT TO RECOVERY OF THE SPECIES.
5. INFORMATION ON INJURIES AND/OR MORTALITIES AND DISPOSITION OF SPECIMENS.
6. LOCATION AND CHARACTERISTICS OF ROOST TREES AND BAT COLONIES.
7. COPIES OF ALL PUBLISHED PAPERS AND REPORTS.

L. FOR PURPOSES OF MONITORING COMPLIANCE AND ADMINISTRATION OF THE TERMS AND CONDITIONS OF THIS PERMIT, THE CONTACT OFFICE OF THE U.S. FISH AND WILDLIFE SERVICE IS:

U.S. FISH AND WILDLIFE SERVICE
ATTN: PERMIT COORDINATOR
1875 CENTURY BOULEVARD, SUITE 200
ATLANTA, GEORGIA 30345-3301

TELEPHONE: 904/731-3191
FACSIMILE: 904/731-3045
PERMITSR4ES@FWS.GOV

ALEX HOAR
U.S. FISH AND WILDLIFE SERVICE
ENDANGERED SPECIES DIVISION
300 WESTGATE CENTER DRIVE
HADLEY, MASSACHUSETTS 01035-9589
(413/253-8631; FAX 413/253-8482)
PERMITSR5ES@FWS.GOV

LISA MANDELL
U.S. FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES - ENDANGERED SPECIES
5600 AMERICAN BLVD. W.
SUITE 990
BLOOMINGTON, MINNESOTA 55437-1458
(612/713-5343; FAX 612/713-5292)
PERMITSR3ES@FWS.GOV

M. COPIES OF ANNUAL REPORTS SHALL ALSO BE SENT TO THE FOLLOWING:

FIELD SUPERVISOR
U.S. FISH AND WILDLIFE SERVICE
J.C. WATTS FEDERAL BUILDING
330 WEST BROADWAY STREET ROOM 265
FRANKFORT, KENTUCKY 40601
TELEPHONE: 502/695-0468
FACSIMILE: 502/695-1024

N. CONTACT INFORMATION FOR U.S. FISH AND WILDLIFE SERVICE STATE FIELD OFFICES AND REGIONS
REQUIRING PRIOR APPROVAL;

FOR STUDIES CONDUCTED IN NEW JERSEY:

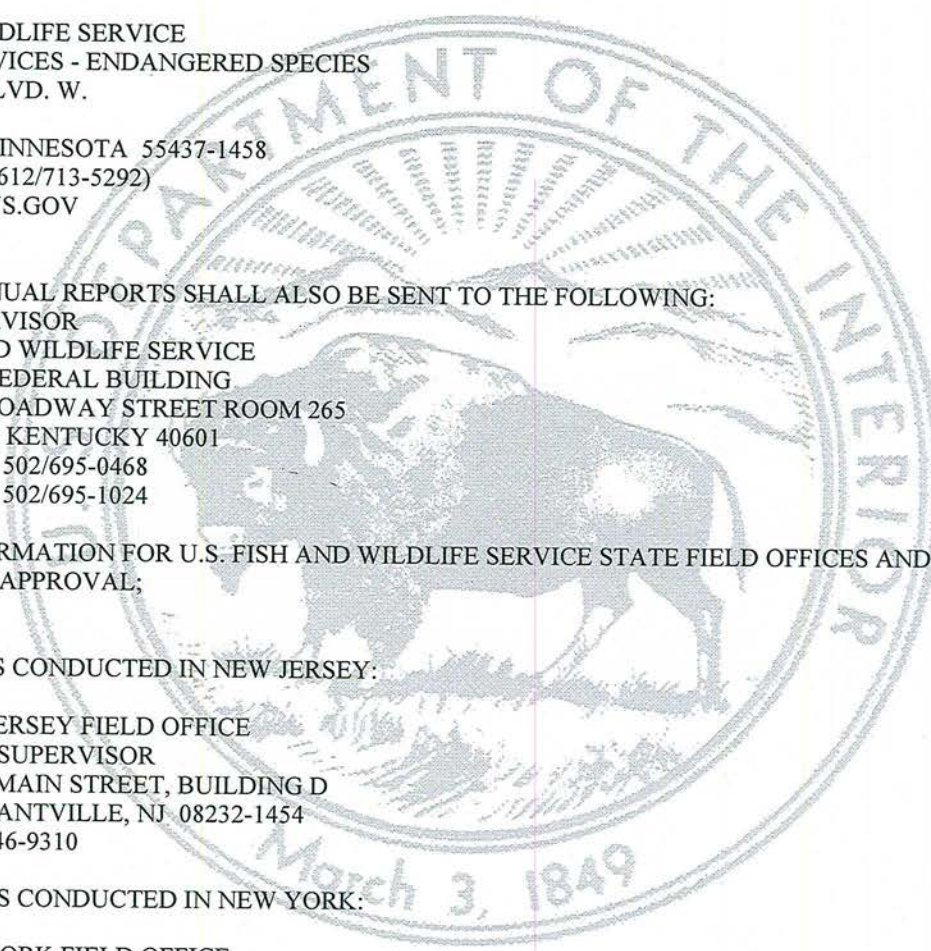
NEW JERSEY FIELD OFFICE
FIELD SUPERVISOR
927 N. MAIN STREET, BUILDING D
PLEASANTVILLE, NJ. 08232-1454
(609) 646-9310

FOR STUDIES CONDUCTED IN NEW YORK:

NEW YORK FIELD OFFICE
FIELD SUPERVISOR
3817 LUKER ROAD
CORTLAND, NY 13045
(607) 753-9334

FOR STUDIES CONDUCTED IN TENNESSEE:

COOKEVILLE FIELD OFFICE
FIELD SUPERVISOR
U.S. FISH AND WILDLIFE SERVICE
446 NEAL STREET
COOKEVILLE, TN 38501-4027
(931) 528-6481



FOR STUDIES CONDUCTED IN OHIO:

ENDANGERED SPECIES COORDINATOR FOR OHIO
U.S. FISH AND WILDLIFE SERVICE
OHIO ECOLOGICAL SERVICES FIELD OFFICE
4625 MORSE ROAD, SUITE 104
COLUMBUS, OHIO 43230
(614/416-8993, X22; FAX 614/416-8994)

ENDANGERED SPECIES COORDINATOR
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
2045 MORSE ROAD, BUILDING G
COLUMBUS, OHIO 43229-6693
(614-265-6329)

FOR STUDIES CONDUCTED IN GEORGIA:

GEORGIA FIELD OFFICE
FIELD SUPERVISOR
105 WESTPARK DRIVE, SUITE D
ATHENS, GA 30606-3175
(706) 613-9493; FAX 706/613-6059

FOR STUDIES CONDUCTED IN KENTUCKY:

FRANKFORT FIELD OFFICE
FIELD SUPERVISOR
J C WATTS FEDERAL BLDG., RM 265
330 WEST BROADWAY
FRANKFORT, KY 40601-8670
(502) 695-0468

FOR STUDIES CONDUCTED IN MISSISSIPPI:

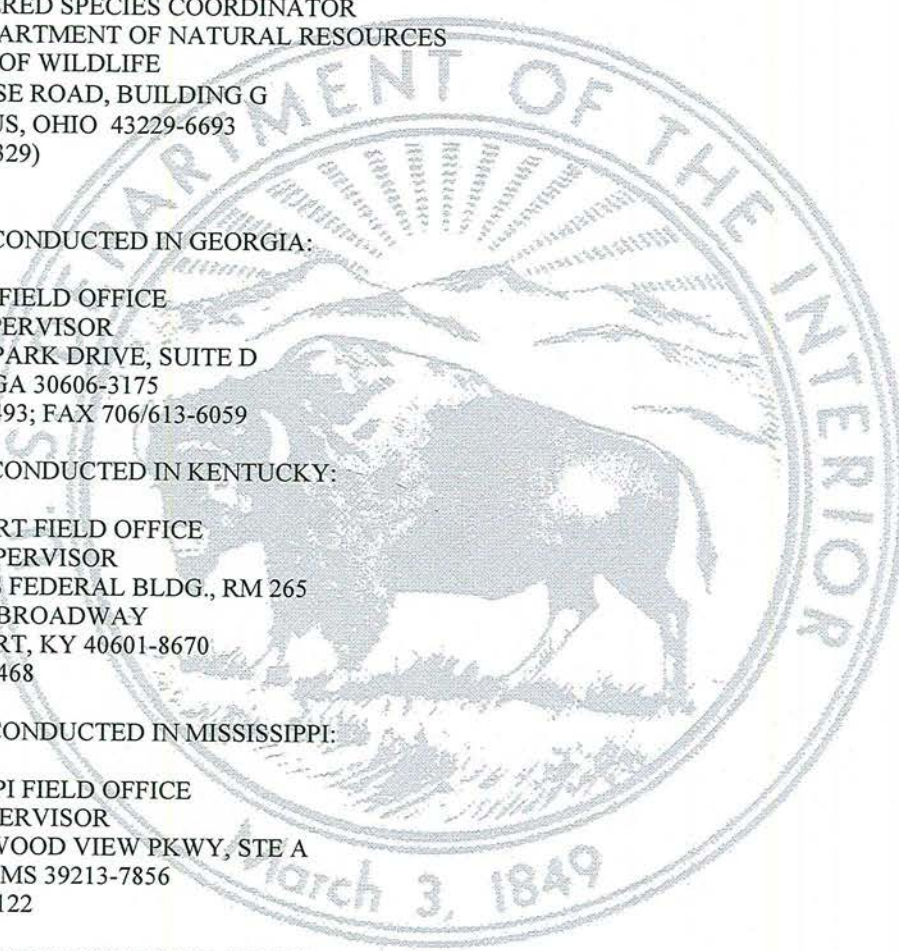
MISSISSIPPI FIELD OFFICE
FIELD SUPERVISOR
6578 DOGWOOD VIEW PKWY, STE A
JACKSON, MS 39213-7856
(601) 321-1122

FOR STUDIES CONDUCTED IN ALABAMA:

DAPHNE FIELD OFFICE
FIELD SUPERVISOR
1208-B MAIN STREET
DAPHNE, ALABAMA 36526
(251) 441-5181

FOR STUDIES CONDUCTED IN LOUISIANA:

LAFAYETTE FIELD OFFICE
FIELD SUPERVISOR
U.S. FISH AND WILDLIFE SERVICE
646 CAJUNDOME BOULEVARD
SUITE 400
LAFAYETTE, LOUISIANA 70506





Virginia Department of Game and Inland Fisheries

4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104

(804) 367-1000 (V/TDD)

Under Authority of § 29.1-412, § 29.1-417, & § 29.1-418 of the Code of Virginia



Scientific Collection Permit

Permit Type: **New**

Fee Paid:

\$40.00

VADGIF Permit No.

051933

Permittee: **Dave Yates**

Address: **Biodiversity Research Institute**

19 Flaggy Meadow Road

Gorham, ME 04038

Office: (207) 839-7600
City/County: **Out of State**

Contract Species Surveys

Authorized Collection Methods: Harp Traps for Bats/Terrestrial Mist Nets (Bats/Birds)

Authorized Waterbodies: N/A

Authorized Marking Techniques: N/A

Authorized Counties / Cities:

York

Norfolk

PERMIT AMENDMENT 5/18/2015: This amendment adds the following:

Authorized Subpermittees: Amanda Bailey/Morgan Ingalls/Caroliine

Byrnes/Chelsea Vosburgh

Authorized Locations: Naval Properties:

Yorktown/Northwest/Norfolk/Oceana/Fentress/Fort Story/Dam Neck/Fort

Eustis/Langley

Permittee MUST notify VDGIF a minimum of 7 days prior to each sampling event. Notification must be made via email to: collectionpermits@dgif.virginia.gov

Report Due: 31 January 2015, 31 January 2016

ALL PERMIT REPORTS MUST CONTAIN COORDINATES; PERMITTEE CAN USE THE VIRGINIA FISH AND WILDLIFE INFORMATION SERVICE (VAFWIS) TO OBTAIN COORDINATES BY VISITING: [HTTPS://FWISWEB1.DGIF.VIRGINIA.GOV/FWIS/INDEX.HTML](https://fwisweb1.dgif.virginia.gov/fwis/index.html)

STANDARD CONDITIONS ATTACHED APPLY TO THIS PERMIT.

Authorized Species:

Description

ID Number

Scientific Name

Bats

Annual Report Due End of Each Year

Authorized Sub-Permittees:

See Attached Sheet

Approved by:

Applicants may appeal permit decisions within 60 days of issuance. The appeal must be in writing to the Director, Department of Game and Inland Fisheries.

Title: **James E. Husband - Permits Manager**

Date: **5/18/2015**

20

Permit Effective **7/28/2014** through **12/31/2015**

15



Virginia Department of Game and Inland Fisheries
4010 West Broad Street, P.O. Box 11104, Richmond, VA 23230-1104
(804) 367-1000 (V/TDD)



Under Authority of § 29.1-412, § 29.1-417, & § 29.1-418 of the Code of Virginia

Scientific Collection Permit

Permit Type: **New**

FeePaid:

\$40.00

VADGIF Permit No.

051933

Authorized Sub-Permittees:

Tim Divoll, Biodiversity Research Institute

Dustin Meattey, Biodiversity Research Institute

Carl Anderson, Biodiversity Research Institute

Lauren Gilpatrick, Biodiversity Research Institute

Amanda Bailey, Biodiversity Research Institute

Morgan Ingalls, Biodiversity Research Institute

Caroline Byrne, Biodiversity Research Institute

Chelsea Vosburgh, Biodiversity Research Institute

DAVID YATES

719 Moosehead Lake Rd
Greenville, ME 04441
(207) 491-4707

EDUCATION:

Bachelor of Science, Wildlife Biology and Management
Unity College, Unity, ME
Graduated May 1999

M.Sc., Conservation Biology
Antioch University New England
Graduated May 2006

SKILLS:

- Proficient in animal tagging and release methods
- Ability to identify bats of N. and C. America in and QIBS by USFWS and PA State
- HERO training
- Collected and prepared blood samples for contaminant analyses.
- Current DEA drug license
- Analyzed water quality of ponds, rivers and streams
- Experience using tranquilizers/sedatives
- B3 and HUET certificates for low level flights
- HAZWOPR training
- Trained in CPR and First Aid

EXPERIENCE:

- Biodiversity Research Institute – Research Biologist/Mammal Director, Gorham, ME*** January 1998 -present
- Certified Indiana Bat Identifier for the state of PA and USFWS
 - Project Manager for Acadia National Park bat survey and tracking study
 - Project manager and conducted bat surveys for US Navy in VA and NJ
 - Lead Biologist Indiana bat surveys for Gas fracking and pipelines in PA
 - Project Manager/Lead Biologist for Maine IF&W Eco-region Surveys for bats for 5 years
 - Project Manager/Lead Biologists for bat mercury studies at superfund sites from VA to Maine involving U.S.F.&W.S.
 - Project Manager/Lead Biologist at 4 U.S. Fish and Wildlife NRDAR sites for bats and furbearers
 - Project Manager bat surveys at multiple National Wildlife Refuges in the northeast
 - Telemetry Coordinator Gulf Oil Spill Project for USFWS NRDAR bird injury assessment
 - Developed Scope of Work for USFWS NRDAR Gulf Oil Spill bird injury assessment
 - Coordinated aerial and ground tracking of more than 400 birds using multiple airplanes and satellite technology
 - Project Manager/Lead Biologist for FPL Maine Hydro. Beaver, muskrat, otter, and mink telemetry study
 - Project Manager/Lead Biologist for live trapping mink and otter study in Maine for state DEP (Master's thesis)
 - Project Manager/Lead Biologist for live trapping mink and otter study in Massachusetts for EPA and other superfund studies
 - Project Manager for Maine IF&W Ecoregion for three areas in Maine, birds and small mammals
 - Project Manager for common loon monitoring in northern and western Maine
 - Project Manager/Lead Biologist for National Park Service survey of small and large mammals of Appalachian Trail in Maine
 - Winter large carnivore tracking surveys for NPS and private landowner
 - Administered schedule III drugs for mink and otter study (Ketamine & Metomidine)
 - DEA Schedule II-III license
 - Researched recent trends of mercury and lead contaminants in the North American piscivorous bird's mammals.
 - Captured, banded and gathered mercury and lead level data in piscivorous birds.
 - Entered banding data into database for Biodiversity Research Institute data analysis.
 - Compiled banding data into official banding schedules for U.S. Fish & Wildlife Services.
 - Supervised banding of Common Loons, Eagles, Kingfishers and various other species.
 - Surveyed reservoirs and lakes for Common Loons, Kingfishers and other piscivorous birds.
 - Presented Mammal, Bat and Common Loon slide show to various organizations for educational purposes
 - Wrote reports for Loon productivity on Reservoirs for state and private agencies.
 - Proposed, designed and organized a mink and otter study for Maine Department of Environmental Protection.

Publications and Reports:

- Yates, David E., Evan M. Adams, Sofia E. Angelo, David C. Evers, John Schmerfeld, Marianne S. Moore, Thomas H. Kunz et al. Mercury in bats from the northeastern United States. *Ecotoxicology* 23, no. 1 (2014): 45-55.
- Nam, D.-H., Yates, D., Ardapple, P., Evers, D. C., Schmerfeld, J., & Basu, N. 2012. Elevated mercury exposure and neurochemical alterations in little brown bats (*Myotis lucifugus*) from a site with historical mercury contamination. *Ecotoxicology*, 12(4), 1094–1101
- Yates, D., K. Taylor, and C. Niven. 2008. Effects of Water Levels on Muskrat (*Ondatra zibethicus*) Populations within the West Grand Lake Project, Maine. Report BRI 2008-25 submitted to BIA and OA System Corporation, Amarillo, Texas. BioDiversity Research Institute, Gorham, Maine.
- Wada, H., D. Yates, D. Evers, R. Taylor, W. Hopkins. 2010. Tissue mercury concentrations and adrenocortical responses of female big brown bats (*Eptesicus fuscus*) near a contaminated river. *Ecotox.* 19:7 1277-84.
- Yates, D., S. Angelo, T. Divoll and D.C. Evers, 2009. Assessment of mercury exposure to bats at Onondaga Lake, New York. Report BRI 2010-11 submitted to U.S. Fish and Wildlife Service, Cortland, NY. BioDiversity Research Institute, Gorham, Maine, 44 pp.
- T. Divoll, D. Yates, D.C. Evers, 2008. Pilot assessment of mercury exposure to bats at Onondaga Lake, New York. Report BRI 2009-10 submitted to U.S. Fish and Wildlife Service, Cortland, NY. BioDiversity Research Institute, Gorham, Maine, 44 pp.
- Yates, D., S.E. Angelo, M.W. Goodale and D.C. Evers. 2011. Bat Mercury Study Examining Footprint Area and Downstream: South River, Virginia - 2009. Report BRI 2009-10 submitted to DuPont Corporate Remediation Group, Newark, Delaware and the U.S. Fish Wildl. Serv., Gloucester, Virginia. BioDiversity Research Institute, Gorham, ME. 57pp.
- Yates, D., M. Moore, T. Kunz, and D.C. Evers 2008. Pilot assessment of methylmercury availability to bats on the South River, Virginia - 2008. Report BRI 2009-16 submitted to DuPont Corporate Remediation Group, Newark, Delaware and the U.S. Fish Wildl. Serv., Gloucester, Virginia. BioDiversity Research Institute, Gorham, ME. 47pp.
- Yates, D., D.C. Evers, and D. Meattley. 2008. Pilot assessment of methylmercury availability to muskrat and shrews on the South Fork River, Virginia - 2008. Report BRI 2009-21 submitted to the U.S. Fish Wildl. Serv., Gloucester, Virginia. BioDiversity Research Institute, Gorham, ME.
- Yates, D., W. Goodale, M. Holden, and D. Evers. 2008. Home ranges size in relation to water level fluctuations in river otter, muskrat, mink and beaver on Brassua Lake and surrounding waterbodies. Report BRI 2008-18 submitted to FPL Energy Maine Hydro. BioDiversity Research Institute, Gorham, Maine.
- Yates, D. and D.C. Evers. 2007-6. Small Mammals and Bat Inventory of the Appalachian Trail in Maine-2006. Report BRI 2007-6 submitted to the Maine Natural Areas Program and NPS. BioDiversity Research Institute, Gorham, ME.
- Yates, D., H. Wada, M. Moore, B. Hopkins, T. Kunz, and D.C. Evers 2007. Pilot assessment of methylmercury availability to bats on the South River, Virginia - 2007. Report BRI 2008-08 submitted to DuPont Corporate Remediation Group, Newark, Delaware and the U.S. Fish Wildl. Serv., Gloucester, Virginia. BioDiversity Research Institute, Gorham, ME. 42pp.
- Yates, D., D.C. Evers, and L. Savoy. 2004. Developing a mercury exposure profile for mink and river otter in Maine. Report BRI 2004-09 submitted to Maine Department of Environmental Protection and Maine Inland Fisheries and Wildlife. BioDiversity Research Institute, Gorham, Maine.
- Yates, D. E., D.T. Mayack, K. Munney, D.C. Evers, A. Major, T. Kaur, and R.J. Taylor. 2005. Mercury levels in mink (*Mustela vison*) and river otter (*Lontra canadensis*) from northeastern North America. *Ecotoxicology* 14:263-274.
- Yates and D.C. Evers. 2007. Pilot assessment of methylmercury availability to furbearers on the North Fork of the Holston River, Virginia - 2005. Report BRI 2007-10 submitted to the U.S. Fish Wildl. Serv., Gloucester, Virginia. BioDiversity Research Institute, Gorham, ME.
- Yates, D., and D.C. Evers. 2006. Assessment of bats for mercury contamination on the North Fork of the Holston River, VA- 2005. Report BRI 2006-9. BioDiversity Research Institute, Gorham, ME.
- Yates, D.E. and D. Evers. 2005. An overall assessment of the loon population at Lake Umbagog National Wildlife Refuge: Investigations into individual-specific demographics and assessment of individual and population health. Report BRI 2004-13 BioDiversity Research Institute, Gorham, Maine. 17pp.
- Yates, D., D.C. Evers, and W. Goodale. 2006. Monitoring of breeding Common Loons: West Branch of the Penobscot River area - 2005. Report BRI 2006-05. BioDiversity Research Institute, Gorham, ME. pp.30
- Yates, D., D.C. Evers, W. Goodale, and W. MacCabe. 2005. Monitoring of breeding Common Loons: West Branch of the Penobscot River area - 2004. Report BRI 2005-10. BioDiversity Research Institute, Gorham, ME. 27 pp.
- Yates, D., L. Savoy, D. Evers, C. DeSorbo, W. Goodale, L. Attix, A. Paul, C. Niven, E. Saxson, and M. Nelson. 2005. Documentation of the reproductive success of the Common Loon on selected lakes in the Rangeley Lakes and Eagle Lake Regions in 2004. Report BRI 2005-06 submitted to the New England Forestry Foundation. BioDiversity Research Institute, Gorham, ME. 60p.

APPENDIX C
COORDINATES OF MIST-NETS AND CAPTURE DATA

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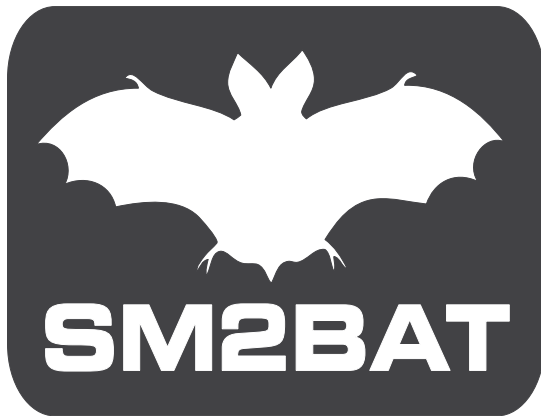
Site Name	Date	Capture Technique	Net nights	Habitat	Net A Lat	Net A Long	Net B lat	Net B Long	Datum
DNA 1	07/26/2015	2, 9m triple highs	2	Red Maple, Sweet Gum, Loblolly Pine, Long Leaf Pine	36.81203	-75.97197	36.81206	-75.9708	WGS84
	07/27/2015		2		36.81203	-75.97197	36.81206	-75.9708	WGS84
DNA 2	07/26/2015	2, 6m double highs	2	Short Leaf Pine, Sweet Gum, Thorny Olive, Live Oak	36.77862	-75.96925	36.77848	-75.9704	WGS84
	07/27/2015		2		36.77862	-75.96925	36.77848	-75.9704	WGS84

Site Name	Date	Start Time	Start Temp	End Time	End Temp	% Clouds	Wind	Precip	% Moon
DNA 1	07/26/2015	20:15	81	1:15	79	100	1-3 mph	none	84
	07/27/2015	20:15	80	1:15	78	25	1-3 mph	none	91
DNA 2	07/26/2015	20:15	79	1:15	79	50	1-3 mph	none	84
	07/27/2015	20:15	81	1:15	78	25	4-7 mph	none	91

Site Name	Date	Time	Species	Age	Sex	Reproductive Status	RFA (mm)	Mass (g)	Net name	Ear (mm)	RS	Band	Notes
DNA 2	07/26	22:52	CORA	Unk	M	Unknown	Unk	Unk	B	Unk	Unk		Escaped
DNA 2	07/26	20:35	LABO	A	F	Post-Lactating	39.8	12.6	A	8	0	DEY2753	
DNA 1	07/26	20:26	LABO	J	M	non-reproductive	36.5	5.6	A	7.5	0		
DNA 1	07/26	20:30	LABO	Unk	F	Unknown	Unk	Unk	A	Unk	Unk		Escaped when net lowered
DNA 1	07/26	21:08	LABO	J	F	non-reproductive	37.4	10.5	A	10	0	DEY2612	Recaptured in net A at 12:25... Bloody around band, band removed
DNA 1	07/27	20:34	LABO	Unk	M	Unknown	Unk	Unk	A	Unk	Unk		Escaped when net was lowered
DNA 1	07/27	22:20	LABO	Unk	F	Unknown	Unk	Unk	A	Unk	Unk		Escaped when net was lowered
DNA 1	07/27	23:00	EPFU	A	M	non-reproductive	45.1	16.9	B	14	0	DEY2613	

APPENDIX D
ACOUSTIC RECORDING DEVICE SPECS

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**Song Meter SM2BAT+
Ultrasonic Recorder**

Wildlife Acoustics, Inc.

www.wildlifeacoustics.com

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Rev. 12/16/11

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Introduction

About This Document

This document describes the use of the SM2BAT+ daughter card for the Song Meter SM2+ acoustic monitoring and data logging platform.

Refer to the *Song Meter SM2+ User Manual* for detailed information on using the Song Meter SM2+ platform. This document is intended as a supplement and assumes you are already familiar with the Song Meter's operation.

You will also want to download and install the latest Wac2Wav postprocessing software and Song Meter Configuration Utility software from the downloads section of our website at www.wildlifeacoustics.com.

Overview

The SM2BAT+ daughter card is installed on the back of the SM2+ motherboard and provides a high-speed 16-bit digital sampling capability. The SM2BAT+ is able to sample at 192kHz on one or both channels, 384kHz on either channel, and can also record in native zero crossing.

The audio input to the SM2BAT+ comes from the output of the two-stage preamplifier on the SM2+. Refer to the section on *Amplifier Configuration Jumpers* in the *Song Meter SM2+ User Manual* for more information about configuring the analog high-pass filters and gain settings. Note that the SM2BAT+ audio signal is **not** routed through the third-stage amplifier configured by the left and right gain parameters in the settings menu. Therefore, the gain is configurable only with the SM2+ switches to +0, +12, +24, +36, +48, or +60dB, and the third stage gain settings will have no effect. For monitoring bats with the SMX-US ultrasonic microphone, the +36dB or +48dB setting is recommended.

The SM2+ automatically detects the presence of the SM2BAT+ daughter card. If present, the 192,000 and 384,000 Hz sample rate choices are added to the list of possible sample rate settings. In addition, the *SET* advanced scheduling command can also configure the 192,000 and 384,000 Hz sample rate as part of an advanced schedule.

When 384,000 Hz sample rate is selected, the SM2BAT+ card is used to sample the audio stream from either the left or right channel. When the 192,000 Hz sample rate is selected, the SM2BAT+ card is used to sample

the audio stream from the left and/or right channels. Otherwise, the SM2+ uses its on-board codec to sample at audio rates up to 96,000Hz.

The SM2BAT+ daughter card can also be configured for zero crossing on the left channel. See “Zero Crossing” on page 13 for more information.

SMX-US Microphone

The SMX-US is an ultrasonic microphone designed for terrestrial monitoring applications, specifically for recording the echolocation calls of bats.

Notes on Weatherproofing

The transducer inside the SMX-US microphone **can be permanently damaged** if it is exposed to water in the event that the weatherproofing fails.

To protect the transducer, there are trade-offs between ultrasonic sensitivity and weatherproofing.

The SMX-US features several layers of protection. First, a porous membrane transparent to ultrasound prevents unpressurized liquid water from entering the microphone. However, the membrane is rated to only 0.07 lbs/in² or 5g/cm². This is easily exceeded by wind-blown rain. The foam windscreen provides a critical second layer of protection to absorb the impact of wind-blown rain so that only unpressurized water reaches the membrane effectively protecting the transducer. When dry, the foam windscreen is almost transparent to ultrasound with a loss of only 2dB. However, the loss increases with frequency when wet, and will effectively block ultrasound if it then freezes.

The membrane is also fragile. The foam windscreen adds a layer of protection against insects, rodents and birds who will tend to nibble on the windscreen instead of the membrane.

We strongly recommend operating the SMX-US with the windscreen, and replacing the windscreen if it becomes fully or partially eaten.

We also recommend positioning the microphones so that they point parallel to the ground, or even slightly downward. In this configuration, even if the windscreen is absent and water penetrates the membrane, the water should not collect in sensitive areas inside the microphone and there is a good chance that the transducer will survive. If you suspect that water may have

SMX-US Microphone

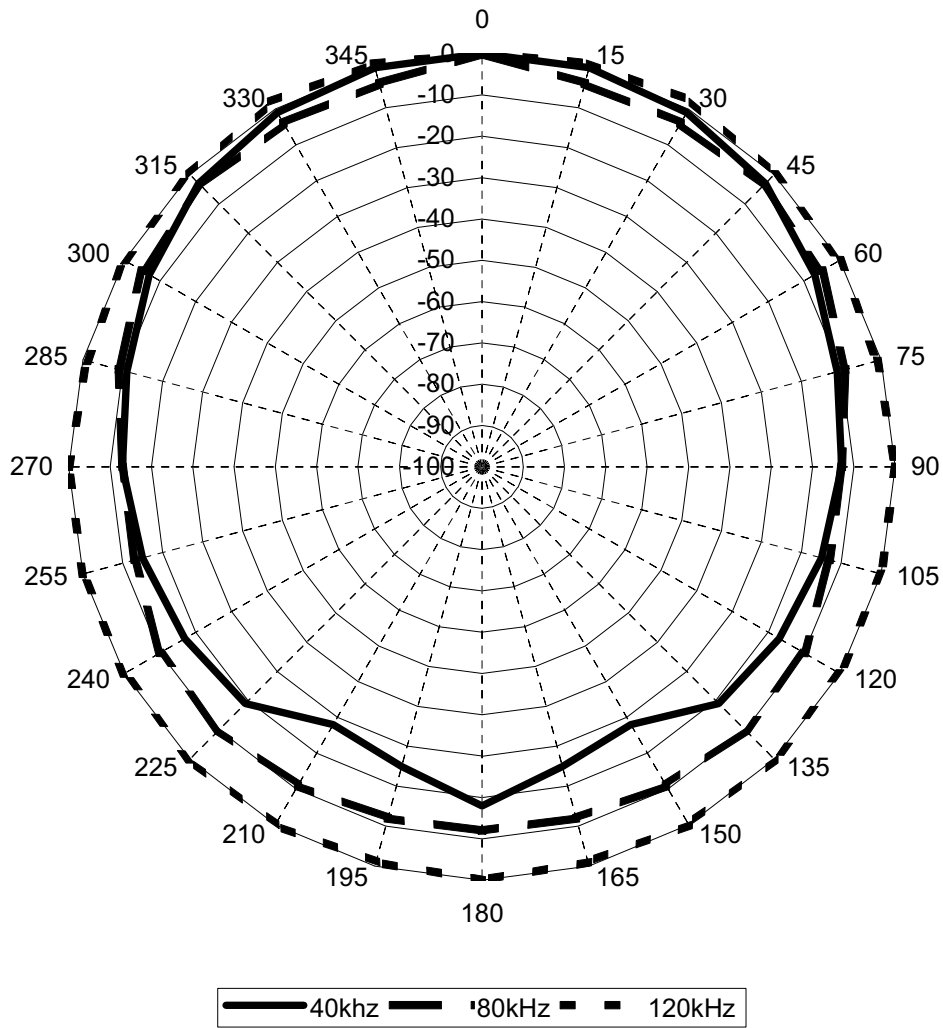
entered the microphone, you should avoid handling it until it has completely dried out. Otherwise water could change position and come in contact with the transducer resulting in damage.

If you are deploying the SM2+ in field conditions expected to remain wet or frozen, you may want to operate the SMX-US microphone without its foam windscreen and instead implement your own weather protection to protect the membrane from wind-blown rain. Again, we recommend that you aim the microphone horizontally or downward (not upward) to reduce the risk of damage should weatherproofing fail.

Directionality and Frequency Response

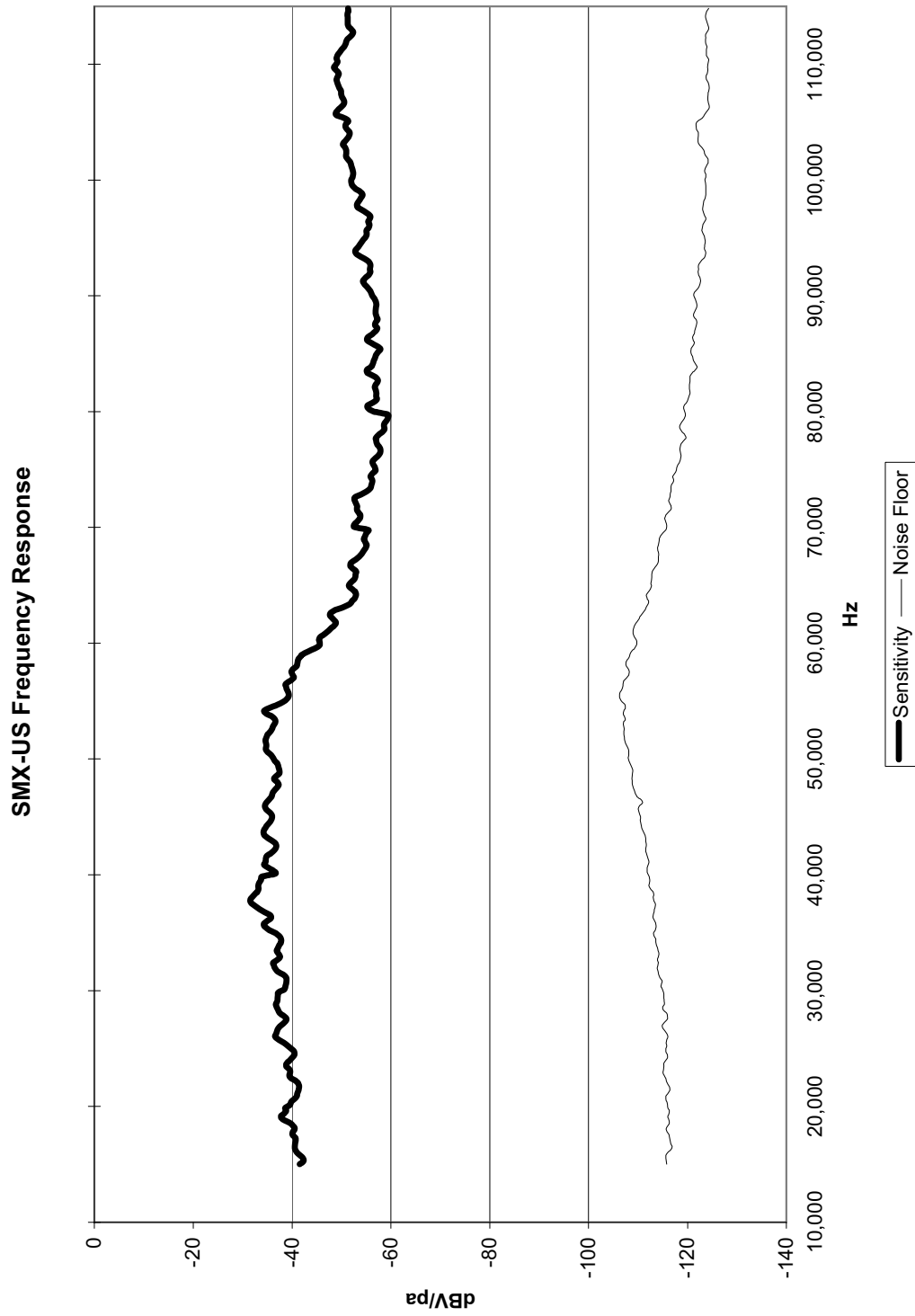
The SMX-US is an omnidirectional microphone and is therefore ideally suited to unattended monitoring in which the precise direction of bat activity may not be known in advance. The following graph illustrates the typical pick-up pattern:

SMX-US Directionality



The SMX-US is sensitive to frequencies over 150kHz. The graph shows the typical frequency response and noise floor of the SMX-US microphone. Some additional attenuation can be expected if the microphone windscreen is wet, especially in higher frequencies:

SMX-US Microphone



Cables

The SMX-US is a powered microphone with low impedance and can drive cables up to 100 meters without a preamplifier and without any noticeable loss at frequencies up to 120kHz.

The SMX-US microphone can be either connected directly to the SM2+ enclosure without any cable or extended on one or more lengths of our standard one meter, ten meter and fifty meter cables up to the maximum. For best results, the SMX-US microphone should be mounted on a cable and placed away from the Song Meter enclosure or other hard objects in order to reduce echos.

Power Consumption and Card Usage

Power

The following table illustrates the typical power consumption for different configurations and settings. Note that actual consumption may vary depending on flash cards, variation in electronic components, and other variables:

Triggered Recordings		
Configuration	Wait for Trigger	Recording
192Kx1 WAV	75	95
192Kx1 WAC	115	125
192Kx2 WAV 384Kx1 WAV	100	130
192Kx2 WAC 384Kx1 WAC	175	190
ZC	35	35

Untriggered Recordings	
Configuration	Recording
192Kx1 WAV	90
192Kx1 WAC	120
192Kx2 WAV	120
192Kx2 WAC	155
384Kx1 WAV	95
384Kx1 WAC	160
ZC	35

High quality Alkaline D cells can deliver about 12,000mAh capacity at 20° C. With triggers in WAV mode, this translates to about 130 hours record time with 192kHz mono and 100 hours record time with 192kHz stereo or 384kHz mono. In zero cross mode, it is possible to record for well over 300 hours. Longer deployments are possible with larger external batteries using the Song Meter SM2PWR power adapter sold separately.

When the SM2BAT+ daughter card is not being used, for example when the Song Meter SM2+ is configured for sampling rates at or below 96kHz, it will still consume an additional 10mA when recording compared to an SM2+ without the SM2BAT+ card installed.

When the Song Meter is sleeping between scheduled recording events, the SM2BAT+ is also powered down and total current consumption is typically less than one milliamp.

Flash Cards

In a typical night with bat activity (and no rain or gusty wind), you will need about 0.5GB per night for a stereo recording. But even with gusty wind causing false triggers, you will probably only need about 2GB per night. In WAV mode, since the files are filtered for false positives, you can expect to use even less. Therefore, a single 32GB card should easily last for 2-8

weeks. In zero cross mode, you can expect a 32GB card to last for months if not years.

For longer deployments, you can use a larger external power source. With 4x32GB flash cards, you should have enough storage to last 50-250 nights depending on conditions.

While most SDHC Class 4 and Class 6 flash cards work well with SM2BAT+, there are some that may result in choppy recordings. The cards we sell are guaranteed to work

Settings

Gain and Filter Switch Settings

You should configure the preamplifier switches with the analog high-pass filter set to 1kHz and the gain set for +48dB or +36dB. Refer to the *Song Meter SM2+ User Manual* for details. The dynamic range can be increased by using +36dB gain to avoid clipping stronger signals without significant impact to quieter signals. +48dB gain will deliver a stronger signal with a slight improvement to high-frequency signal-to-noise ratio over +36dB gain.

The SMX-US microphone does not need the 2.5V 2.2K bias, but will work with or without the bias switched “on”. Note that the bias is required for the SMX-II acoustic microphones.

Menu Settings

Audio Settings

The audio settings should be set as follows:

```

Sample rate: 192000      (for 192kHz rate)
                or      384000      (for 384kHz rate)
Channels:    MONO-L      (for left channel)
                or      MONO-R      (for right channel)
                or      STEREO      (for both channels)
Compression: WAC0      (lossless compression)
                or      None      (individual WAV files)
                or      ZC      (zero crossing mode)

```

Settings

The SM2BAT+ card can both record at 192kHz in stereo, or in mono on either the left or right channel.

WAC compression will create one file for each scheduled recording and contains compressed samples for each detected trigger event. Triggers on left and right channels (in the case of 192kHz stereo recordings) are triggered and compressed individually. With +36dB gain, all 16 bits are needed to resolve fainter signals, and so lossy compression is not recommended (so you should use WAC0). At +48dB gain, WAC1 will offer some improvement in compression without significant adverse effects. Higher levels of compression with the SMX-US microphone are not recommended.

If no compression is used, an individual time-stamped WAV file will be created for each triggered event during the scheduled recording period.

Advance Audio Settings

The advanced settings should be set as follows:

Dig HPF Left	fs/12 (16kHz for 192kHz)
	or fs/24 (16kHz for 384kHz)
Dig LPF Left	Off (low-pass disabled)
Trg Lvl Left	18SNR (adaptive +18dB)
Trg Win Left	2.0s

There are two trigger operational modes for WAC and WAV mode. Both trigger modes operation is specified with the above settings but their function differs.

In WAC mode, digital filters are implemented as specified by a fraction of the sample rate in the HPF (high pass filter) and LPF (low pass filter setting). For example, the digital high-pass filter shown above is set to either 1/12th of the sample rate for 192kHz / 12 = 16kHz or 1/24th of the sample rate for 384kHz / 24 = 16kHz. This will filter out frequencies below 16kHz. Higher or lower settings are available to suit your needs. For example, if you have low frequency bats echolocating near or below 16kHz, you may consider using fs/16 for 192kHz and fs/32 for 384kHz for a 12kHz high pass filter.

In WAC mode, Song Meter will measure the rolling-average power spectrum in the frequency band (above 16kHz in the above example) for periods of the trigger window setting 2.0 seconds in the above

example), and if an onset of signal is detected that exceeds this threshold by 18dB, a trigger event is started. Recording will continue until no trigger is detected for a 2.0 second period of time. Longer or shorter trigger windows are available. Longer windows will increase card usage, but will allow further detection if a bat is passing and becomes too faint to re-trigger. You can increase detection rate on fainter signals by reducing the threshold, but this may also increase the false trigger rate, especially in wind and rain.

In triggered WAV mode, individual WAV files are created for each trigger. In this mode, the digital HPF and LPF settings do not actually filter out information from the recordings, but are instead used to define the frequency band of interest for the SM2BAT+ to apply more sophisticated triggering algorithms. At the end of the trigger event, additional algorithms are used to determine if the recording likely contains bat activity or just unwanted noise e.g. wind and rain. If the latter, the SM2BAT+ deletes the WAV file keeping only those recordings most likely to contain useful information. This allows considerable savings in card storage. The resulting WAV files can be opened directly in the analysis software of your choice.

More information on filters and triggers can be found in the *Song Meter SM2+ User Manual*

Scheduling Recordings

Simple One-Channel Configuration

The configurations described below are available as example configurations in the Song Meter Configuration Utility distribution. They are titled “SM2BAT-192-MONO.SET” and “SM2BAT-384-MONO.SET”. For the SM2BAT+ to be able to determine your location's sunrise and sunset times, it is necessary to input your latitude, longitude and timezone. These are found under location settings. You may also want to set a device-specific prefix.

The SM2BAT+ Terrestrial Ultrasonic Packages come with one SMX-US ultrasonic microphone. The easiest set-up is to connect the microphone directly to the left microphone connector on the SM2BAT+ enclosure and mount on a tree or post at the field site. You can also extend the microphone on a cable up to 100 meters away from the enclosure.

Scheduling Recordings

You can configure the Song Meter to record only from sunset to sunrise each day in half hour segments as follows:

First, configure your latitude, longitude, and UTC offset in the “Location” settings.

Next, enter the following advanced schedule:

```
01 AT SSET-00:00:00
02 DO

03 RECORD 00:30:00 (recommended for 384kHz)
or 03 RECORD 01:00:00 (recommended for 192kHz)

04 GOTO LINE 03 00X
05 UNTSRIS+00:00:00
06 GOTO LINE 01 00X
```

The schedule above will wait for sunset, then record back-to-back one-hour or half-hour segments until sunrise (the last segment will end early at sunrise), and repeat daily. You can modify this example to suit your own needs.

Note that the maximum uncompressed file length is 2GB which works out to 46.6 minutes at 384kHz mono and 192kHz stereo or 93.2 minutes at 192kHz mono. If you use one hour periods instead of half-hour periods for 384kHz mono or 192kHz stereo, recordings would be split into alternating 46.6 and 13.4 minute recordings which may be confusing.

Two-Channel Ultrasonic Recording

The SM2BAT+ can sample at 192kHz on both channels in stereo. Recordings with two channels from one or both microphones on cables can allow monitoring two locations simultaneously. For example you could monitor at ground level and at 50m in the rotor swept zone of a wind farm simultaneously with just one SM2BAT+.

The configuration described below is available as an example configuration in the Song Meter Configuration Utility distribution, “SM2BA+-192-STEREO.SET”. For the SM2BAT+ to be able to determine your location's sunrise and sunset times, it is necessary to input your latitude, longitude and timezone. These are found under location settings. You may also want to set a device-specific prefix.

For stereo ultrasonic recordings, you can configure Song Meter to use both channels and install a second SMX-US microphone.

Refer to the one-channel recording settings above. The Settings->Audio->Channels should be set to “STEREO” to enable both channels, and you will want to set the digital high-pass filter and triggers for the right channel as well.

Stereo recordings with compression and triggering consume about 30% more power and will use twice as much flash storage as single-channel recordings.

The triggers act independently so each channel is compressed efficiently.

Mixed Ultrasonic and Acoustic Recording

The SM2BAT+ card permits two channels to simultaneously record conventional audio on one channel and ultrasonic activity on the other at 192kHz sample rate by using an SMX-II acoustic microphone on one channel and an SMX-US ultrasonic microphone on the other.

Alternatively, the SM2BAT permits the recording of conventional audio on one channel on one schedule and ultrasonic activity at 384kHz sample rate on the other channel on a different schedule, but not simultaneously.

Stereo Mixed Recordings

One way to make a mixed recording is to sample both channels at 192kHz at the same time to make a stereo recording. But you can then use the digital low-pass filters to set a cut-off frequency on the acoustic side to filter out the ultrasonic sounds and improve compression ratios. For example, setting a digital low-pass filter to $f_s/24$ will filter out sounds above 8kHz. An example of this is available in the Song Meter Configuration Utility distribution “SM2BAT-192-MIXED-STEREO.SET”

Scheduled Mixed Recordings

Another way to make mixed recordings is to use the Song Meter advanced schedule “*SET*” command to make ultrasonic recordings at some times and conventional recordings at other times. An example of this configuration is available in the Song Meter Configuration Utility distribution “SM2BAT-192-MIXED-SCHED.SET”

Scheduling Recordings

For example, the following schedule would make ultrasonic recordings on the left channel at 192kHz at night, and then a 24kHz recording on the right channel to record the dawn chorus for an hour after sunrise.

```
01 SET192000xMONO-L
02 AT SSET-00:00:00
03 DO
04 RECORD 01:00:00
05 GOTO LINE 04 00X
06 UNTSRIS+00:00:00
07 SET 24000xMONO-R
08 RECORD 01:00:00
09 GOTO LINE 01 00X
```

A similar example for 384kHz can be found in “SM2BAT+-384-MIXED-SCHED.SET”:

```
01 SET384000xMONO-L
02 AT SSET-00:00:00
03 DO
04 RECORD 00:30:00
05 GOTO LINE 04 00X
06 UNTSRIS+00:00:00
07 SET 24000xMONO-R
08 RECORD 01:00:00
09 GOTO LINE 01 00X
```

Zero Crossing

Native Zero Crossing mode is supported in the SM2BAT+ daughter card on the left channel and can be selected by setting Settings->Audio->Compression to “ZC”. In this mode, the sample rate and advanced audio settings have no effect except for the left trigger window (“Trg Win Left”) as described below.

Zero Crossing is not the same as full-spectrum recording. In full spectrum recording, the SM2+ samples audio signals at a specified sample rate measuring the relative amplitude of the signal at each point using 16 bits per sample such that each sample is represented as an integer number between -32,768 and +32,767 inclusive. In contrast, zero crossing mode measures the time between transitions of the signal between positive and negative values relative to some sensitivity threshold. Zero crossing has advantages

including significantly lower power consumption and flash card storage requirements. However, zero crossing representations of bat calls lack information about the changing amplitude and harmonic structure of the underlying signal. It is possible to convert from full spectrum to zero crossing by removing information from the signal, but it is not possible to convert from zero crossing back to full spectrum.

If Zero Crossing is selected, the Song Meter goes into a low power state and creates Titley Scientific AnaBat™ sequence files compatible with AnaLookW™ or other zero crossing software¹. This is “native” zero crossing, meaning that the files are not digitally created. They are created using zero-crossing hardware on the SM2BAT+ daughter card.

The SM2BAT+ assesses each zero cross trigger to verify that it is a bat pass and not a false positive. This performs a similar function to CFCread, but no post processing is necessary, the files are ready to be opened directly in AnaLookW or other zero cross software.

The Zero Crossing implementation reduces data requirements further by dividing the zero crossings by a division ratio. The SM2BAT+ uses a division ratio of 8.

During the scheduled recording period, SM2BAT+ will create zero crossing sequence files for each trigger. The trigger starts when a zero crossing event is detected, and ends when no zero crossing event is detected for the period specified by Settings->Audio->Advanced->Trig Win Left. The trigger may also end when the sequence file grows to its maximum capacity.

Note that it is also possible to convert full spectrum ultrasonic recordings created in the WAC file format from any SM2BAT+ card to AnaLookW compatible files as described in “Post Processing” on page 15.

Zero Crossing requires a sensitivity threshold that is not actually “zero”, but a level slightly greater than zero, and measures signal transitions that cross this threshold. The threshold is required because a signal devoid of bat calls will still contain transitions around zero as a result of ambient and electronic noise. If the threshold is too low, many zero crossings will be detected in a quiet signal resulting in significant noise. If the threshold is too high, the echolocation calls of bats may be distorted or undetectable.

1. AnaBat, AnaLookW and CFCread are trademarks of Titley Scientific. There is no relationship between Titley Scientific and Wildlife Acoustics.

Scheduling Recordings

The SM2BAT+ automatically adjusts the sensitivity threshold at the start of each recording period after waking up from sleep mode. The display will show “ZC Sensitivity Auto Leveling” for several seconds while the level is adjusted.

Post Processing

A .WAC file is created for each scheduled recording segment. In the advanced program above, for example, a .WAC file would be created every hour from sunset to sunrise.

The *Song Scope* software can open .WAC files natively. To quickly locate and review potential bat echolocation calls in a long triggered recording, you can set up *Song Scope* band-pass and detector parameters and use the batch scan feature.

The *WAC2WAV* utility (available at no charge on our web site) can convert the .WAC files into standard .WAV files for analysis by other programs. Usually it is best when processing triggered ultrasonic recordings to use the “Split Triggers” feature. This will take a mono or stereo .WAC file containing possibly many individual triggered events (e.g. bat passes), and break them out into many individual .WAV files for analysis.

The max duration and min spacing parameters let you selectively restrict the duration of each created .wav file and to optionally ignore detections to satisfy the desired spacing in order to fit whatever monitoring protocol you may be used to. For example, if you are used to using Time Expansion detectors that only record for 5 seconds and then pause for 50 seconds while the time expansion buffer is recorded, you could select a max duration of 5 seconds and a min spacing of 50 seconds to simulate this behavior. By default, all detections are included in their entirety.

The compensation filter may be selected to digitally alter the signal to flatten the frequency response of the SMX-US microphone. This may be helpful for analysis by automated classification software that relies on the frequency response to match known bat recordings.

The “Skip Noise” feature can be used to further analyze each candidate trigger to determine if it contains actual bat echolocation calls (or other biological activity) rather than just noise. The algorithm looks for the presence of narrowband energy in the specified frequency band with at least the minimum specified duration. Files that do not meet this criterion are

still split out as .WAV files, but the filename is prepended with the prefix “NOISE_” so they can be set aside.

Finally, if you prefer zero crossing analysis over full spectrum recordings, you can select “Output ZCA” to create zero crossing files instead of .WAV files. In this way, the SM2+ is like having a full spectrum recorder and a zero crossing recorder in one device. The division ratio can be specified as well as the sensitivity. The sensitivity is specified in dB relative to a full-scale signal, or can be set to zero for auto-leveling

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Enclosure 10. Sustainability Report, Dune Surveys & Plantings



NATIONAL AQUARIUM®

Sustainability Report, Dune Surveys & Plantings

Naval Air Station Oceana – Dam Neck Annex

**Naval Facilities Engineering Command Mid-Atlantic
(NAVFAC MIDLANT), PWD Oceana Environmental
Program Division**

November 2010

I. Introduction

Sand dunes protect many coastal areas from high winds, salt spray, storms, and flooding and erosion due to wave energy. Along the mid-Atlantic seaboard, wave and wind action cause these dunes to shift over time. Many native dune plant species are adapted to grow with these moving sands and provide some stabilization. In many areas, human development over the past century has upset the balance of this natural system and the coastal dune system has degraded over the years. Mankind is only now beginning to find ways to work with nature so that the dunes are preserved and development is better planned to reduce adverse impacts to this habitat.

A healthy dune system is important for ecological and physical reasons. Sand dune vegetation is uniquely adapted to thrive in stressful conditions such as extreme heat, salt spray, drought, limited nutrients, and shifting sands. This vegetation provides habitat, including nesting sites to birds, small mammals, reptiles, amphibians, and insects.

Dunes also provide a physical barrier to the harsh conditions of the sea and act as a reservoir for beach nourishment. Coastal communities are beginning to see the value of these systems and are actively working to restore dune systems in their area.



Eroding sand dunes at Dam Neck Annex (February, 2010)

Naval Air Station Oceana (NASO) – Dam Neck Annex maintains nearly 1930 acres of land, including four miles of beachfront property. The base's coastal habitat communities contain primary sand dune structures, and marshes. Many of the dunes at the base are degraded, barren of plant life, and require stabilization. In their present condition, they are eroding along the trailing edge, resulting in lost habitat and hindered base operations. It is a long-term objective to stabilize these dunes by planting native grasses and installing dune fencing so that a protective barrier can be maintained while ensuring that the mission of the naval base is not compromised. Working with community volunteers to plant these grasses, provides an opportunity to educate local citizens about the importance of dune communities as coastal habitat and provide them with a hands-on opportunity for restoration activities.

II. Objectives

This project supports the Naval Facilities Engineering Command Mid-Atlantic (NAVFAC MIDLANT), PWD Oceana Environmental Program Division (NAVFAC ML-PWD Oceana EV) managers with the implementation of shoreline and dune stabilization and conservation/habitat restoration along the coastal region of NASO Dam Neck Annex. Federal regulations require sound management in support of mission. The beach dunes are in danger of severely eroding due to wave and wind action associated with storm conditions. The NAVFAC ML-PWD Oceana EV has partnered with the National Aquarium to assist with eroding dune areas along the Dam Neck beaches. In order to sustain the most valuable resource and training area, protective measures and stabilization is required. The installation of sand fencing builds up sand from wind

action and provides a medium for vegetation to bind sand and strengthen the integrity of the dune system. A plan of future restoration sites is required to provide guidance for future phases of restoration. Beach stability has been compromised with such storms as Hurricane Isabel (2003) and Hurricane Ida (2009). Buffer and training sites have been degraded as well as sensitive ecological habitat areas. The goal of this project is to stabilize sand dunes covering Naval Air Station Oceana – Dam Neck Annex. Stabilizing these dunes will reduce their movement, protecting base operations from creeping sand and providing a natural barrier to ocean swells. Project objectives include:

- Provide the lead on dune restoration activities along the four mile stretch of Dam Neck beaches. Base and community volunteers will be utilized to plant the vegetation; however, the Aquarium will plan, coordinate, purchase materials, and implement the project.
- Provide technical assistance in support of a development of a master plan map documenting erosive conditions and future dune restoration sites as well as vegetative restoration projects. This road map will be provided as a guide for future conservation opportunities as well as document site vulnerabilities.

III. Methods

Since 2006 the Aquarium has worked with Navy operations to restore and maintain the Dam Neck beaches sections at a time. These 2-3 day planting events were prioritized by areas of the beach where attention was needed most and could be easily accessed by Aquarium staff and community volunteers.

Four grasses and one flowering species were planted to compliment what currently thrives on the existing dunes as well as adding diversity to the habitat. Availability of native grass species from local nurseries also contributed to the decision of species selection. These five species, American beach grass (*Ammophila breviligulata*), bitter panicum (*Panicum amarum*), switchgrass (*Panicum virgatum*), salt meadow hay (*Spartina patens*), and goldenrod (*Solidago nemoralis*) are perennial plants that play an important part of mid-Atlantic coastal dune habitats and are uniquely equipped to survive in this type of environment (Appendix B). Over the course of the restoration events the grasses were planted in either pairs of bareroot “culms” or rooted “plugs” spaced approximately 18” apart and at least 6” deep. Hand-held applicators were used to spread a slow-release 10-10-10 fertilizer over the areas.

Dune fencing was installed at each site stretching along the main beach to further stabilize the dunes (Appendix A). These fences serve as a wind break, helping sand accrete around them. Parallel lines of fencing were placed along the bottom (or toe) of the dunes. Dune **instillation** at Dam Neck planting events prior to 2006 had additional fencing installed at 100’ intervals perpendicular to the toe and top fences. Galvanized wiring was used to secure the 3’ tall slatted wood fences to 8’ long posts half-buried in the sand.



IV. Results

During the period of March, 2006 - November 2010 over 220,000 plants were planted on the Dam Neck dunes with the help of 362 volunteers. Continuous dune fencing was installed over the last 5+ years by Navy personnel, Aquarium staff and volunteers. Due to a lack in records from personnel turnover it is uncertain exactly how much linear footage of fencing was installed. As of the November 2010 survey, fencing stretches along the main beach of Dam Neck Annex (Figure 1). Volunteers who assisted in the work included individuals from: Navy personnel, college and high school classes, the Virginia Aquarium and Marine Science Center, youth groups, and local members of the community.



Our goal of stabilized dune habitat can be readily demonstrable using various monitoring protocols. We expect to demonstrate at least 80 percent plant survival one year after planting, along with subsequent plant spreading and coalescence, such that plant cover approaches that typically found in dune habitats in the mid-Atlantic region.

Planting events showing less than 80 percent survival after one year were observed at Dam Neck Annex when a planting was followed by a major storm event or long period of drought.

In November 2009, Hurricane Ida hit the Virginia Beach coast.

NAVFAC ML-PWD Oceana EV staff reported Dam Neck's coast eroding an area approximately 20-40+ ft deep along 5000+ linear feet

stretch of the coastal dune line (Figure 1). Though significant dune damage, half of the restoration grasses planted in October, 2009 remained and no breaching occurred protecting base operations from salt intrusion and flooding. Base personnel immediately replaced lost fencing and the Aquarium returned to replant areas of lost grasses. In addition, areas unsuccessful due to drought are replanted by Navy personnel, Aquarium staff and volunteers the following planting season after the drought.

The shifting sand dunes on Dam Neck Annex are dynamic complex systems. Dam Neck Annex is observed to have an active coastline with high energy waves and major storm events annually. Due to a highly active coast, dunes are observed to frequently shift along the Dam Neck coast. Because these sites are owned by the Department of Defense, they will remain in a natural state and not be threatened by coastal development. The restored dunes are monitored visually throughout the year by a long-standing partnership with NAVFAC ML-PWD Oceana EV staff and the help of the Aquarium. With additional funding the Aquarium will progress to advanced monitoring techniques using areal photography and random species sampling of the project site. After a series of successful planting events (seven since 2006), the Aquarium is confident with the knowledge and skill to implement the long term stability plan maintaining the shifting dunes at Dam Neck Annex protecting base operations.

V. Future Work

A master plan of the four mile coast of NASO Dam Neck Annex was created as a road map for future optimal planting sites and dune fence installation (Figure 1). This road map is an evaluation of the dunes that will be revisited annually as more restoration occurs, the dunes shift, and general maintenance of the area is performed.

On the master plan below the four mile stretch of Dam Neck is identified by three sections to better understand the current condition. These three sections consist of beaches known as the Main Beach, Range Beach, and MACS24 making up the ~21120 linear foot shoreline (Figure 1).

- Section one is the area furthest south marked in green. The site was both fenced and planted over two restoration events in April and November of 2010 by the National Aquarium and volunteers. This area will be visually monitored by NAVFAC ML-PWD Oceana EV staff at the beginning of each planting season, after any major storm events and after long periods of drought to determine plant survival and condition of dune fencing. Further restoration in this area will occur to replace lost vegetation and damaged fencing as needed.
- Section two is an area the Aquarium restored with several planting events from 2006-2008. In November 2009 Hurricane Ida damaged this area creating loss in plants, sand and fencing (Figure 1). New fencing was installed by the NAVFAC ML-PWD Oceana EV staff between December 2009-January 2010 in an effort to replace lost fencing and accrete sand. This section was also part of the Christmas tree project. Over 500 Christmas trees were placed behind the newly installed fence to expedite sand accumulation. As of November 2010 base personnel have plans to bring in sand replenishing these areas hit hardest during the storm. These areas will be revisited after sand replenishment to determine if they are suitable for planting. Ideally this section is most favorable for the next phase in dune stabilization at Dam Neck.
- Section three is a well established primary dune ecosystem. The dunes are very high in elevation and are thriving with vegetation (mostly Sea oats). Although this area was fenced in the past by Navy personnel, it has since been either lost or buried within the dune. It is expected this area will naturally accumulate some sand during the sand replenishment project. NAVFAC ML-PWD Oceana EV staff recommends installing a layer of fencing to widen the dune and prevent unapproved dune access. This area will be fenced by either Navy personnel or the Aquarium depending on when funding and supplies become available.



**NASO Dam Neck Annex
Sustainability Report
November 2010**



- Severe Storm Damage Area
- 2010 Restoration Site
- Fenced Area
- No Visible Fencing
- ▲ Beach Access Points

0 750 1,500 3,000 4,500 6,000
Feet

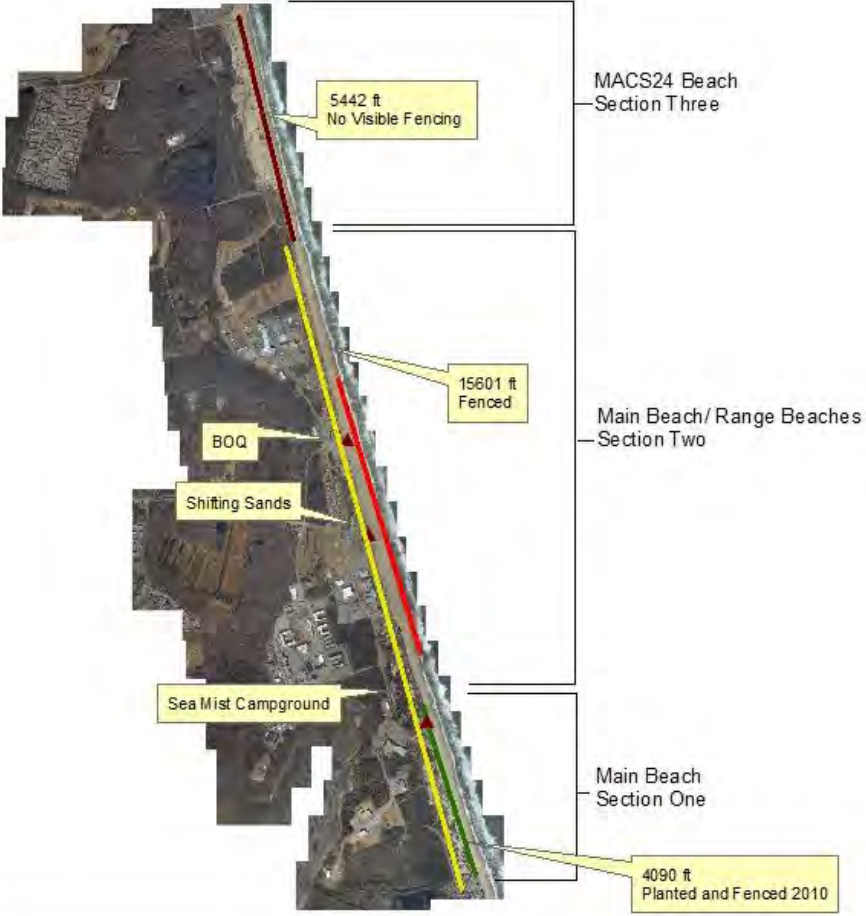


Figure 1

VI. Partners

Since the late 1990s, the National Aquarium in Baltimore has been building a multi-faceted citizen-based coastal habitat restoration program with many public and private sector partners aimed at achieving high-quality, science-based habitat restoration while increasing the connection of local residents to the beauty and value of the Chesapeake Bay and coastal habitats. Here we continued and expanded our larger community-based restoration program at NASO Dam Neck Annex with dune restoration events by engaging local community volunteers to help stabilize primary dune structures using native vegetation. Funding for these projects was provided by the Department of Defense and National Environmental Education and Training Foundation through the National Public Lands Day Program.

Naval Facilities Engineering Command Mid-Atlantic (NAVFAC MIDLANT), PWD Oceana Environmental Program Division will be the local contact for future projects. They have shown continued support with on-site logistics, preparation, and help in recruiting local volunteers. The Dam Neck Annex dune stabilization project helps the NAVFAC ML-PWD Oceana EV towards meeting the Navy's environmental mandates and helps meet many goals of the Chesapeake Bay Program. In-kind support from the base included on site lodging for Aquarium staff, use of equipment needed to install sand dune fencing and manual labor for the installation as well as volunteer labor for the planting events.

Community volunteers participated in a hands-on restoration experience of vital habitats close to their home. They learn about the importance of this coastal habitat while working to protect it. Public involvement in the process is critical because community-based restoration provides unique opportunities to engage the public to improve the status of the resource and generate positive publicity to raise awareness of the cause and effect relationships of coastal development. The Virginia Aquarium and Marine Science Center was an important partner in developing local support for the project.

VII. Conclusions

With future funding the Aquarium plans to continue the partnership with the NAVFAC ML-PWD Oceana EV strengthening their dunes at Dam Neck Annex. Final products for this project include further restoration of coastal dune habitat by installing sand dune fencing and planting native dune plants. The project continues to result in direct, substantial and measurable benefits to many living resources.

Dune habitats are an especially valuable and threatened resource along the mid-Atlantic coast. These areas have been particularly hard hit by erosion and human encroachment, resulting in widespread loss throughout the area. They provide remote and key habitat for many wildlife species, including ground nesting birds, songbirds, water fowl, small mammals, amphibians, reptiles and insects.

Public involvement in the process of coastal dune restoration is critical because community-based restoration of primary dunes provide unique opportunities to engage the public to improve the status of the resource and generate positive publicity to raise awareness of the cause and effect relationships of coastal development. The focus of educational messages associated with this project will range from imparting knowledge (classroom activities) to increasing action (direct involvement in the process) to increasing stewardship (best management practices in one's own backyard).

Dune Fence Installation Guide

Dam Neck Annex

Prepared by the



NATIONAL AQUARIUM®

September 2006

Importance of Dunes

Sand dunes protect many coastal areas from high winds, salt spray, storms, flooding and erosion due to wave energy. Along the mid-Atlantic seaboard, wave and wind action cause these dunes to shift over time. Many native dune plant species are adapted to grow with these moving sands and provide some stabilization. In many areas, human development over the past century has upset the balance of this natural system and the coastal dune system has degraded over the years. Mankind is only now beginning to find ways to work with nature so that the dunes are preserved and development is both better planned to reduce adverse impacts to this habitat.

A healthy dune system is important for ecological and physical reasons. Sand dune vegetation is uniquely adapted to thrive in stressful conditions such as extreme heat, salt spray, drought, limited nutrients, and shifting sands. This vegetation provides habitat, including nesting sites, to birds, small mammals, reptiles amphibians, and insects. Dunes also provide a physical barrier to the harsh conditions of the sea and act as a reservoir for beach nourishment. Coastal communities are beginning to see the value of these systems and are actively working to restore dune systems in their area.

Equipment

Dune fencing – 4' high by 50 ft rolls
Pressure treated 8' 2 x 4 posts
Galvanized wire
Gloves
Pliers
Auger and 4 foot long 4" Auger bit

Installation of Dune Fencing

Fencing provides a wind break, reducing the movement of dunes and helping sand accrete. Dune fencing consists of wire 4' pieces of wooden lathe bound together by wire into 50 foot long rolls. Installation requires deciding on fence line locations, digging post holes and placing posts in the ground along the fence line, and then attaching the

fence to the posts. Dune fencing functions by trapping sand blown by on-shore winds landward across the beach toward the dune line. As the fences become buried, they build up the dune by preventing windblown sand from migrating further in a shoreward direction. Dune fencing has the potential to increase dune height by as much as four feet per year and new fencing can be installed above buried fencing, further building dune height.

Main fence lines run parallel to the ocean. Most sections of the project site have at least one, and up to several existing fence lines in varying states of burial, depending on when they were installed. One new fence line will run approximately 20 ft below (seaward) of the existing bottom (toe) of the dune or 20 ft seaward of the seaward-most existing fence line. The new toe fence is to be installed along the entire length of the project site, except at pedestrian or vehicle crossover points. A second, parallel fence line is to be installed above the new toe fence along selected portions of the project site. Placement of this fence will vary depending on local conditions. In some areas, the second fence will be installed between existing, substantially buried, fence lines; and in other places behind all existing fence lines (e.g. Figure 1). Placement of the second fence line will be up to the installers' discretion, using the following guidance:

- Attempt to install the upper fence near the top or crest of the dune, to the seaward edge of the flattened top or plateau of the dune
- Install between existing fence lines if existing fences are substantially buried and there is a flattened space between them
- Install behind existing fences if the fences are still exposed and have substantial sand trapping potential or if there is a strong slope between existing fences and a more suitable plateau behind them

Using an auger, drill holes in the sand approximately 4' deep for the fence posts. If 4' is not tenable, dig as deep as possible. Holes should be placed at the ends of the length of fence (i.e. every 50 ft) and approximately 10 feet apart in between. Attempt to be place a post at the bottom of each "dip" or low point as you move along the dune, ensuring that the fence can be installed flush to the sand across each dip. It is more important that posts are installed taking local topography into consideration (i.e. at the bottom of dips) than it is that they be placed on strict 10 ft centers. Place the 2 x 4 in the hole, with the 4" face oriented toward the ocean, and infill with sand. Tamp the sand around the base of the posts. Sit the roll of fence next to the first post. Attach the end, with the bottom of the fence flush with sand, using galvanized wire near the top, bottom and in the middle of the fence. Unroll the fence to the next post and repeat until that section of fence is complete. Start the next roll of fence on the same post where the last one ended. Repeat in this manner until the fence runs the length of the dune. See Figure 2 for an illustration of a standard fence installation.

Work Plan

Sand dunes at Dam Neck run the length of the beach from Camp Pendleton to Sandbridge. The site has been divided into 6 sections (see Map), with divisions corresponding to natural breaks in the fencing design (e.g. Vehicle/pedestrian crossover

points, beginning or end points of existing fencing). The entire project will require the installation of approximately 5 miles of dune fencing along 3.1 miles of beach using about 2,600 2 x 4 posts. The following section describes a flow of work to divide the project into manageable, prioritized pieces.

Task 1: Install Toe Fence Entire Length of Section 2

Fencing			
Feet	Rolls	2x4s	Ties
2,300	46	230	690

Start installing toe (seaward-most) fence beginning just south of the vehicle cross over at the north end of Section 2 (75° 57' 19.29"W, 36° 46' 36.32" N). New toe fencing is to be installed approximately 20 ft seaward of existing seaward-most fence. Fence will run continuously south to the pedestrian cross over located between Sections 1 and 2.

Task 2: Install Toe Fence Entire Length of Section 1

Fencing			
Feet	Rolls	2x4s	Ties
3,800	76	380	1,140

Start installing toe (seaward-most) fence beginning just south of the pedestrian cross over separating Sections 2 and 1 (75° 57' 12.04"W, 36° 46' 15.21" N). New toe fencing to be installed approximately 20 ft seaward of existing seaward-most fence. Fence will run continuously south to the southern terminus of Section 1 (Sandbridge, southern end of the base). At the extreme end of the site, curve the fencing gradually west (landward) and run approximately 100 feet along sand path leading through the back dune area.

Task 3: Install Toe Fence Entire Length of Section 3

Fencing			
Feet	Rolls	2x4s	Ties
2,600	52	260	780

Start installing toe (seaward-most) fence beginning just north of the vehicle cross over separating Sections 2 and 3 (75° 57' 19.29"W, 36° 46' 36.32" N). New toe fencing is to be installed approximately 20 ft seaward of existing seaward-most fence. Begin new fence along sand path running up the dune; run fence southeast along path until about 20 feet east of existing toe fence; turn path sharply to the north and run new toe fence parallel to, and about 20 feet seaward of, existing toe fence. Fence will run continuously north to the northern end of Section 3 (75° 57' 27.20"W, 36° 47' 01.37" N), marked by wooden stairs and a pedestrian crossover. There are two additional pedestrian cross over in the section, both marked by stairs down the dune. Construct breaks in the fence to allow for pedestrian access at these locations. Note that there is

high-quality existing fencing in this section and no additional upper dune fencing will be needed.

Task 4: Install Toe Fence Entire Length of Section 4

Fencing			
Feet	Rolls	2x4s	Ties
2,000	40	200	600

Start installing toe (seaward-most) fence beginning just north of the pedestrian cross over separating Sections 3 and 4 (75° 57' 27.20"W, 36° 47' 01.37" N). New toe fencing is to be installed approximately 20 ft seaward of existing seaward-most fence. Fence will run continuously north to the northern end of Section 4 (75° 57' 31.93"W, 36° 47' 19.52" N), marked by wooden stairs and a pedestrian crossover. There are two additional pedestrian cross-overs in the section, both marked by stairs down the dune. Construct breaks in the fence to allow for pedestrian access at these locations. Note that there is high-quality existing fencing in this section and no additional upper dune fencing will be needed.

Task 5: Install Toe Fence Entire Length of Section 5

Fencing			
Feet	Rolls	2x4s	Ties
3,200	64	320	960

Start installing toe (seaward-most) fence beginning just north of the pedestrian cross over separating Sections 4 and 5 (75° 57' 31.93"W, 36° 47' 19.52" N). Conditions in Section 5 are variable. Existing high-quality toe fencing runs north, continuing from Section 4, until the vehicle crossover located approximately 1,200 feet into Section 5. New toe fencing is to be installed approximately 20 ft seaward of this existing toe fence until it ends. Fencing is absent, sporadic or in poor condition north of the end of the existing high-quality fence. There are some existing 4x4 posts without attached fencing in this area that can be used to install sand fence. The exact placement of fencing in this area will be up to the installer's discretion, with existing posts used to establish either toe or upper fence lines as possible and appropriate. For the purposes of this task, install only toe (seaward) fence, using existing posts if possible. Fence will run continuously north to the northern end of Section 5 (75° 57' 42.08"W, 36° 47' 50.30" N), which is approximately 275 ft north of the vehicle cross-over in front of a small (Guard?) structure. Construct breaks in the fence to allow for vehicle access at this location and the vehicle cross-over in the southern part of Section 5.

Task 6: Install Toe Fence Entire Length of Section 6

Fencing			
Feet	Rolls	2x4s	Ties
2,800	56	280	840

Conditions in Section 6 are similar to those in Section 5: sporadic or absent fencing throughout, with sporadic existing 4x4 posts without attached fencing. There is no continuous, high-quality fencing in Section 6 as there is in the southern part of Section 5. Start installing toe (seaward-most) fence southern end of Section 6 (75° 57' 42.08"W, 36° 47' 50.30" N), heading north. The exact placement of fencing in Section 6 will be up to the installer's discretion, with existing posts used to establish either toe or upper fence lines as possible and appropriate. For the purposes of this task, install only toe (seaward) fence, using existing posts if possible. Fence will run continuously north to the northern end of Section 6 (75° 57' 49.38"W, 36° 47' 16.76" N) There are two vehicle cross-overs in this Section – one just north of the beginning of the section and another about 960 feet south of the northern end of the section. Construct breaks in the fence to allow for vehicle access at these locations.

Task 7: Install Upper Fence Entire Length of Section 2

Fencing			
Feet	Rolls	2x4s	Ties
2,300	46	230	690

Start installing upper (landward-most) fence beginning just south of the vehicle cross over at the north end of Section 2 (75° 57' 19.29"W, 36° 46' 36.32" N). New upper fencing is to be installed near the top or crest of the dune, to the seaward edge of the flattened top or plateau of the dune. Fence will run continuously south to the pedestrian cross over located between Sections 1 and 2.

Task 8: Install Upper Fence Entire Length of Section 1

Fencing			
Feet	Rolls	2x4s	Ties
3,800	76	380	1,140

Start installing upper (landward-most) fence beginning just south of the pedestrian cross over separating Sections 2 and 1 (75° 57' 12.04"W, 36° 46' 15.21" N). Upper fencing is to be placed seaward of, or behind landward-most existing fence, as appropriate. Placement of the upper fence line will be up to the installers' discretion, using the following guidance:

- Attempt to install the upper fence near the top or crest of the dune, to the seaward edge of the flattened top or plateau of the dune
- Install between existing fence lines if existing fences are substantially buried and there is a flattened space between them
- Install behind existing fences if the fences are still exposed and have substantial sand trapping potential or if there is a strong slope between existing fences and a more suitable plateau behind them

Fence will run continuously south to the southern terminus of Section 1 (Sandbridge, southern end of the base).

Task 9: Install Upper Fence in Section 5, as Needed

Fencing			
Feet	Rolls	2x4s	Ties
2,000	40	200	600

Start installing toe (seaward-most) fence beginning just north of the end of the existing high-quality toe fencing runs that runs north to the vehicle crossover located approximately 1,200 feet into Section 5. New upper fencing is to be installed near the top or crest of the dune, to the seaward edge of the flattened top or plateau of the dune. There are some existing 4x4 posts without attached fencing in this area that can be used to install sand fence. The exact placement of fencing in this area will be up to the installer’s discretion, with existing posts used to establish either toe or upper fence lines as possible and appropriate. For the purposes of this task, install only upper fence, using existing suitable posts not used during earlier toe fence installation. Fence will run continuously north to the northern end of Section 5 (75° 57’ 42.08”W, 36° 47’ 50.30” N), which is approximately 275 ft north of the vehicle cross-over in front of a small (Guard?) structure. Construct breaks in the fence to allow for vehicle access at this location and the vehicle cross-over in the southern part of Section 5.

Task 10: Install Upper Fence Entire Length of Section 6

Fencing			
Feet	Rolls	2x4s	Ties
2,800	56	280	840

Conditions in Section 6 are similar to those in Section 5: sporadic or absent fencing throughout, with sporadic existing 4x4 posts without attached fencing. There is no continuous, high-quality fencing in Section 6 as there is in the southern part o Section 5. Start installing upper fence at southern end of Section 6 (75° 57’ 42.08”W, 36° 47’ 50.30” N), heading north. The exact placement of fencing in Section 6 will be up to the installer’s discretion, with existing posts used to establish either toe or upper fence lines as possible and appropriate. For the purposes of this task, install only upper fence, using existing suitable posts not used during earlier toe fence installation. Fence will run continuously north to the northern end of Section 6 (75° 57’ 49.38”W, 36° 47’ 16.76” N) There are two vehicle cross-overs in this Section – one just north of the beginning of the section and another about 960 feet south of the northern end of the section. Construct breaks in the fence to allow for vehicle access at these locations.

Task 10: Install Cross Fencing as Needed Using Remaining Materials

With any remaining material, install fencing perpendicular to, and connecting, the original toe and upper fencing. Cross fencing should be installed in areas where it

appears that prevailing winds parallel to the shore are limiting the effectiveness of the original fencing or where installation of cross fencing will enhance the trapping of long-shore transported sands. Cross fencing should be installed no closer than once every 100 feet.



Figure 1

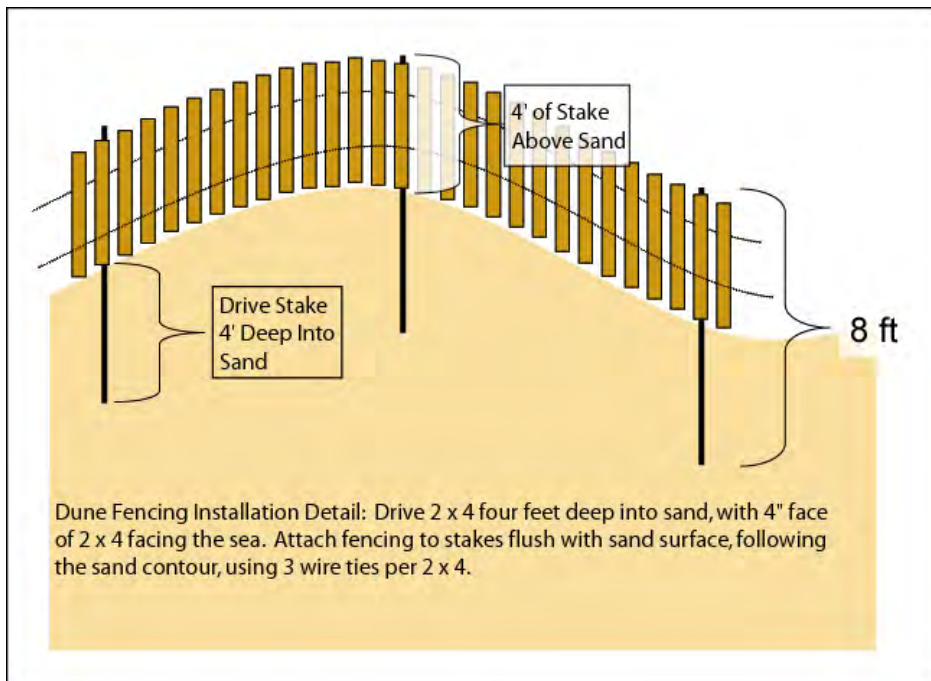


Figure 2

Appendix B

Recommended Native Sand Dune Plant Species List for Dam Neck Annex

Species Name	Common Name
<i>Ammophila breviligulata</i>	American Beach Grass
<i>Cakile edentula</i>	American searocket
<i>Hibiscus moscheutos</i>	swamp rosemallow
<i>Panicum amarum</i>	coastal panic grass
<i>Panicum Virgatum</i>	switchgrass
<i>Spartina patens</i>	salt meadow hay
<i>Solidago nemoralis</i>	gray golden rod
<i>Solidago sempervirens</i>	seaside goldenrod
<i>Uniola paniculata</i>	sea oats

* Note, this is a limited list based on species present on Dam Neck Annex and availability from Pineland's Nursery (Columbus, NJ), American Native Plants (Perry Hall, MD), and Cullipher Farms (Norfolk, VA).



**Cooperative Agreement FINAL REPORT for Dune
Restoration at Naval Air Station Oceana – Dam Neck Annex**
Agreement#/title: N40085-11-2-9822



March 2013

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I. Introduction

Sand dunes protect many coastal areas from high winds, salt spray, storms, flooding and erosion due to wave energy. Along the mid-Atlantic seaboard, wave and wind action cause these dunes to shift over time. Many native dune plant species are adapted to grow with these moving sands and provide some stabilization. In many areas, human



development over the past century has upset the balance of this natural system and the coastal dune system has degraded over the years. Mankind is only now beginning to find ways to work with nature so that the dunes are preserved and development is better planned to reduce adverse impacts to this habitat.

A healthy dune system is important for ecological and physical reasons. Sand dune vegetation is uniquely adapted to thrive in stressful conditions such as extreme heat, salt spray, drought, limited nutrients, and shifting sands. This vegetation provides habitat, including nesting sites, to birds, small mammals, reptiles, amphibians, and insects. Dunes also provide a physical barrier to the harsh conditions of the sea and act as a reservoir for beach nourishment. Coastal communities are beginning to see the value of these systems and are actively working to restore dune systems in their area.

Naval Air Station Oceana (NASO) – Dam Neck Annex maintains nearly 1,100 acres of land, including four miles of beachfront property. The base’s coastal habitat communities contain primary sand dune structures, and marshes. Many of the dunes at the base are degraded, barren of plant life, and require stabilization. In their present condition, they are eroding along the trailing edge resulting in lost habitat with the potential to hinder base operations. It is a long-term objective to stabilize these dunes by planting native grasses and installing dune fencing so a protective barrier can be maintained while ensuring the mission of the naval base is not compromised. Working with community volunteers to plant these grasses provides an opportunity to educate local citizens about

the importance of dune communities as coastal habitat and provide them with a hands-on opportunity for restoration activities.

II. Objectives

This project supports Commander, Navy Region Mid Atlantic Natural Resource (CNRMA) managers with the implementation of shoreline and dune stabilization and conservation/habitat restoration along the coastal region of NASO Dam Neck Annex. Federal regulations require sound management in support of mission. The beach dunes are in danger of erosion due to wave and wind action associated with storm conditions. In order to sustain the most valuable resource and training area, protective measures and stabilization is required. The installation of fencing supports sand deposit through wind action and provides a medium for vegetation to bind sand and strengthen the integrity of the dune system. Beach stability can often be compromised with major storm events, including hurricanes, threatening training sites as well as sensitive ecological habitat. The goal of this project is to stabilize sand dunes covering the Virginia coastline along NASO – Dam Neck Annex. Stabilizing these dunes will reduce their movement, protect base operations from creeping sand and provide a natural barrier to ocean swells.

Project objectives:

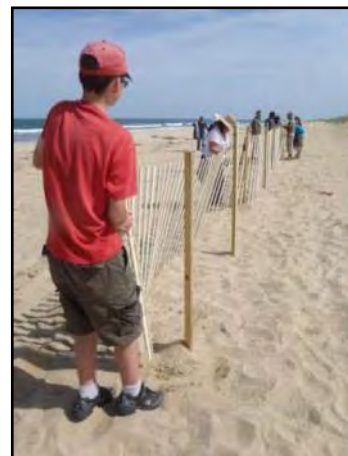
- Conduct two two-day community based outreach events in the spring (Mar-May) and fall (Sept-Nov). Activities included dune fence installation and vegetation planting.
- The National Aquarium (Aquarium) planned, coordinated volunteer registration, purchased materials, and acted as project lead.
- Planted a total of 55,000 native dune grasses.

III. Methods

Spring Planting Event

The Aquarium hosted a two-day restoration event May 11-12, 2012 with 76 volunteers dedicating 700 hours to the project. Restoration practices included planting native dune grasses along the leading and trailing edge of the dunes and the installation of dune fencing. Planting and fencing took place along the northernmost beachfront section of NASO – Dam Neck Annex.

Three grass species were planted, American beach grass (*Ammophila breviligulata*), Salt meadow hay (*Spartina patens*) and bitter panicum (*Panicum amarum*). These perennial grasses are an important part of mid-Atlantic coastal dune habitats and are uniquely equipped to survive in this type of environment. The salt meadow hay and bitter panicum were planted in pairs of bareroot “culms” spaced approximately 18” apart and at least 6” deep. Rooted American beach grass was similarly planted with one “plug” per wole. Using these methods, 15,000 American beach grass, 5,000 salt meadow hay, and 10,000 bitter



panicum were planted over 1.6 acres of dune. Hand-held applicators were used to spread a slow-release 10-10-10 fertilizer over the areas.

Dune fencing was also installed at the project site. Due to the nature of the site, augers provided to assist with post hole digging did not fare well. Volunteers found it more productive to hand dig 4' holes for the 8' 2x4 wooden posts. Although the plan was to fence the entire length of the planted area, this setback slightly slowed the process. At the end of the second day dune fencing stretched just over half the planting site and was later completed by base personnel.

Fall Planting Event

The Aquarium hosted a second two-day restoration event September 7-8, 2012 with 32 volunteers dedicating 160 hours to the project. Restoration practices included planting native dune grasses along the leading and trailing edge of the dunes. No fence installation occurred during the fall event. Planting took place starting at the Sea Mist campsite to the southernmost section of NASO – Dam Neck Annex.



During the fall event two grass species were planted, American beach grass (*Ammophila breviligulata*) and Switch grass (*Panicum amarum*). Each were planted one “plug” per hole spaced approximately 18” apart and at least 6” deep. Using these methods, 6,000 American beach grass, and 19,000 switch grass were planted over 1 acre of dune. Hand-held applicators were used to spread a slow-release 10-10-10 fertilizer over the areas.

For the fall event all plants were purchased through Pinelands Nursery (Columbus, NJ) and were not “bare root” (rather plugs of 50 per tray- 500 trays). Cullipher Farms, our bare root supplier in VA, informed the Aquarium in July, 2012 they would no longer be able to supply this type of grass. Although the CESU contract scoped 30K grasses for the September planting the Aquarium reduced the number of plants by 5,000 making it a total of 25k. This modification was made to reflect the change from bare root to plugs. Grass plugs are well established, larger, and typically a more expensive plant type. This adjustment allowed the Aquarium to stay on budget while acknowledging it is more time consuming to complete the planting.

IV. Results

Success is measured by the percent survival of the planted grasses over the years. After one growing season we typically expect to see an 80% survival of vegetation along with subsequent plant spreading and coalescence, such that plant cover approaches that typically found in dune habitats in the mid-Atlantic region. Because this site is owned by

the Department of Defense, dunes will remain in a natural state and not be threatened by coastal development.

Due to their close proximity, the Aquarium strongly depends on Naval Facilities Engineering Command MIDLANT (NAVFAC ML) natural resources staff to monitor the project site immediately following planting events up to the first year in the event of a major storm or hurricane. By maintaining communication with NAVFAC ML staff, the Aquarium receives post storm reports of any possible breaches or damage to dune fencing. In late October 2012, a category 1 hurricane “Sandy” approached the eastern coastline passing Virginia Beach Sunday, October 28. With peak



Dune fencing damage post Hurricane Sandy

winds of 80mph reported by NOAA’s National Weather Service, damage was incurred at the planting site. NAVFAC ML staff reported a total loss of dune fencing and up to a 50% loss of newly planted vegetation. Although a devastating storm, no breaches were reported along the four mile stretch of NASO-Dam Neck Annex, underscoring the importance of maintaining a healthy sand dune system in order to protect base resources.

V. Future Work

The Aquarium and partners will continue to build up the primary dunes at NASO – Dam Neck Annex over the next several years. As of March 2013 replacement dune fencing is being installed at the most vulnerable areas along the four mile stretch. The Aquarium has plans to revisit the site to plant additional native dune grasses in 2013 if funding is available.

VI. Partners

Since the late 1990s, the **National Aquarium** has been building a multi-faceted citizen-based coastal habitat restoration program with many public and private sector partners aimed at achieving high-quality, science-based habitat restoration while increasing the connection of local residents to the beauty and value of the Chesapeake Bay and coastal habitats. Here we continued and expanded our larger community-based restoration program with dune restoration events by engaging local community volunteers to help stabilize primary dune structures using native vegetation. Funding for this project was provided by the Cooperative Ecosystem Studies Unit.

Naval Facilities Engineering Command MIDLANT (NAVFAC ML) – NAS Oceana Public Works Department is the local contact for this project. They were responsible for on-site logistics and preparation while offering support to recruit local volunteers. This

project helps them towards meeting the Navy’s environmental mandates and helps meet many of the goals of the Chesapeake Bay Program. **Naval Air Station Oceana Dam Neck Annex** hosted the dune restoration projects. In-kind support from the bases included equipment needed to install sand dune fencing and manual labor for the installation as well as volunteer labor for the planting events.

Virginia Aquarium and Marine Science Center located nearby NASO Dam Neck Annex has supported the project by sharing the outreach opportunity at their institution with staff and volunteers. They have been involved throughout the planning process to offer support when needed.

Community volunteers participated in a hands-on restoration experience of vital habitats close to their home. They learned about the importance of this coastal habitat while working to protect it. Public involvement in the process was critical because community-based restoration provides unique opportunities to engage the public to improve the status of the resource and generate positive publicity to raise awareness of the cause and effect relationships of coastal development.



VII. Conclusions

Final products for this project include the restoration of 2.6 acres of coastal dune habitat by installing sand dune fencing and vegetating the site. This was accomplished with the help of 108 volunteers dedicating 540 hours planting 55,000 native sand dune grasses. Both grasses and fencing were quickly challenged during Hurricane Sandy and loss of



both incurred. While major storms such as Sandy not common, our coastlines are constantly assaulted by strong winds and other erosive forces. It is therefore very important to ensure a healthy sand dune system in these areas so that damage is minimized and nearby resources are not affected. A healthy dune system will provide the support needed to prevent a breach between the shoreline and freshwater marshes.

Dune habitats are an especially valuable and threatened resource along the mid-Atlantic coast. These areas have been particularly hard hit by erosion and human encroachment, resulting in widespread loss throughout the area. They provide remote and key habitat for many wildlife species, including ground nesting birds, songbirds, water fowl, small mammals, amphibians, reptiles and insects.

Public involvement in the process of coastal dune restoration is critical because community-based restoration of primary dunes provide unique opportunities to engage the public to improve the status of the resource and generate positive publicity to raise awareness of the cause and effect relationships of coastal development. The focus of educational messages associated with this project will range from imparting knowledge to increasing action to increasing stewardship (best management practices in one's own backyard).



NATIONAL AQUARIUM®

Naval Air Station Oceana Dam Neck Annex – Monitoring needs.

I. Introduction

Sand dunes protect many coastal areas from high winds, salt spray, storms, flooding and erosion due to wave energy. Along the mid-Atlantic seaboard, wave and wind action cause these dunes to shift over time. Many native dune plant species are adapted to grow with these moving sands and provide some stabilization. In many areas, human development over the past century has upset the balance of this natural system and the coastal dune system has degraded over the years. Mankind is only now beginning to find ways to work with nature so that the dunes are preserved and development is better planned to reduce adverse impacts to this habitat.

A healthy dune system is important for ecological and physical reasons. Sand dune vegetation is uniquely adapted to thrive in stressful conditions such as extreme heat, salt spray, drought, limited nutrients, and shifting sands. This vegetation provides habitat, including nesting sites, to birds, small mammals, reptiles, amphibians, and insects. Dunes also provide a physical barrier to the harsh conditions of the sea and act as a reservoir for beach nourishment. Coastal communities are beginning to see the value of these systems and are actively working to restore dune systems in their area.

II. Site Description

Naval Air Station Oceana (NASO) – Dam Neck Annex maintains nearly 1,100 acres of land, including four miles of beachfront property. The base’s coastal habitat communities contain primary sand dune structures, and marshes. Many of the dunes at the base are degraded, barren of plant life, and require stabilization. In their present condition, they are eroding along the trailing edge resulting in lost habitat with the potential to hinder base operations. It is a long-term objective to stabilize these dunes by planting native grasses and installing dune fencing so a protective barrier can be maintained while ensuring the mission of the naval base is not compromised. Working with community volunteers to plant these grasses provides an opportunity to educate local citizens about the importance of dune communities as coastal habitat and provide them with a hands-on opportunity for restoration activities.

III. Monitoring Protocols

- a. **Photo Stations** (annually in fall)

The purpose of the photo station is to establish fixed locations from which photographs can periodically be taken. Comparing these photos as the site matures and shifts allows one to visually assess the progress of the sand dune.

i. Equipment

- Digital Camera
- Clipboard and paper or notebook
- Prints of earlier shots from each photo station
- Pens or pencils
- Map of photo station locations

ii. Protocol

It is very important each photo station shot is framed identically to previous shots from that station. Note landmarks in the previous shots, including the location of the horizon, tree lines, etc. and ensure these landmarks appear in the proper part of the frame when taking pictures from that station again. Retake any photos that do not appear to be properly framed. Attempt to schedule photos during fair weather.

Photo stations at NASO Dam Neck Annex should be taken immediately before and after a planting event followed by annual photos.



Sample photo station



b. **Wildlife, Bird and Habitat Survey** (measured quarterly)

Background: Sand dunes provide a unique habitat to wildlife including birds, small mammals and insects. They provide food and shelter for resident and migratory wildlife. Identifying the types and numbers of animals present at different times throughout the year can give a more complete picture of the habitat benefits this area provides.

It is very important to attempt to quantify the animals utilizing the land. This can be very difficult, as many animals will be scared off by human presence, or are active at night. Since it is not always possible to see and count the various species during a monitoring event, the next best thing is to monitor evidence of animal presence. This can come in many forms, including animal tracks, scat, or visible homes (dens, nests, etc.).

i. Supplies

- Binoculars
- Datasheets, clipboards and pencils
- Field guides for animal ID

ii. Protocols

Attempt to schedule monitoring session for early morning, when birds and other animals are most likely to be active. Use a data sheet to record all birds, mammals, reptiles, amphibians, and notable insects (such as dragonflies) that are observed.

In addition to animals actually observed, use the data sheet to note animal evidence. Attempt to identify scat and tracks to a species or family level using field guides. Monitoring should occur at minimum on a quarterly basis, but can be carried out more frequently if volunteers wish to do so.

c. Vegetation Survival (measured annually in the fall)

i. Supplies

- GPS
- clipboard and pencils

ii. Protocols

Attempt to estimate the percentage of plant survival post planting at the conclusion of the growing season (fall). Observations are also important after major storm events to determine any plant loss or dune breaching. Use GPS to estimate area calculation of lost section as well as marking waypoint of any breaches in the dunes.

Grasses should be monitored for both survival and seed production indicating plant propagation.

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Enclosure 11. Cooperative Ecosystems Studies Unit Dune Restoration at NASO DNA

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**COOPERATIVE AGREEMENT BETWEEN THE U.S. DEPARTMENT OF THE NAVY
AND
NATIONAL AQUARIUM, BALTIMORE MD
FOR DUNE GRASS PLANTINGS AT NAVAL AIR (NAS) OCEANA (DAM NECK
ANNEX)**

**COOPERATIVE AGREEMENT
NUMBER N62470-13-2-8023**

27 SEPTEMBER 2013

1. Introduction: This Cooperative Agreement is made by and between the U.S. Department of the Navy (DON), represented by the Naval Facilities Engineering Command, Atlantic, and National Aquarium in Baltimore, Inc. It is issued to:

National Aquarium in Baltimore
501 Pratt Street
Baltimore, MD 21202

2. Purpose: This project supports Commander, Navy Region Mid Atlantic Natural Resource managers with the implementation of shoreline and dune stabilization and conservation/habitat restoration along the coastal region of NASO Dam Neck Annex (DNA). National Aquarium Baltimore shall use cooperative agreement funds, in compliance with enclosure (1), Terms and Conditions, to carry out the project described by enclosure (2), Scope of Work (SOW).

3. Authorities: The authority for this Cooperative Agreement is 16 USC §670c-1 (Sikes Act; on-post project for the maintenance and improvement of natural resources or for the benefit of natural and historic research).

4. Period of Performance: The period of performance covered by this Cooperative Agreement is from the date of the last signatory to this Agreement until 30 March 2015.

5. Funding: The total funding obligated for this Cooperative Agreement is \$46,911.00.

6. Accounting and Appropriations Data:

AA 1731804 52FA 252 00052 0 068732 2D C002LD 324423CN400Q \$46,911.00
Funding Document Number: N3244213RC025LD

7. Awarding Office:

Commander
Naval Facilities Engineering Command, Atlantic
6506 Hampton Blvd
Norfolk, VA 23508-1278

8. Cooperative Agreement Administrative Office / Representative:

Stewart Blake Wittmann
Naval Facilities Engineering Command, Atlantic

6506 Hampton Blvd.
Norfolk, VA 23508
Phone: (757) 322-8123
E-mail: blake.wittmann@navy.mil

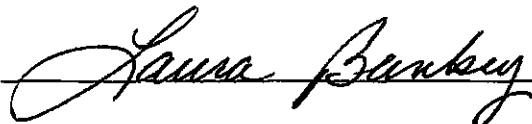
9. Paying Office:

Defense Finance and Accounting Service
P.O. Box 998022
Cleveland, OH 44199

10. Delegations: Full administration duties have been delegated to the administrative office (paragraph 8). Upon request, the awarding office (paragraph 7) will make the full text of delegated contract administration functions available. Please direct questions to those contacts.

11. Terms and Conditions: This Cooperative Agreement shall be governed by the Terms and Conditions provided in enclosure (1), attached hereto and made a part hereof.

12. Signature of representatives for National Aquarium in Baltimore:

 _____ 9/30/13
Date
Project Manager
National Aquarium in Baltimore

13. For the United States of America: Signature of awarding Grants Officer:

 _____ 9/20/13
Date
Patricia Kelliher
Acquisition Director, NAVFAC LANT

**COOPERATIVE AGREEMENT BETWEEN THE U.S. DEPARTMENT OF THE NAVY
AND
NATIONAL AQUARIUM, BALTIMORE MD
FOR DUNE GRASS PLANTINGS AT NAVAL AIR (NAS) OCEANA (DAM NECK
ANNEX)**

A. Purpose

This project supports Commander, Navy Region Mid Atlantic Natural Resource managers with the implementation of shoreline and dune stabilization and conservation/habitat restoration along the coastal region of NASO Dam Neck Annex (DNA). National Aquarium Baltimore shall use cooperative agreement funds, in compliance with enclosure (1), Terms and Conditions, to carry out the project described by enclosure (2), Scope of Work (SOW).

B. Project Area

NAVAL AIR (NAS) OCEANA (DAM NECK ANNEX)

C. Designated Representative

The Navy Representatives are:

Navy Technical Representative is:

Paul Block
Natural Resource Specialist
Naval Facilities Engineering Command, Atlantic
6506 Hampton Blvd
Norfolk, VA 23508
Phone: 757-322-8499
paul.block@navy.mil

Contract Specialist is:

Stewart Blake Wittmann
Naval Facilities Engineering Command, Atlantic
6506 Hampton Blvd.
Norfolk, VA 23508-1278
Telephone: 757-322-8123
Email: blake.wittmann@navy.mil

Cooperative Representatives are:

The Technical Representative is:

Charmaine Dahlenburg
Project Manager
National Aquarium in Baltimore
501 East Pratt Street
Baltimore, MD 21202

410-576-3800
cdahlenburg@aqua.org

D. Government Requirements/Materials Available for Use

To reimburse the Cooperator in the amount of \$46,911.00 for the direct costs of tasks and other allowable direct and indirect costs as described in the attached scope of work. Allowability of costs, whether direct or indirect, shall be determined in accordance with the DoDGARS, 32 C.F.R. Part 32, and OMB Circular A-122.

E. General Requirements

1. The Cooperator shall visit the designated areas as often as necessary and within the limits stated in the scope of work to accomplish the purpose of this agreement.
2. The Cooperator shall provide all vehicle transportation, meals, and lodging for him/herself and any personnel; and all equipment and analyses necessary to complete the work.

F. Specific Requirements

1. Conduct the work described in the attached scope of work ENCLOSURE (2) Scope of Work for Dune Grass Plantings at NAS Oceana (DAM NECK ANNEX)

2. The Cooperator shall be reimbursed for work as documentation of the work and cost is provided to the NTR. Except that no more than 80% of the total will be paid prior to the delivery of the services, described in section F.1 above, to NAVFAC Atlantic. The Cooperator shall provide sufficient details to support all payment invoices. Payments are on a reimbursable basis for work performed, but they shall not exceed the amount agreed to on page 1 of this Cooperative Agreement.

G. Special Requirements

COOPERATIVE AGREEMENT TERMS AND CONDITIONS (SEPT 2006 Rev 2)

DoDGARs Part 22: <http://www.dtic.mil/whs/directives/corres/pdf/321006r22p.pdf>

DoDGARs Part 32: <http://www.dtic.mil/whs/directives/corres/pdf/321006r32p.pdf>

OMB Circulars: <http://www.whitehouse.gov/omb/circulars/>

Chapter 1 ARTICLES

1. **Order of Precedence**
2. **Statutes and Regulations**
3. **Cost Principles and Audit ***
4. **Record Retention and Access Requirements ***
5. **Modification of Cooperative Agreement**
6. **Prior Approvals and Changes**
7. **Allowable Costs ***

8. **Unexpended Balance**
9. **Overpayment and Earned Interest**
10. **Future Funding**
11. **Subagreements ***
12. **Officials Not to Benefit ***
13. **Hatch Act ***
14. **Lobbying ***
15. **Environmental Standards ***
16. **Nondiscrimination ***
17. **Cargo Preference ***
18. **Preference for U. S. Flag Air Carriers ***
19. **Profit or Fee ***
20. **Claims, Disputes, and Appeals ***
21. **Controlled Unclassified Information**
22. **Debarment and Suspension ***
23. **Drug Free Workplace ***
24. **Standards for Financial Management Systems ***
25. **Payment ***
26. **Procurement ***
27. **Property ***
28. **Reports ***
29. **Termination and Enforcement ***
30. **After-Award Requirements ***
31. **Cost Share or Match ***
32. **Resource Conservation and Recovery Act**

* Refer to DoDGARS, Part 22, appendices A-C for applicable modifications and requirements.

1. **Order of Precedence**

This Cooperative Agreement is subject to the laws and regulations of the United States. Any inconsistency or conflict in the terms and conditions specified in this Cooperative Agreement shall be resolved according to the following order of precedence:

- (a) The Federal statute authorizing this award, or any other Federal statutes directly affecting performance of this Cooperative Agreement.
- (b) Department of Defense Grant and Assistance Regulations (DoDGARs) 32 CFR Part 32, Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations.
- (c) These General Terms and Conditions.
- (d) Other terms and conditions contained within this Cooperative Agreement and any attached schedules.

2. **Statutes and Regulations**

This Cooperative Agreement is subject to the laws and regulations of the United States that apply to assistance instruments including Chapter 63 of U.S. Code Title 31. DoDGARs Part 32 is hereby incorporated into this Cooperative Agreement by reference. The following OMB circulars, as appropriate, are also incorporated by reference into this Cooperative Agreement:

- (a) A-133, "Audits of State, Local Governments, and Non-Profit Organizations"
- (b) A-122, "Cost Principles for Non-Profit Organizations"

3. Cost Principles and Audit

DoDGARS Part 32, Uniform Administrative Requirements for Grants and Cooperative Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations and the OMB Circulars below apply specifically to the Cooperator. The Cooperative Agreement shall be consistent with these authorities:

- (a) A-133, "Audits of States, Local Governments, and Non-Profit Organizations"
- (b) A-122, "Cost Principles for Non-Profit Organizations"

Cooperator shall submit a copy of OMB Circular A-133 audit reports to the agency Inspector General (IG) and to DoD (IG).

4. Record Retention and Access Requirements

All financial and programmatic records, supporting documents, statistical records, and other records of cooperators or sub-cooperators which are:

- (i) Required to be maintained by the terms of this part, program regulations or the cooperative agreement, or
- (ii) Otherwise reasonably considered as pertinent to program regulations or the cooperative agreement.

5. Modification of Cooperative Agreement

The only method by which this Cooperative Agreement can be modified is by a formal, written and signed modification. Administrative modification(s) to the Cooperative Agreement may be accomplished unilaterally by the signature of designated Cooperative Agreement Administrative Representative or Awarding Officer. Changes to the express clauses or terms of the Cooperative Agreement affecting price, quality, quantity or delivery of the Cooperator's duties shall be the subject of a bilaterally executed modification. No other communications, whether oral or in writing, shall modify this Cooperative Agreement.

6. Prior Approvals and Changes

Any program changes to the approved project must comply with DoDGARS Subpart 32.25, Revision of Budget and Program Plans, for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations.

7. Allowable Costs

Cooperative agreement funds may be applied only to those costs allowed under DoDGARS Subpart 32.27, Allowable Costs, for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations and, for Institutions of Higher Education only, OMB Circular A-21.

8. Unexpended Balance

In the absence of any specific notice to the contrary, cooperators are authorized to carry forward unexpended balances of funds received to subsequent funding periods.

9. Overpayment and Earned Interest

Overpayment. Within ninety (90) days after the end date of the Cooperative Agreement, any overpayment of funds shall be remitted to the Administrative Grants Officer (AGO) at the Administrative Office on the Award/Modification document, by check made payable to the Naval Facilities Engineering Command. An overpayment represents the difference between allowable actual expenditures and total disbursements received by the Cooperator.

Cooperator is authorized reimbursements under the conditions set forth at 32 CFR 32.22 (e)-(j), for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations.

10. Future Funding

The total funding obligated for this Cooperative Agreement is \$46,911.00.

11. Subagreements

Cooperator shall comply with DoDGARS Subpart 32.5, Subawards, for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations.

12. Officials Not to Benefit

No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this Cooperative Agreement, or to any benefit arising from it, in accordance with 41 U.S.C. 22.

13. Hatch Act

The cooperator agrees to comply with the Hatch Act (5 U.S.C. 1501-1508 and 7324 - 7328), as implemented by the Office of Personnel Management at 5 CFR part 151, which limits political activity of employees or officers of State or local governments whose employment is connected to an activity financed in whole or part with Federal funds.

14. Lobbying

By signing and submitting this proposal, the cooperator is providing the certification at Appendix A to 32 CFR Part 28 regarding lobbying.

15. Environmental Standards

By accepting funds under this Cooperative Agreement, the cooperator assures that it will:

(a) Comply with applicable provisions of the Clean Air Act (42 U.S.C. 7401, et seq.) and Clean Water Act (33 U.S.C. 1251, et seq.), as implemented by Executive Order 11738 [3 CFR, 1971-1975 comp., p. 799] and Environmental Protection Agency (EPA) rules at Subpart J of 40 CFR Part 32.

(b) Identify to the cooperator agency any impact that this agreement may have on:

(1) The quality of the human environment, and provide help the agency may need to comply with the National Environmental Policy Act (NEPA, at 42 U.S.C. 4321, et seq.) and to prepare Environmental Impact Statements or other required environmental documentation. In such cases, the cooperator agrees to take no action that will have an adverse environmental impact (e.g., physical disturbance of a site such as breaking of ground) until the agency provides written notification of compliance with the environmental impact analysis process.

(2) Coastal barriers, and provide help the agency may need to comply with the Coastal Barriers Resource Act (16 U.S.C. 3501, et seq.), concerning preservation of barrier resources.

(3) Any existing or proposed component of the National Wild and Scenic Rivers system, and provide help the agency may need to comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271, et seq.).

16. Nondiscrimination

By accepting funds under this Cooperative Agreement, the cooperator assures that it will comply with applicable provisions of the following national policies prohibiting discrimination:

(a) On the basis of race, color, or national origin, in Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d, et seq.), as implemented by DoD regulations at 32 CFR Part 195

(b) On the basis of sex or blindness, in Title IX of the Education Amendments of 1972 (20 U.S.C. 1681, et seq.).

(c) On the basis of age, in the Age Discrimination Act of 1975 (42 U.S.C. 6101, et seq.) as implemented by Department of Health and Human Services regulations at 45 CFR Part 90.

(d) On the basis of handicap, in Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794), as implemented by Department of Justice regulations at 28 CFR Part 41 and DoD regulations at 32 CFR Part 56.

17. Cargo Preference

The cooperator agrees that it will comply with the Cargo Preference Act of 1954 (46 U.S.C. 1241), as implemented by Department of Transportation regulations at 46 CFR 381.7, which require that at least 50 percent of equipment, materials or commodities procured or otherwise obtained with U.S. Government funds under this cooperative agreement, and which may be transported by ocean vessel, shall be transported on privately owned U.S.-flag commercial vessels, if available.

18. Preference for U. S. Flag Air Carriers

Travel supported by U.S. Government funds under this cooperative agreement shall use U.S.-flag air carriers (air carriers holding certificates under 49 U.S.C. 41102) for international air transportation of people and property to the extent that such service is available, in accordance with the International Air Transportation Fair Competitive Practices Act of 1974 (49 U.S.C. 40118) and the interpretative guidelines issued by the Comptroller General of the United States in the March 31, 1981, amendment to Comptroller General Decision B138942.

19. Profit or Fee

In accordance with 32 CFR 22.205(b), no fee or profit may be charged to this cooperative agreement.

20. Claims, Disputes, and Appeals

(a) Cooperator Claims.

Per 32 CFR 22.815, any claims arising out of this agreement must be:

- (1) Submitted in writing to the Grants Officer;
- (2) Specify the nature and basis for the relief requested, and;
- (3) Include all data and relevant facts in support of the claim.

(b) DOD Component Claims.

Claims by a DOD Component shall be the subject of a written decision by the Grants Officer.

(c) Alternative Dispute Resolution (ADR).

The Parties shall use ADR to the maximum extent practicable, and comply with 32 CFR 22.815 ADR policies and procedures.

(d) Grants Officer Decisions.

(1) Within 60 calendar days after receipt of a written claim, the Grants Officer shall:

(a) Prepare a written decision, which shall include: the reasons for the decision; the relevant facts on which the decision is based; and the identity and mailing address of the cognizant Appeal Authority, and; shall be included in the award file, or

(b) Notify the Cooperator of a date when the written decision will be rendered. The notice shall address why additional time is needed.

(2) The Grants Officer's decision is final, unless appealed. In the event of an appeal, the Parties shall endeavor to use ADR procedures to the maximum extent practicable.

(e) Formal Administrative Appeals.

All formal administrative appeals shall comply with the applicable provisions of 32 CFR 22.815(e), Claims, disputes, and appeals.

(1) Appeal Authority. The Assistant Commander for Acquisition is the Appeal Authority to decide formal, administrative appeals under this Grant.

(f) Non-exclusivity of remedies.

Nothing in this section is intended to limit a cooperator's right to any remedy under the law.

21. Controlled Unclassified Information

The parties understand that information and materials provided pursuant to or resulting from this cooperative agreement may be export controlled, sensitive, for official use only, or otherwise protected by law, executive order or regulation. The cooperator is responsible for compliance with all applicable laws and regulations. Nothing in this cooperative agreement shall be construed to permit any disclosure in violation of those restrictions.

22. Debarment and Suspension

Cooperators shall comply with the requirements of DoDGARs Part 25, Subpart C, "Government-Wide Suspension and Debarment (Nonprocurement)", 32 CFR Part 25, Subpart C. The cooperator shall also include a similar term or condition in any lower-tier covered transactions, as required by DoDGARs Part 25, Subpart B, 32 CFR Part 25 (2004).

23. Drug Free Workplace

By accepting funds under this Cooperative Agreement, the cooperator agrees to comply with the “Government –Wide Drug-Free Workplace (Grants)” requirements specified by DoDGARS Part 26, Subpart B (or Subpart C, if the cooperator is an individual) of 32 CFR Part 26 (2004), which implements Secs. 5151-5160 of the Drug-Free Workplace Act of 1988 (41 U.S.C. 701, et. seq.).

24. Standards for Financial Management Systems

By accepting funds under this cooperative agreement, the cooperator agrees to maintain a financial management system that complies with DoDGARS Subpart 32.21, for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations.

25. Payment

Cooperator shall submit any request for payment in accordance with 32 CFR 32.22, Payment, for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations. Cooperator is authorized reimbursements under the conditions set forth at 32 CFR 32.22(e)–(j), for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations as limited in this paragraph and in Terms and Conditions paragraphs F, Special Requirements, and I, Billing and Payment Procedures, set forth herein. Advance payments will not be made under this Cooperative Agreement.

26. Procurement

Cooperator’s system for acquiring goods and services under this Cooperative Agreement shall comply with 32 CFR 32.40-32.48, for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations.

27. Property

Title shall vest in, and cooperator shall manage, property under this cooperative agreement in accordance with 32 CFR 32.2, and 32.30-32.37, for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations].

28. Reports

Cooperator shall maintain and submit reports in accordance with 32 CFR 32.50-32.53, for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations.

29. Termination and Enforcement

This award is subject to 32 CFR 32.61, Termination, and 32.62, Enforcement, for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations.

30. After-Award Requirements

Closeouts, subsequent adjustments, continuing responsibilities, and collection of amounts due are subject to the requirements in 32 CFR 32.71 - 32.73, for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations.

31. Cost Share or Match

Any cost share or cost match agreements shall comply with 32 CFR 32.23, for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations.

32. Resource Recovery and Conservation Act

Cooperator shall comply with the requirements contained in 32 CFR 32.49.

[End of Items]

H. Accident Prevention

1. The Cooperator shall ensure that the standard operating health and safety procedures and policies set forth by NAVFAC Atlantic and as stated in the proposal are adhered to in order to provide and maintain work environments and procedures which will—

- A) Safeguard the public and Government personnel, property, materials, supplies, and equipment exposed to Cooperator operations and activities;
- B) Avoid delays in project completion dates; and
- C) Control costs in the performance of this agreement.

2. Whenever the Contracting Officer becomes aware of any noncompliance with these requirements or any condition which poses a serious or imminent danger to the health or safety of the public or Government personnel, the Contracting Officer shall notify the Cooperator orally, with written confirmation, and request immediate initiation of corrective action. This notice, when delivered to the Cooperator or the Cooperator's representative at the work site, shall be deemed sufficient notice of the noncompliance and that corrective action is required. After receiving the notice, the Cooperator shall immediately take corrective action. If the Cooperator fails or refuses to promptly take corrective action, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken.

The Cooperator shall not be entitled to any equitable adjustment of the contract price or extension of the performance schedule on any stop work order issued under this clause.

3. The Cooperator shall insert this clause with appropriate changes in the designation of the parties, in subcontracts.

I. Billing and Payment Procedures

1. Partial payments equal to the amount of work accomplished may be made monthly during the field work portion; after submittal of a progress report.

2. The final payment of 20 percent of the Cooperative Agreement overall value shall be paid when the final report and all other submittals have been received.

3. Any requirement for the payment or obligation of funds, under the terms of this Cooperative Agreement, shall be subject to the availability of appropriated funds, and no provision herein shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency

Act, 31 USC §1341 et seq. Nothing in this Cooperative Agreement shall be construed as implying that Congress will, at a later time, appropriate funds sufficient to meet deficiencies.

4. All work will be reviewed and approved by the Navy Cooperative Agreement Representative. The total cost of the project is \$46,911.00. Reimbursement for Cooperator expenses pursuant to this Agreement will be made by following the invoice procedures below.

252.232-7006 WIDE AREA WORKFLOW PAYMENT INSTRUCTIONS (JUN 2012)

(a) Definitions. As used in this clause--

Department of Defense Activity Address Code (DoDAAC) is a six position code that uniquely identifies a unit, activity, or organization.

Document type means the type of payment request or receiving report available for creation in Wide Area WorkFlow (WAWF).

Local processing office (LPO) is the office responsible for payment certification when payment certification is done external to the entitlement system.

(b) Electronic invoicing. The WAWF system is the method to electronically process vendor payment requests and receiving reports, as authorized by DFARS 252.232-7003, Electronic Submission of Payment Requests and Receiving Reports.

(c) WAWF access. To access WAWF, the Contractor shall--

(1) Have a designated electronic business point of contact in the Central Contractor Registration at <https://www.acquisition.gov>; and

(2) Be registered to use WAWF at <https://wawf.eb.mil/> following the step-by-step procedures for self-registration available at this Web site.

(d) WAWF training. The Contractor should follow the training instructions of the WAWF Web-Based Training Course and use the Practice Training Site before submitting payment requests through WAWF. Both can be accessed by selecting the "Web Based Training" link on the WAWF home page at <https://wawf.eb.mil/>.

(e) WAWF methods of document submission. Document submissions may be via Web entry, Electronic Data Interchange, or File Transfer Protocol.

(f) WAWF payment instructions. The Contractor must use the following information when submitting payment requests and receiving reports in WAWF for **N62470-13-2-8009**

(1) Document type. The Contractor shall use the following document type(s).

NAVY CONSTRUCTION/FACILITIES MANAGEMENT
INVOICE

(2) Inspection/acceptance location. The Contractor shall select the following inspection/acceptance location(s) in WAWF, as specified by the contracting officer.

Inspection – N62470
Acceptance – N62470

(3) Document routing. The Contractor shall use the information in the Routing Data Table below only to fill in applicable fields in WAWF when creating payment requests and receiving reports in the system.

Routing Data Table*

Field Name in WAWF	Data to be entered in WAWF
Pay Official DoDAAC	<u>N68732</u>
Issue By DoDAAC	<u>N62470</u>
Admin DoDAAC	<u>N/A</u>
Inspect By DoDAAC	<u>N62470</u>
Ship To Code	<u>N/A</u>
Ship From Code	<u>N/A</u>
Mark For Code	<u>N/A</u>
Service Approver (DoDAAC)	<u>N/A</u>
Service Acceptor (DoDAAC)	<u>N/A</u>
Accept at Other DoDAAC	<u>N/A</u>
LPO DoDAAC	<u>N62470</u>
DCAA Auditor DoDAAC	<u>N/A</u>
Other DoDAAC(s)	<u>N62470</u>

(4) Payment request and supporting documentation. The Contractor shall ensure a payment request includes appropriate contract line item and subline item descriptions of the work performed or supplies delivered, unit price/cost per unit, fee (if applicable), and all relevant back-up documentation, as defined in DFARS Appendix F, (e.g. timesheets) in support of each payment request.

(5) WAWF email notifications. The Contractor shall enter the email address identified below in the "Send Additional Email Notifications" field of WAWF once a document is submitted in the system.

NAFINVOICES@NAVY.MIL

(g) WAWF point of contact. (1) The Contractor may obtain clarification regarding invoicing in WAWF from the following contracting activity's WAWF point of contact.

Gina.johns@navy.mil or via telephone at 757-322-8309

(2) For technical WAWF help, contact the WAWF helpdesk at 866-618-5988.

(End of clause)

J. Reference Document

(Enter Accounting information)

ENCLOSURE (2)

August 2013

SCOPE OF WORK:

Project Proposal for FY2013-FY2015 CESU **NASO Dam Neck Annex DUNE RESTORATION**

References: 15 CFR 930 Coastal Zone Management Act, Clean Water Act, and OPNAVINST 5090.1C

Project Number: EPR# 32442NR215

Background: This project supports Commander, Navy Region Mid Atlantic Natural Resource managers with the implementation of shoreline and dune stabilization and conservation/habitat restoration along the coastal region of NASO Dam Neck Annex (DNA). Period of Performance is 18 months from award date. End date is expected to be 30 March 2015.

Federal regulations require sound management in support of the mission. NASO DNA's mission is tied to the stability of beach and dune lands. The beach and dunes at this site are in danger of erosion due to wave and wind action associated with storm and general weather conditions. Beach stability has already been compromised due to such storms as Hurricane Isabel. This storm resulted in buffer, training sites, and sensitive ecological habitat areas being degraded. Currently, there are several severely eroded dune areas along the NASO DNA beaches. In order to sustain the most valuable resources and training area, protective measures and stabilization is required.

Several techniques are available to address stabilization concerns. One technique includes the installation of sand fencing. This fencing builds up sand from wind action and provides a medium for vegetation to bind sand and strengthen the integrity of the dune system. In November of 2010, as part of the FY09 CESU agreement with CESU PARTNER (National Aquarium in Baltimore), a fence installation and dune restoration plan was finalized for NASO DNA. We are in the implementation phase of the plan which requires fence installation and vegetation planting along the NASO DNA coastal dune line. Fence installation and vegetation planting will be completed by Navy, selected CESU partner and volunteer labor under CESU partner/NAVY supervision. Fencing activities are followed up with additional (CESU partner-led, community-based) restoration techniques such as planting appropriate vegetation cover for additional dune stabilization.

Deliverables/Responsibilities:

- Conduct a two day Spring (Mar-May) Fence Installation and Vegetation Planting Event...Due prior to: 15 May annually
 - Dune restoration at NASO DNA is an ongoing requirement due to the dynamic nature of the shoreline and dune environment. Navy will identify areas for dune restoration projects. CESU PARTNER will plan, coordinate, purchase materials, and implement the dune restoration projects, including managing its labor force. CESU Partner may utilize volunteers in dune restoration efforts. Volunteers, Natural Resources staff, project partners and community citizens will be utilized to plant vegetation. CESU PARTNER will coordinate and manage signing up all volunteers; any volunteers will be CESU PARTNER volunteers. Navy will coordinate granting base access for CESU PARTNER staff and volunteers.
 - Navy will provide lead in dune restoration project in classified areas CESU PARTNER will plan, coordinate, purchase materials, and implement dune restoration project in classified areas subject to applicable national security restrictions.
 - The CESU partner will be required to coordinate with Navy representatives concerning contracted beach replenishment projects and avoidance of potential threatened and endangered species.

- Conduct a two day Fall (Sept-Nov) Fence Installation and Vegetation Planting Event...Due prior to: 15 Nov annually
 - Dune restoration at NASO DNA is an ongoing requirement due to the dynamic nature of the shoreline and dune environment. Navy will identify areas for dune restoration projects. CESU PARTNER will plan, coordinate, purchase materials, and implement the dune restoration projects, including managing its labor force. CESU Partner may utilize volunteers in dune restoration efforts. Volunteers, Natural Resources staff, project partners and community citizens will be utilized to plant vegetation. CESU PARTNER will coordinate and manage signing up all volunteers any volunteers will be CESU PARTNER volunteers. Navy will coordinate granting base access for CESU PARTNER staff and volunteers.
 - Navy will provide lead in dune restoration project in classified area by base personnel. CESU PARTNER will plan, coordinate, purchase materials, and implement the project subject to applicable national security restrictions.
 - The CESU partner will be required to coordinate with Navy representatives concerning contracted beach replenishment projects and avoidance of potential threatened and endangered species.

- Produce and deliver a Final Project Summary Report

Routine correspondence to the NTRs may be addressed to:

Naval Facilities Engineering Command Atlantic
 Attn: Mr. Paul Block (Code EV52PB)
 6506 Hampton Blvd.
 Norfolk, VA 23508
 Email: paul.block@navy.mil

Contract Administration:

The Cooperator shall receive direction on all elements of this contract from Mr. Stewart Blake Wittmann, Contract Specialist (CS). Correspondence should be addressed as follows:

Naval Facilities Engineering Command Atlantic
Attn: Mr. Blake Wittmann (Code AQ21)
6506 Hampton Blvd.
Norfolk, VA 23508
Phone: 758-322-8123

Naval Technical Representative:
Attn: Mr. Paul Block (CodeEV52)
Naval Facilities Engineering Command Atlantic
Code EV52CP
6506 Hampton Blvd.
Norfolk, VA 23508
757-322-8499
paul.block@navy.mil



NATIONAL AQUARIUM[®]

Project Title: NASO DAM NECK ANNEX DUNE RESTORATION

Contract: N62470-13-2-8023

Organization Information: National Aquarium in Baltimore, Inc.
501 East Pratt Street
Baltimore, MD 21202
410-576-3800
www.aqua.org

Federal Tax Exempt Number: 52-1121163

Contact Person: Charmaine Dahlenburg
Project Manager

410 659-4274 (office)
410-576-2356 (fax)
cdahlenburg@aqua.org

Request: The National Aquarium requests \$46,911 to conduct a community-based environmental stewardship project that will engage 40 – 50 volunteers in planting 30,000 native dune grasses and installing sand fencing to restore eroded shoreline near Virginia Beach. Two restoration events (spring and fall) will educate volunteers about coastal dune ecology during a day of environmental stewardship.

Organizational Summary: The National Aquarium Institute (Aquarium) is one of the nation's foremost 501(c)(3) conservation education organizations. With venues in both Baltimore, MD and Washington, DC, our mission is to inspire conservation of the world's aquatic treasures. Since opening in 1981, the Aquarium has attracted more than 45 million visitors to our 5.8 acre campus in the heart of Baltimore, which features more than 16,000 animals representing more than 600 species. In 2005, we affiliated with the National Aquarium in Washington, DC to form the National Aquarium Institute. Today, our two venues attract approximately 1.6 million visitors annually.



Project Description: Since its inception, the Aquarium has recognized its significant role in educating people about the importance of protecting our environment. Each year, the Aquarium Conservation Team (ACT!) recruits more than 700 citizen volunteers and local students to engage them in restoring tidal habitats through planting events at six to seven project sites. In 2005, we began partnering with the Department of Navy (DoN) to restore native habitats including tidal salt marshes, underwater grass beds, and primary sand dunes at several locations in Virginia including Navy Air Station Oceana-Dam Neck Annex (DNA) in Virginia Beach. Much of the habitat at the DNA remains barren and eroding from wind and wave action associated with general weather conditions and heavy storms like Hurricane Isabel. In order to sustain the region's most valuable resources, protective measures and stabilization is required.

Dune habitats are an especially important and threatened resource along the Mid-Atlantic coast. They have always been a part of the natural history of Virginia Beach and are important to the ecology of the region. Coastal dunes provide critical habitat for many species of wildlife including ground nesting birds, songbirds, waterfowl, small mammals, amphibians, reptiles, and insects. Primary sand dunes act as a reservoir for beach nourishment and provide a physical barrier to the harsh conditions of the sea including high winds, storm activity, flooding, and erosion due to wave energy. Native dune plants are highly resilient and have adapted to thrive in stressful conditions such as extreme heat, drought, shifting sands, and limited nutrients.



The NASO Dam Neck Annex Dune Restoration project aims to protect these important habitats, by inviting local community volunteers to participate in restoration events. With this project, the National Aquarium will host two restoration events in spring and fall at Dam Neck, working with volunteers to address stabilization concerns. Volunteers will plant native grasses and install sand dune fencing, which builds up sand from wind action and provides a medium for vegetation to bind, strengthening the integrity of the dune system.

This project represents the continuation of an ongoing planting and stabilization. Since 2007, the National Aquarium organized sand dune restoration events at DNA in partnership with Virginia Aquarium & Marine Science Center and the U.S. Navy to restore a total of 15 acres of dunes. These events involved more than 400 local volunteers who planted over 250,000 native plants and installed sand fencing to protect the newly planted grasses. What differentiates the National Aquarium’s efforts is our commitment to developing community involvement at the grassroots level by providing hands-on projects that demonstrate conservation behaviors for local citizens.

Timeline:

February 2014	DNA Site Visit with DoN
Spring 2014	Two-day community based sand fence instillation and vegetation planting.
Fall 2014	Two-day community based sand fence instillation and vegetation planting.
February 2015	Final Report

Expected Deliverables and Outcomes:

The goal of the project is to stabilize dune structure along the 3 mile stretch of DNA by installing sand fencing and planting native grasses while providing an opportunity for community members to learn about the importance of coastal dunes. We plan to achieve this goal through the following activities:

1. Recruit 40 – 50 volunteers to participate in a restoration event at NASO Dam Neck Annex.
2. Purchase 30,000 native plants.
3. Conduct a pre-planting orientation for volunteers to educate them about coastal dune ecology and receive training in restoration techniques.
4. Plant 30,000 plants along the leading and trailing edges of the dunes.

5. Install sand fencing to strengthen the integrity of the dune system.
6. Conduct post event volunteer surveys to evaluate the impact of the program.

The first event is a two-day spring fence installation and planting event to be completed by May 15, 2014. The second is a two-day spring fence installation and planting event to be completed by November 15, 2014.

Key Staff: The National Aquarium's Chesapeake Bay Initiative (CBI) is a nationally recognized program that fosters partnerships with local communities and organizations to protect and restore habitats throughout the Bay. Each Year, CBI actively recruits volunteers and engages them in the technical process of restoring and monitoring tidal habitats at six to seven project sites. CBI directly supports increasing public awareness of conservation issues by providing citizens with the tools they need to become active environmental leaders in their communities.

The National Aquarium will take the lead in organizing a community-based restoration event in the spring and fall of 2014. Logistically, this will include registering volunteers, ordering plants and supplies, coordinating the planting event including planting instructions and providing volunteer education and comfort, and following up after the planting with volunteer thank you letters and surveys. Key individuals leading this effort include:

Laura Bankey currently holds the position of Director of Conservation at the National Aquarium, where she manages staff, volunteers, and interns in conjunction with the Aquarium's conservation objectives. Her Primary focus is on regional Chesapeake Bay issues and promoting individual, community, corporate and legislative actions that will improve Bay health. Areas of interest include community-based habitat restoration, sustainable seafood, climate change adaptation, marine debris, environmental education and gardening for wildlife. She holds undergraduate degrees in Chemistry and Biochemistry from the University of Dallas and a master's degree in Marine Science from the College of William and Mary's Virginia Institute of Marine Science.

Charmaine Dahlenburg, Conservation Project Manager II, holds a master's degree in Environmental Science and Policy from Johns Hopkins University. She manages conservation projects including budget preparation and grant writing, implementation of work plan at the project site, and tracking of all technical and financial project aspects. She also serves as the liaison between the Conservation Department, project partners, and volunteers to successfully carry out restoration projects including work with the Department of Defense at Naval Support Facility Indian Head and Naval Air Station Dam Neck Annex.

Laura Cattell Noll, Conservation Technician, holds a bachelor's degree from Eastern Mennonite University in Environmental Science. She coordinates many of the Aquarium's environmental education programs and serves as a liaison between the Conservation Department and local teachers participating in our *Wetland Nursery Program* and *Terrapins in the Classroom* program.

Stephanie Pully, Conservation Technician, holds a bachelor's degree in Environmental Science from the University of Maryland, Baltimore County. She serves as a liaison between project partners and volunteers while also acting as a volunteer coordinator for the Aquarium Conservation Team (ACT!), a core group of trained volunteers who lead community members in the field during restoration projects. She is also a certified Master Naturalist.

Budget: The total cost of the project is \$46,911. A detailed budget is attached with this proposal.

National Aquarium in Baltimore

Virginia Coastal Dune Restoration Project
2013 Budget

VA Dune Restoration

	Salary and Benefits	Hours of time	<u>Total Budget</u>
<u>Personnel</u>			
<u>Position/Title</u>	<u>hourly pay</u>	<u>on Project</u>	
Project Manager - salary and benefits	\$22	300	\$6,600
Conservation Technician - salary and benefits	\$17	198	\$3,366
Conservation Technician - salary and benefits	\$17	198	\$3,366
<u>Subtotal</u>			\$13,332

Travel

Housing for Aquarium staff and core volunteers	6 staff*4 nights@\$100/night		\$2,400
Food for core volunteers and staff	6 staff*6 days@\$56/day		\$2,016
Travel for planning and implementation	3 trips*500 miles/trip*0.555\$/mile		\$833
<u>Subtotal</u>			\$5,249

Supplies

Dune Fencing	1250 ft of fencing at \$1.6/foot		\$2,000
Fence posts	150 posts at 2.50 each		\$375
Staples	10 lbs of galvanized ties		\$15
Post hole digger	\$25 each		\$50
Fence delivery			\$650
Plants			
Dune grasses	30,000 plants @ \$0.75 each		\$22,500
Plant delivery			\$1,000
Auger Rental	\$100/day for 4 days		\$400
Fertilizer	1425 lbs at \$42 per 50lb bag		\$840
Volunteer Comfort Supplies	first aid, bottled water, field gear, etc		\$500
<u>Subtotal</u>			\$28,330

Subtotal \$46,911

Grant from Cooperative Ecosystems Studies Unit \$46,911

Additional Funds Needed \$0

**National Aquarium
Conservation Department
Field Safety Protocol**

Project: NASO DAM NECK ANNEX DUNE RESTORATION

Project mission:

The National Aquarium and NASO Dam Neck Annex will be working together in 2014 on a Dune Restoration project in Virginia Beach, Virginia. The Aquarium Conservation Team will work to stabilize coastal dune habitat by planting native vegetation including American beachgrass, saltmeadow cordgrass, and switchgrass. Dune stabilization will help protect both sites and base operations in their trailing edge, as well as provide habitat to local wildlife and a food source for resident and migrating birds.

Liability:

All volunteers will have signed “The Hold-Harmless Form” approved by the NAIB’s Human Resources Department (attached).

Participant requirements:

The field site is an active military base and because of current security concerns, all participants must be American citizens.

The Aquarium is recommending that no one under 10 years of age participate. An adult must accompany those under 18. Participants are informed in advance that they will get dirty and that they should bring the following items: work gloves, water bottle, necessary medications, hat, sunscreen, comfortable shoes, identification, and warm clothes! No cameras allowed.

Potential safety hazards/considerations:

- sun exposure/dehydration and hypo/hyperthermia
- slippery conditions
- wildlife/plant-life/insects
- unforeseen emergencies/change in weather conditions
- uneven footing
- unexploded ordinances

Precautions:

- 1 comprehensive and 3 field pack first aid kits will either be positioned at designated locations or carried by field supervisors.
- Sunscreen will be supplied to minimize the effects of sun exposure. There will also be comfort stations for rest and/or assessment.
- Bug spray, poison ivy wipes, and Calamine lotion will be on hand. There are no larger animals (i.e. snakes or mammals) that are considered to be a potential threat. Gloves will be provided.
- Team leaders will have walk-about radios on hand for logistical needs as well as to report safety issues/injuries. There will be morning planning meetings* and evening

debriefings of the day's activities, at which time safety issues/concerns and solutions will be discussed.

- Holly Fowler, a Wilderness First Responder, will be the “onsite safety officer” of those that may be in need of medical attention. Laura Cattell Noll, a Maryland First Responder, is the alternate safety officer.

*Each morning a safety briefing will be given by an Aquarium staff member. The briefing will review the following points along with specific instructions as they relate to the points below:

- Thank you for being a part of the team this morning.
- Remind everyone to stay remain within the restoration area and not to roam
- If at anytime you, as a volunteer of the project, are unclear or uncomfortable about a procedure or undertaking please notify your supervisor immediately. We are grateful for your contribution as a volunteer and we want to make sure that this is an enjoyable, rewarding, and safe experience.
- With this being said, this will be hard work and you may be faced with challenging conditions. Remember: Team Work and Safety First!
 - Stay well hydrated and protect yourself from the sun.
 - We have (bug spray and water bottles) on hand for your use.
 - Supervisors will have field first aid kits.
 - Use the buddy system when working.
 - Listen carefully when instructions are being given.
 - When operating equipment of any kind look to see who is around you to avoid causing an injury.
 - If you witness a procedure that you feel is a potential hazard or could cause injury bring it up to a supervisor.
 - If an injury should occur we have a plan in place with local emergency agencies to evacuate you from the island and get you the appropriate medical attention
- Describe the mission of the day and take questions.

Contact information:

The following is a phone list for those involved a supervisory or contact role and their assigned task roles:

Dune Restoration Project Contact:

First Name	Last Name	Work Phone	Cell Phone
Laura	Bankey	410-659-4207	410-302-5655
Charmaine	Dahlenburg	410-659-4274	443-386-8407
Michael	Wright	757-433-2883	757-373-8531

Emergency information in the area of Norfolk, Virginia

- In case of information, dial 911. If on base the call will be routed to a Navy operator first and then to the county emergency response.
- If you dial from a cell phone, the call is directed to the county emergency services. They will mobilize the nearest rescue squad which will come directly to the base.
- *Please note that if you need to leave the planting in the event of an emergency, you must be escorted by Navy personnel so they can open the gate.*
- **Sentara Virginia Beach Hospital: 1060 First Colonial Road, Virginia Beach, Virginia 23454 (phone) 757-395-8000**

Directions to Hospital (4.9 miles, 13 minutes):

West on S. Birdneck Road toward General Booth Blvd (0.9 mi)

Turn LEFT onto Bells Road (0.5 mi)

First RIGHT onto Oceana Blvd. (1.8 mi)

Road Name Changes to SR-408 [First Colonial Road] (1.8), continue straight

Hospital is on the right

- **Patient First Facility for DAM NECK:** 1605 General Booth Boulevard, Virginia Beach, Virginia 23454 (phone) 757-721-0512

Vehicle Emergencies

Gene Taylor: (410) 576-1149 (w); (410) 310-6976 (c); 717.642.9722 (h—emergency only!)

Charles Myers: 410-659-4238 (w)

If the vehicle needs to be **towed within 40 miles of NAIB**, and you cannot reach one of the above contacts, please call: Tim's Towing 410-488-9098



SAND DUNE RESTORATION PLANTING

**NAVAL AIR STATION OCEANA-DAM NECK ANNEX
VIRGINIA BEACH, VA
SEPTEMBER 12-13, 2014**

HELP REBUILD SAND DUNES!

Sand dunes protect land by acting as natural barriers to prevent erosion and absorb wave energy. Without this protection, soft coastline would disappear rapidly.

The National Aquarium—in partnership with the Command Navy Region Mid-Atlantic, the Naval Facilities Engineering Command Mid-Atlantic and the Virginia Aquarium and Marine Science Center—will plant native dune grasses, restoring habitat for local wildlife while protecting the shoreline.

VOLUNTEERS ARE NEEDED!

Registration is required. Space is limited. Contact us today!

Please contact Stephanie Pully at (410) 576-1014 or conserve@aqua.org to receive a registration packet.



All participants must be a minimum age of 10 and a U.S. citizen. Participants under the age of 18 must be accompanied by an adult. This event is rain or shine, so please dress for the weather.

REGISTRATION FORM

SAND DUNE RESTORATION AT VIRGINIA BEACH



Please Note: All participants must be U.S. citizens. One form must be completed for each participant. Individual registration and release forms will need to be submitted for each volunteer. Personal information is required for base access.

Name (First, Middle, Last) _____

Social Security _____ Date of Birth _____

City _____ State _____ ZIP code _____

Phone _____ Email _____

Days of planned participation: Friday, September 12 Saturday, September 13

Please be sure to bring a valid picture ID with you during the event.

MEDICAL/HEALTH INFORMATION:

Allergies, medical conditions, physical limitations, special needs, etc.

IN CASE OF AN EMERGENCY:

Contact Name _____ Relationship _____

Home Phone _____ Work Phone _____

I affirm that I am in good health and that the above information is accurate and complete. _____ (Please initial here)

The undersigned acknowledges that he/she has read and fully agrees to the above.

Signature of Participant or Parent/Guardian _____ Date _____

PHOTO RELEASE: Conservation staff frequently take pictures of participants. Participants agree to allow the Aquarium to use their pictures for promotional or marketing materials.

Signature of Participant or Parent/Guardian _____ Date _____

PLEASE RETURN THIS FORM TO:

National Aquarium
501 East Pratt Street, Baltimore, MD 21202
Phone: 443-386-8407 | Fax: 410-986-2356
conserve@aqua.org

RELEASE AND WAIVER AGREEMENT

In consideration of being permitted to participate in the Sand Dune Restoration sponsored by the National Aquarium (the "Aquarium"),

I _____, acknowledge and agree that:
(print participant's name)

ASSUMPTION OF RISK; RELEASE. I am participating in the Program voluntarily. I understand that the Program includes activities beyond the Aquarium's control. I assume all risks of participating in the Program and I understand that such risks could be considerable. I, for myself and my heirs, personal representatives, assigns and next-of-kin, hereby voluntarily RELEASE AND FOREVER DISCHARGE the Aquarium, all of its affiliates, successors and assigns, and all of the directors, officers, employees, volunteers, agents and representatives of the Aquarium, the U.S. government and the other before-mentioned entities (the "Releasees"), from any and all claims, damages, costs (including reasonable attorneys' fees), and other liabilities ("Losses"), including without limitation, Losses arising from or related to any injury to me or my property, or any other person or their property, whether caused by the negligence of Releasees or otherwise.

Hold Harmless. I agree to indemnify and hold harmless each and every Releasee from and against any and all Losses (including without limitation, any damages inflicted by me upon any facilities or vehicles used in the Program) which any of them may sustain by reason of my participation in the Program.

Personal Health and Insurance. I certify that I am sufficiently physically fit to participate in the Program. I certify that I have and will maintain medical insurance covering any and all medical costs that may arise from my participation in the Program.

CANCELLATION/TERMINATION AND RULES. I agree that the Aquarium reserves the right to (i) alter the Program itinerary and arrangements for any reason whatsoever, and/or (ii) cancel or terminate the Program for any reason whatsoever. I agree to follow all rules of behavior deemed appropriate by the Aquarium Staff and to not exceed limits established by the Aquarium Staff. I agree that the Aquarium reserves the right to require me to withdraw from the Program at any time if I violate such rules or limits, or when such action is determined by the Aquarium to be in the best interests of the health, safety, and general welfare of the other Program participants. I understand that if I withdraw from the Program, I will be sent home at my own expense.

Applicable Law. I agree that this Release and Waiver Agreement (this "Agreement") shall be construed and governed by Maryland law without regard to any rules relating to conflicts of laws. I further agree that any lawsuit, claim or other legal proceeding related to the Program or this Agreement must be brought exclusively in the federal or state courts located in Baltimore, Maryland, and I hereby submit to personal jurisdiction in the State of Maryland and to venue in such courts.

Miscellaneous Terms. This Agreement contains the entire agreement between the Aquarium and I regarding any and all Losses arising from or related to my participation in the Program. I waive any right to a trial by a jury with regard to claims rising out of my participation in the Program. This release shall be construed as a whole according to its fair meaning, and not strictly for or against either of the parties. I agree that this Agreement is intended to be as broad and inclusive as permitted by applicable law and that if any portion of the Agreement is held invalid or unenforceable by a court of competent jurisdiction, the balance of the Agreement will continue in full legal force and effect.

ACKNOWLEDGEMENT. I certify that I (i) have read this Agreement in its entirety and understand all of its terms and conditions, (ii) have had the opportunity to consult with any advisors of my choice regarding this Agreement, and (iii) am entering into this Agreement by my own free will, without coercion from any source.

Signature of Participant

Print Name

Date

FOR PARTICIPANTS UNDER 18 YEARS OF AGE:

I am the parent or guardian of the minor participant and on behalf of myself, the minor participant, and all other parents or guardians of the minor participant, I (i) agree to and accept the foregoing, (ii) authorize any emergency medical care that may be necessary, and (iii) represent and warrant that I have the authority to agree to and accept all of the foregoing.

Signature of Parent/Guardian

Print Name

Date



NATIONAL AQUARIUM[®]

Sand Dune Restoration NASO Dam Neck Annex

**Briefing Document for National Aquarium Staff/ACT!
May 16-17, 2014**

PROJECT SUMMARY

The National Aquarium Institute (Aquarium) is one of the nation's foremost 501(c)(3) conservation education organizations. Our mission is to inspire conservation of the world's aquatic treasures. Since its inception, the Aquarium has recognized its significant role in educating people about the importance of protecting our environment. Each year, the Aquarium Conservation Team (ACT!) recruits more than 700 citizen volunteers and local students to engage them in restoring habitats through planting events at six to seven project sites. In 2005, we began partnering with the Department of Navy (DoN) to restore native habitats including tidal salt marshes, underwater grass beds, and primary sand dunes at several locations in Virginia including Navy Air Station Oceana-Dam Neck Annex in Virginia Beach. Much of the habitat remains barren and eroding from wind and wave action associated with general weather conditions and heavy storms like Hurricane Isabel. In order to sustain the region's most valuable resources, protective measures and stabilization is required.

PROJECT DESCRIPTION

Coastal sand dunes are formed by the action of sea and wind. Material carried by the rivers is deposited with the help of the sea along the coastline forming sand dunes. They protect the land by acting as a natural barrier to salt water intrusion and sea wind erosion. The sand dune system absorbs the energy of the waves, and without this protection soft coastline would disappear rapidly. Even small disruptions in the dune system can cause salt-water infiltration into the ground water, threatening local farmlands. Although sand dunes may appear to be lifeless, in reality they are home to a multitude of species. Their importance has been acknowledged over the last years and they now are priority habitats for conservation.

PLANTING TECHNIQUE

We will be planting American beachgrass (*Ammophila breviligulata*), Bitter panicgrass (*Panicum amarum*), Groundsel brush (*Baccharis halimifolia*) and Beach plum (*Prunus maritima*). Planting technique will be demonstrated by Aquarium staff at the beginning of each day and all necessary tools will be provided. We will plant 7,000 American beachgrass 2" plugs, 7,950 Bitter panicgrass 2" plugs, 25 one gallon potted Groundsel brush and 25 one gallon potted Beach plum totaling 15,000 plants.

SAFETY

We developed a detailed safety plan for the project that includes all aspects of the program. All participants will be briefed daily on safety issues. A Project Leader will be in charge of all related safety issues and will coordinate the daily briefings and liability release forms. **Closed toed shoes must be worn at all times.**

ENTRANCE TO PLANTING SITE

Staff/Volunteers for the planting will be entering through ~~V.A. Army National Guard-Camp Pendleton property~~, reference the map below for directions. All volunteers/staff will be on an approved list at the gate if they supplied the required information *or* have a military ID/ Common Access Card.

THINGS TO BRING FOR FIELD WORK:

- Rain/foul weather Gear
- Hat
- Water Bottle
- necessary medications
- ID 

THE NATIONAL AQUARIUM WILL PROVIDE: Necessary tools, gloves, granola bars, water, and portable restrooms.

SCHEDULE:

Friday, May 16

Please arrive at the site by 9am for check-in (see map below). You will be shuttled from the parking area to the planting site (~~~1.5 miles away~~). Once you arrive at the planting site, you will be matched with an Aquarium Conservation Team member to guide you during planting. We anticipate ending by 3pm, however ending time may be earlier due to weather or the rate at which planting is completed.

Saturday, May 17

Please arrive at the site by 9am for check-in (see map below). You will be shuttled from the parking area to the planting site (~~~1.5 miles away~~). Once you arrive at the planting site, you will be matched with an Aquarium Conservation Team member to guide you during planting. We anticipate ending by 3pm, however ending time may be earlier due to weather or the rate at which planting is completed.

WEATHER

Unless weather conditions are extreme or dangerous, planting will continue as scheduled. **If we make the call to cancel a particular day's activities, you will be contacted with as much notice as possible. If you do not hear from us, then the planting will go on as planned.**

DIRECTIONS:

To Dam Neck Annex:

- Take I-295 Baltimore Washington Parkway South.
- Take exit 1B for I-95 S/I-495 S towards RICHMOND.
- Merge onto CAPITAL BELTWAY.
- Take I-95 S towards RICHMOND. 85 miles
- Take exit 84A for I-295 S, on the left towards ROCKY MT NC.
- Merge onto I-295 S.
- Take exit 28 for I-64/US-60 towards RICHMOND/NORFOLK.
- Merge onto I-64 E via EXIT 28A toward NORFOLK / VA BEACH.
- Follow I-64 East to Norfolk thru Hampton Roads Bridge tunnel (83.5 miles)
- Take exit 284A for 264 W toward Downtown/Norfolk/Portsmouth
- Keep left at the fork, follow signs for 264 E/ VA Beach and merge onto 264E (10.2 miles)
- Take exit 22 for Birdneck Road toward Oceanfront Alt Route.
- Turn right onto Birdneck Road
- Follow National Aquarium signs & flags to designated parking areas



CONTACTS:

NAME	AFFILIATION	OFFICE #	CELL#	EMAIL
Laura Bankey	NAIB	410-659-4207	410-302-5655	lbankey@aqua.org
Charmaine Dahlenburg	NAIB	410-659-4274	443-368-8407	cdahlenburg@aqua.org
Stephanie Pully	NAIB	410-576-1014	443-386-8407	SPully@aqua.org
Michael Wright	Navy	757-433-3461	757-373-8531	Michael.f.wright@navy.mil
Beth Firchau	VA Aquarium	757-385-0233	757-434-0745	bfirchau@virginiaaquarium.com

ACKNOWLEDGEMENTS

The National Aquarium wishes to gratefully acknowledge the following partners as critical to the continued success of this project. Project partners include, but are not limited to: Command Navy Region Mid-Atlantic, the Naval Facilities Engineering Command Mid-Atlantic, ~~VA Army National Guard~~ and the Virginia Aquarium and Marine Science Center.



NATIONAL AQUARIUM®

Project Title: NASO DAM NECK ANNEX DUNE RESTORATION

Contract: N62470-14-2-9017

Organization Information: National Aquarium in Baltimore, Inc.
501 East Pratt Street
Baltimore, MD 21202
410-576-3800
www.aqua.org

Federal Tax Exempt Number: 52-1121163

Contact Person: Charmaine Dahlenburg
Project Manager

410 659-4274 (office)
410-576-2356 (fax)
cdahlenburg@aqua.org

Request: The National Aquarium requests \$94,308 to conduct a two-year community-based environmental stewardship project that will engage 80 – 100 volunteers in planting 60,000 native dune grasses and installing sand fencing to restore eroded shoreline near Virginia Beach. Four restoration events (spring and fall) spanned over two years will educate volunteers about coastal dune ecology during a day of environmental stewardship.

Organizational Summary: The National Aquarium Institute (Aquarium) is one of the nation's foremost 501(c)(3) conservation education organizations. Our mission is to inspire conservation of the world's aquatic treasures. Since opening in 1981, the Aquarium has attracted more than 45 million visitors to our 5.8 acre campus in the heart of Baltimore, which features more than 16,000 animals representing more than 600 species. In 2005. Today, the Aquarium attracts approximately 1.3 million visitors annually.



Project Description: Since its inception, the Aquarium has recognized its significant role in educating people about the importance of protecting our environment. Each year, the Aquarium Conservation Team (ACT!) recruits more than 700 citizen volunteers and local students to engage them in restoring tidal habitats through planting events at six to seven project sites. In 2005, we began partnering with the Department of Navy (DoN) to restore native habitats including tidal salt marshes, underwater grass beds, and primary sand dunes at several locations in Virginia including Navy Air Station Oceana-Dam Neck Annex (DNA) in Virginia Beach. Much of the habitat at the DNA remains barren and eroding from wind and wave action associated with general weather conditions

and heavy storms like Hurricane Isabel. In order to sustain the region's most valuable resources, protective measures and stabilization is required.

Dune habitats are an especially important and threatened resource along the Mid-Atlantic coast. They have always been a part of the natural history of Virginia Beach and are important to the ecology of the region. Coastal dunes provide critical habitat for many species of wildlife including ground nesting birds, songbirds, waterfowl, small mammals, amphibians, reptiles, and insects. Primary sand dunes act as a reservoir for beach nourishment and provide a physical barrier to the harsh conditions of the sea including high winds, storm activity, flooding, and erosion due to wave energy. Native dune plants are highly resilient and have adapted to thrive in stressful conditions such as extreme heat, drought, shifting sands, and limited nutrients.



The NASO Dam Neck Annex Dune Restoration project aims to protect these important habitats, by inviting local community volunteers to participate in restoration events. With this project, the National Aquarium will host two restoration events annually for two years in spring and fall at Dam Neck, working with volunteers to address stabilization concerns. Volunteers will plant native grasses and install sand dune fencing, which builds up sand from wind action and provides a medium for vegetation to bind, strengthening the integrity of the dune system.

This project represents the continuation of an ongoing planting and stabilization. Since 2007, the National Aquarium organized sand dune restoration events at DNA in partnership with Virginia Aquarium & Marine Science Center and the U.S. Navy to restore a total of 15 acres of dunes. These events involved more than 500 local volunteers who planted over 284,234 native plants and installed sand fencing to protect the newly planted grasses. What differentiates the National Aquarium’s efforts is our commitment to developing community involvement at the grassroots level by providing hands-on projects that demonstrate conservation behaviors for local citizens.

Timeline:

February 2015	DNA Site Visit with DoN
Spring 2015	Two-day community based sand fence instillation and vegetation planting.
Fall 2015	Two-day community based sand fence instillation and vegetation planting.
Spring 2016	Two-day community based sand fence instillation and vegetation planting.
Fall 2016	Two-day community based sand fence instillation and vegetation planting.
February 2017	Final Report

Expected Deliverables and Outcomes:

The goal of the project is to stabilize dune structure along the 3 mile stretch of DNA by installing sand fencing and planting native grasses while providing an opportunity for community members to learn about the importance of coastal dunes. We plan to achieve this goal through the following activities:

1. Recruit 80 – 100 volunteers to participate four restoration events at NASO Dam Neck Annex.
2. Purchase 60,000 native plants.

3. Conduct a pre-planting orientation for volunteers to educate them about coastal dune ecology and receive training in restoration techniques.
4. Plant 60,000 plants along the leading and trailing edges of the dunes.
5. Install sand fencing to strengthen the integrity of the dune system.
6. Conduct post event volunteer surveys to evaluate the impact of the program.

Outlined in the *Request for Statement of Interest, Cooperative Agreement*, task one will be a two-day spring fence installation and planting event to be completed by May 15, 2015. Task two, a two-day spring fence installation and planting event to be completed by November 15, 2015. Task three, a two-day spring fence installation and planting event to be completed by May 15, 2016 and task four, a two-day spring fence installation and planting event to be completed by November 15, 2016.

Key Staff: The National Aquarium's Chesapeake Bay Initiative (CBI) is a nationally recognized program that fosters partnerships with local communities and organizations to protect and restore habitats throughout the Bay. Each Year, CBI actively recruits volunteers and engages them in the technical process of restoring and monitoring tidal habitats at six to seven project sites. CBI directly supports increasingly public awareness of conservation issues by providing citizens with the tools they need to become active environmental leaders in their communities.

The National Aquarium will take the lead in organizing a community-based restoration events in the spring and fall of 2015 and 2016. Logistically, this will include registering volunteers, ordering plants and supplies, coordinating the planting event including planting instructions and providing volunteer education and comfort, and following up after the planting with volunteer thank you letters and surveys. Key individuals leading this effort include:

Laura Bankey currently holds the position of Director of Conservation at the National Aquarium, where she manages staff, volunteers, and interns in conjunction with the Aquarium's conservation objectives. Her Primary focus is on regional Chesapeake Bay issues and promoting individual, community, corporate and legislative actions that will improve Bay health. Areas of interest include community-based habitat restoration, sustainable seafood, climate change adaptation, marine debris, environmental education and gardening for wildlife. She holds undergraduate degrees in Chemistry and Biochemistry from the University of Dallas and a master's degree in Marine Science from the College of William and Mary's Virginia Institute of Marine Science.

Charmaine Dahlenburg, Conservation Project Manager II, holds a master's degree in Environmental Science and Policy from Johns Hopkins University. She manages conservation projects including budget preparation and grant writing, implementation of work plan at the project site, and tracking of all technical and financial project aspects. She also serves as the liaison between the Conservation Department, project partners, and volunteers to successfully carry out restoration projects including work with the Department of Defense at Naval Support Facility Indian Head and Naval Air Station Dam Neck Annex.

Curtis Bennett, Conservation Project Manager I, holds a master's degree in Wildlife Ecology from the University of Delaware. He manages many of the Aquarium's environmental education programs including budget preparation, grant writing, and implementation for the *Wetland Nursery Program* and *Terrapins in the Classroom* program.

Stephanie Pully, Conservation Technician, holds a bachelor's degree in Environmental Science from the University of Maryland, Baltimore County. She serves as a liaison between project partners and volunteers

while also acting as a volunteer coordinator for the Aquarium Conservation Team (ACT!), a core group of trained volunteers who lead community members in the field during restoration projects. She is also a certified Master Naturalist.

Stacy Trust, Conservation Technician, holds a bachelor's degree in Psychology from Bucknell University. She coordinates many of the Aquarium's environmental education programs and serves as a liaison between the Conservation Department and local teachers participating in our *Wetland Nursery Program* and *Terrapins in the Classroom* program. She is also a certified Master Naturalist.

Budget: The total cost of the project is \$94,308. A detailed budget is attached with this proposal.

National Aquarium in Baltimore

Virginia Coastal Dune Restoration Project
2015-2016 Budget

DNA Dune Restoration

			Spring 2015	Fall 2015	Spring/Fall 2016	Total Budget
Personnel	Salary and Benefits	Hours of time				
<u>Position/Title</u>	<u>hourly pay</u>	<u>on Project</u>				
Project Manager - salary and benefits	\$22	300	\$3,300	\$3,300	\$6,930	\$13,530
Conservation Technician - salary and benefits	\$17	265	\$2,253	\$2,253	\$4,731	\$9,236
Conservation Technician - salary and benefits	\$17	131	\$1,113.50	\$1,114	\$2,339	\$4,566
<u>Subtotal</u>						\$27,333
Travel						
Housing for Aquarium staff and core volunteers	6 staff*4 nights@\$100/night		\$1,200	\$1,200	\$2,400	\$4,800
Food for core volunteers and staff	6 staff*6 days@\$56/day		\$1,008	\$1,008	\$2,016	\$4,032
Travel for planning and implementation	3 trips*500 miles/trip*0.55\$/mile		\$416	\$416	\$833	\$1,665
<u>Subtotal</u>						\$10,497
Supplies						
Dune Fencing	1250 ft of fencing at \$1.6/foot		\$1,000	\$1,000	\$2,000	\$4,000
Fence posts	150 posts at 2.50 each		\$188	\$188	\$375	\$751
Staples	10 lbs of galvanized ties		\$8	\$8	\$15	\$31
Post hole digger	\$25 each		\$25	\$25	\$50	\$100
Fence delivery			\$325	\$325	\$650	\$1,300
Plants						
Dune grasses	30,000 plants @ \$.075/\$.80 each		\$11,250	\$11,250	\$24,000	\$46,500
Plant delivery			\$500	\$500	\$1,000	\$2,000
Auger Rental	\$100/day for 4 days		\$200	\$200	\$400	\$800
Volunteer Comfort Supplies	first aid, bottled water, field gear, etc		\$250	\$250	\$500	\$1,000
<u>Subtotal</u>						\$56,481
<u>Subtotal</u>			\$ 23,035	\$ 23,037	\$ 48,238	\$94,310
Grant from Cooperative Ecosystems Studies Unit						\$94,310

*Year 2 salary figures and plant costs include a 5% increase

Enclosure 12. Erosion Control Plan

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Final Erosion Control Plan
Naval Air Station Oceana,
Naval Auxiliary Landing Field Fentress,
Naval Air Station Oceana Dam Neck Annex, and
Naval Support Activity Hampton Roads Northwest Annex

May 2013

Prepared for:



Naval Facilities Engineering Command - Atlantic
6506 Hampton Blvd.
Norfolk, VA 23508

Contract No. N62470-12-D-7002
Task Order 002

Prepared by:



Stell Environmental Enterprises, Inc.
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- APPENDIX B: Field Survey Forms - Located on Compact Disk
- APPENDIX C: Cost Estimates - Located on Compact Disk

ACRONYMS

BMP	best management practices
COMNAVREG	Commander, Navy Region, Mid-Atlantic
CWA	Clean Water Act
CY	cubic yards
ECP	Erosion Control Plan
E&S	Erosion and Sediment
EPA	Environmental Protection Agency
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
GIS	geographic information system
GMI	Geo Marine, Inc.
GPS	global positioning system
INRMP	Integrated Natural Resource Management Plan
MIDLANT	Mid-Atlantic
NAVFAC	Naval Facilities Engineering Command
NASO	Naval Air Station Oceana
NALFF	Naval Auxiliary Landing Field Fentress
NASO DNA	Nava Air Station Oceana Dam Neck Annex
NPDES	National Pollutant discharge Elimination System
NSA NWA	Naval Support Activity Hampton Roads Northwest Annex
SEE	Stell Environmental Enterprises, Inc.
SF	Square feet
SOW	Scope of Work
SWPPP	Stormwater Pollution Prevention Plan
U.S.	United States
VA	Virginia
VCDR	Virginia Department of Conservation and Recreation

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1 INTRODUCTION

Stell Environmental Enterprises, Inc. (SEE) prepared this Erosion Control Plan (ECP) under Naval Facilities Engineering Command (NAVFAC) Contract No. N62470-12-R-7002, Delivery Order No. 002. A survey of all erosion features was conducted at each of the following four installations, located in the Virginia Beach, Virginia (VA) area:

- Naval Air Station Oceana (NASO),
- Naval Auxiliary Landing Field Fentress (NALFF),
- NASO Dam Neck Annex (NASO-DNA), and
- Naval Support Activity Hampton Roads Northwest Annex (NSA-NWA)

The results of the erosion survey, documented in this ECP, will allow the installations to maintain compliance with regulations, such as the Environmental Protection Agency's (EPA) Clean Water Act (CWA); prevent release of sediment to streams, ponds and wetlands; maintain productive land use; and ensure the safety of personnel using the lands. The locations of these installations are shown in Figure 1-1.

This is the first erosion control survey undertaken at these installations. Based on conversations with the client, there have been no Notices of Violation associated with erosion or sediment release to the surface waters on or off-site. This survey will be proactive in identifying those areas that may or could be releasing sediment that could affect downgradient water quality in surface water. This survey will also be used to establish a baseline showing the location and extent of erosion that currently exists at each installation.

1.1 PROJECT OBJECTIVES

The purpose of the erosion survey is to identify erosion areas and to document those areas (Sections 4 and 5), and then describe measures to address those areas (Sections 6 and 7). Specifically, the objectives for this project are to:

- Identify the areas of existing and potential erosion at each installation;
- Document the survey process and results of the erosion survey; and
- Address the erosion areas by recommending the appropriate control measure which may include: construction to repair the erosion or reduce the potential for future erosion, implementation of a best management practice, or monitoring.

1.2 PROJECT SCOPE

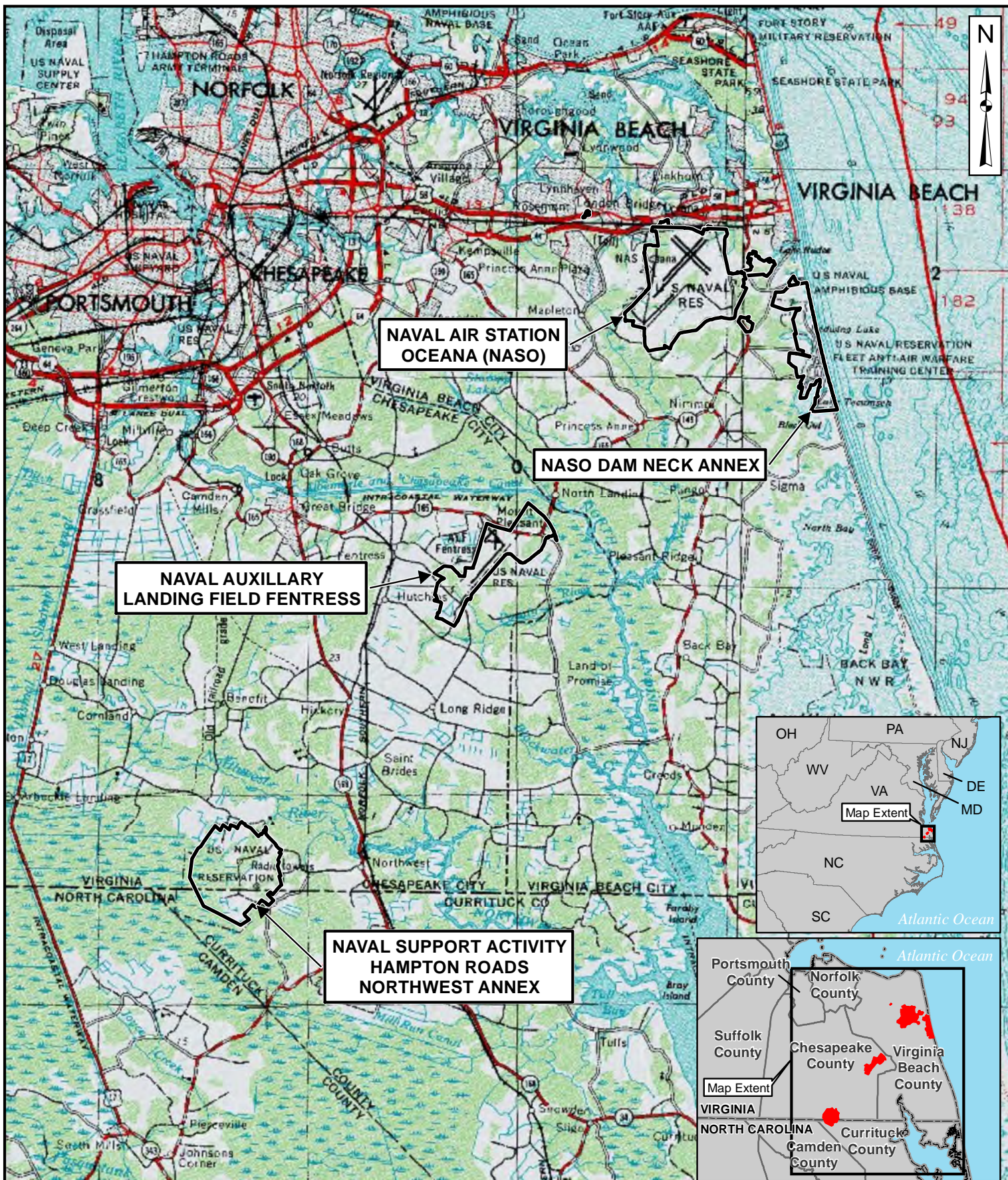
To meet the project objectives, the scope of this project includes the following activities:

- Provide a desk-top analysis of existing information, including Integrated Natural Resource Management Plans (INRMPs), Stormwater Pollution Prevention Plans (SWPPPs), and numerous aeriels, wetland maps, and geographic information system (GIS) information for each installation;
- Conduct a visual survey of accessible surface water features including streams, ditches, ponds, stormwater outfalls, unpaved roadways, agricultural areas, etc.;

- Document signs of erosion for the above areas by recording the type and cause of erosion, obtaining global positioning system (GPS) coordinates and photographs, and documenting soil types, and usage level; and
- Prepare the ECP to document observation results and provide recommendations to control or mitigate the erosion areas and the associated costs.

**FIGURE 1-1
PROJECT LOCATION MAP**

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ArcUSA, US Census, ESRI, National Atlas of the United States

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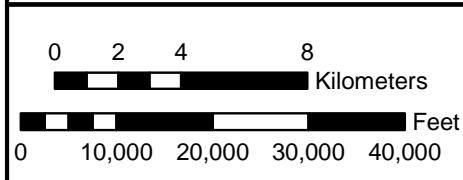


FIGURE 1-1: PROJECT LOCATION MAP
 Naval Air Station Oceana (NASO), Naval Auxillary
 Landing Field Fentress, NASO Dam Neck Annex,
 Naval Support Activity Hampton Roads
 Northwest Annex
 EROSION CONTROL PLAN
 VIRGINIA BEACH, VIRGINIA

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2 JUSTIFICATION AND DRIVERS

2.1 MISSION

The mission of NASO is to provide every element of supply, material, maintenance, personnel, and training facilities required to ensure F/A-18 Hornet fighter squadrons achieve the requisite level of readiness necessary to deploy on command aircraft carriers as fully combat fighter and attach squadrons. NALFF serves as a major carrier landing training facility for aircraft stationed at NASO and Chambers Field. The mission of NASO DNA is to provide quality education and training in specified combat systems operations and maintenance, provide specialized skills training, and to provide training systems support to operational and systems commands. The mission of NSA-NWA is to coordinate the provision of shore activity support to tenant commands, which include all branches of the armed forces and the Coast Guard. A large amount of suitable land area without erosion features, ruts, steep slopes, and depressions is required to support the training activities for these missions. By minimizing erosion, the current amount of suitable, level land area and roadways can be maintained for training purposes to support each facility's mission (INRMPs for NASO, NASO DNA, NALFF and NSA-NWA).

2.2 REGULATORY DRIVERS

Numerous federal and state government regulations, standards, and guidance drive or influence erosion control activities at NASO, NALFF, NASO DNA and NSA NWA. The following is an identification and summary of the primary regulations, standards, and guidance that pertain to the erosion control measures discussed in this document:

Navy Erosion and Sediment Control Instruction - The Commander, Navy Region (COMNAVREG), Mid-Atlantic (MIDLANT) has developed minimum standards and criteria for the effective control of soil erosion, sediment deposition, and non-agricultural runoff from land disturbing activities at installations under its purview. These standards and criteria apply to land disturbing activities greater than or equal to 10,000 square feet (SF) in size and have the following objectives:

- Establish the criteria, procedures, and responsibilities for preparing and complying with Erosion and Sediment Control Plans for land disturbing activities.
- Establish a procedure for inspecting land disturbing activities and their associated erosion and sediment controls.

Navy Post Construction Stormwater Runoff Management Instruction - The COMNAVREG MIDLANT has adopted stormwater best management practices for development or redevelopment activities of parcels greater than or equal to one acre in size. This instruction also applies to land development activities for parcels less than one acre in size if the activities are part of a larger common plan of development. This instruction seeks to maintain compliance with state and federal environmental regulations through the following objectives:

- Require that the after-development runoff from land development and redevelopment activities is maintained as nearly as practicable to the pre-development runoff characteristics in order to reduce flooding, siltation, stream bank erosion, and property damage.

- Establish minimum design criteria for the protection of properties and aquatic resources downstream from land development and redevelopment activities to prevent damage resulting from increases in volume, velocity, frequency, duration, and peak flow rate of stormwater runoff.
- Establish minimum design criteria for measures to minimize non-point source pollution from stormwater runoff that would otherwise degrade water quality.
- Establish provisions for the long-term maintenance of stormwater management control devices and other techniques specified to manage the quality and quantity of runoff.
- Establish administrative procedures for the submission, review, approval, and disapproval of stormwater plans and the inspection of approved projects.

VA Erosion and Sediment Control Regulation. The VA Erosion and Sediment Control Regulation (4 VA Code 50-60-48) was developed to address erosion and sediment control. The *Virginia Erosion and Sediment Control Handbook*, 1992, was prepared as a guidance to assist in implementing the above regulation and was used in preparing this document.

- This regulation is based upon relevant physical and developmental information relating to the watershed and drainage basins of the Commonwealth of VA, including, but not limited to, data relating to land use, soils, hydrology, geology, size of land area being disturbed, proximate water bodies and their characteristics, transportation, and public facilities and services.
- Erosion control measures will include such surveys of lands and waters as may be deemed appropriate by the VA Water Pollution Control Board or required by any applicable law to identify areas, including multijurisdictional and watershed areas, with critical erosion and sediment problems.
- The regulation contains conservation standards for various types of soil and land uses to include criteria, techniques, and methods for the control of erosion and sediment resulting from land-disturbing activities.

United States (U.S.) EPA CWA – Section 104 (2)(n1) of the CWA promotes and encourages continuing comprehensive studies of the effects of pollution, including sedimentation, in the estuaries and estuarine zones of the U.S. on fish and wildlife, fishing, recreation, water supply and water power, and other beneficial purposes. The CWA addresses water quality impacts through multiple sections within the Act including nonpoint pollution control, discharges to potable water systems, and stormwater management. Nonpoint pollution and stormwater discharges play a major role in transporting sediment resulting from erosion into our nation’s water resources; therefore, minimizing erosion will have a positive impact on water quality by limiting the sediment and pollutants that enter the potable, recreational, and navigable surface water on and downstream of the four installations.

Chesapeake Bay Preservation Act - The Chesapeake Bay Preservation Act, 1988, states that the Virginia Soil and Water Conservation Board will encourage and promote protection of existing high quality state waters and restoration of all other state waters to a condition or quality

that will permit all reasonable public uses and will support the propagation and growth of all aquatic life, including game fish, which might reasonably be expected to inhabit them. Minimizing erosion will have a positive impact by limiting the sediment and pollutants that enter state waters from portions of NASO.

2.3 NAVY POLICY

Navy policy on natural resources management, including surface water, is to manage natural resources to support and be consistent with the military mission while protecting and enhancing those resources for multiple use, sustainable yield, and biological integrity. Land use practices and decisions must be based on scientifically sound conservation procedures and techniques, and the use of scientific methods and an ecosystem management approach. (OPNAVINST 5090.1C 2007)

Employing ecosystem management will help maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations. (Department of Defense Initiative 4715.3 1996).

The basic principles and guidelines of ecosystem management are to:

- Preserve the function and integrity of natural ecosystems;
- Integrate human social and economic interests with environmental considerations;
- Involve all interested parties (stakeholders) in identifying management goals; and
- Adapt to changing conditions and requirements.

2.4 STEWARDSHIP

Environmental stewardship is essential to the safe, healthful, and compliant execution of the Navy's mission and the protection and preservation of natural resources. The Navy promotes environmental stewardship through projects that enhance the installation's natural resources, promote proactive conservation measures, and support investments that demonstrate the Navy's environmental leadership and environmental stewardship (Department of the Navy, NASO 2011). To achieve these ideals, NAVFAC has established an Environmental Management System that will:

- Comply with applicable laws, regulations and policies;
- Integrate environmental stewardship into operational decisions;
- Implement, modify, and sustain practices that minimize and prevent creation of waste and pollutants at its source;
- Develop objectives and targets to minimize environmental risk, and monitor progress towards those goals;
- Educate the Navy's workforce and supported commands on their responsibilities to the environment;

- Foster communication throughout the installation on our environmental commitments and performance; and
- Sustain the Navy's partnerships with public agencies and community organizations to mutually monitor and improve the quality of the environment.

3 EROSION PROCESSES AND TYPES OF EROSION

Soil erosion is the process by which the land's surface is worn away by the action of wind, water, ice, and gravity. Natural or geologic erosion has been occurring at a relatively slow rate since the earth was formed and is a tremendous factor in the creation of the earth as we know it today. The picturesque mountains of the west, the rolling farmlands of the Piedmont, and the productive estuaries of the Coastal Zone are all products of the geologic erosion and sedimentation process in Virginia. Except for some cases of shoreline and stream channel erosion, natural erosion occurs at a slow rate and is an important factor in maintaining an environmental balance (VA DCR 1992).

Water-generated erosion is the most severe type of erosion and is the type of erosion that is the focus of this report. Water-generated erosion occurs as a result of the impact of rain droplets on unprotected soil surfaces and is due to frictional forces on soil particles as those rain droplets combine and move across the surface of the land. The force due to impact of raindrops is primarily vertical and tends to detach soil particles, while the force of flowing water is primarily horizontal and acts to move detached particles from one place to another. Water-generated erosion can be broken down into the following types, as defined in the Virginia Erosion and Sediment Control Handbook (VA DCR 1992).

Splash erosion is the initial effect of rain upon the soil. Raindrop impact dislodges soil particles and splashes them into the air. These detached particles are then vulnerable to movement via surface water flow, including sheet, rill, gully, or channel erosion.

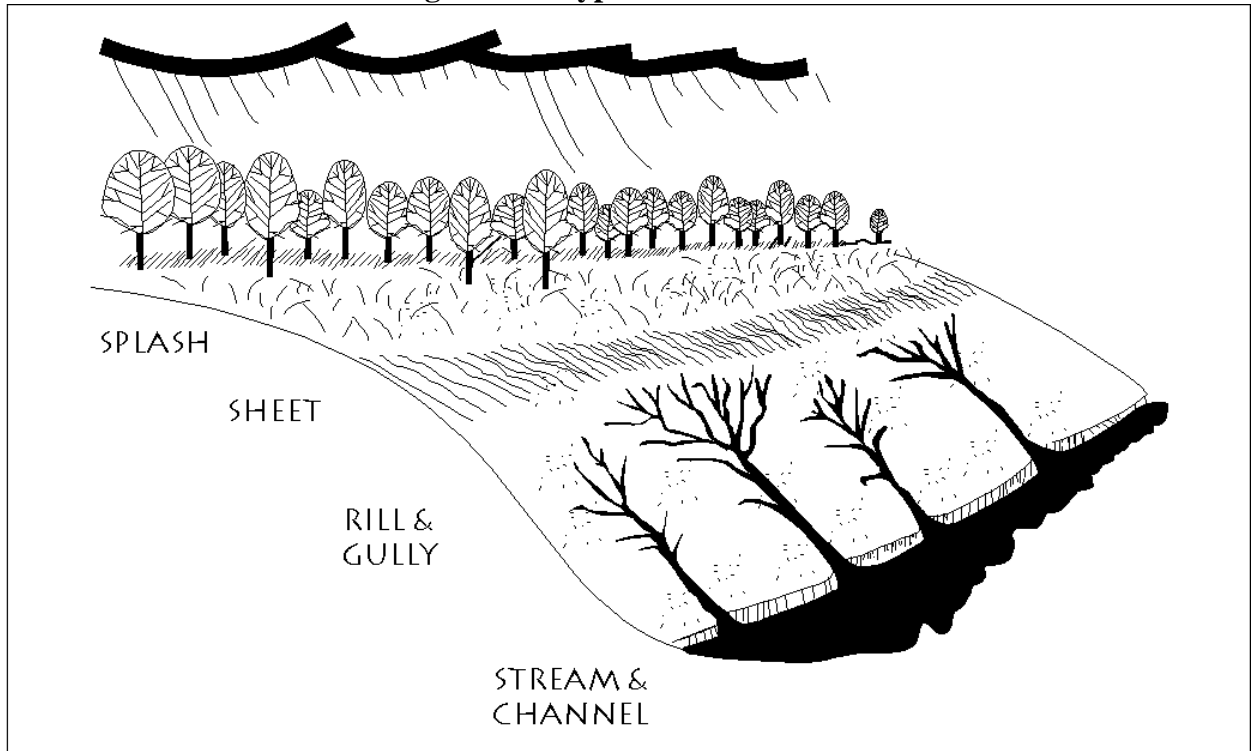
Sheet erosion is caused by the shallow flow of water over the land's surface before it concentrates. Although seldom the detaching agent, sheet flow transports soil particles detached by raindrop impact. Sheet erosion has been identified as a major cause of soil loss on agricultural fields. Sheet flow rarely moves as a uniform sheet for more than a few feet on land surfaces before concentrating in the surface irregularities.

Rill erosion occurs as sheet flow begins to concentrate in the low spots of irregular surfaces. As flow changes from sheet flow to shallow concentrated flow, the velocity and turbulence of flow increase. The energy of this concentrated flow is able to detach and transport additional soil particles. When this occurs, the running water begins to cut small channels. Rills are small but well-defined channels that are up to a few inches deep. They are easily mitigated in agricultural areas by harrowing and other surface treatments.

Gully erosion occurs when rills combine and the increased volume and velocity of water form larger and deeper channels. The main difference between rill erosion and gully erosion is magnitude. Gullies are often too large to be repaired by tillage equipment and typically require heavy equipment and special repair techniques.

Stream and Channel erosion takes place when the volume and velocity within a stream channel are such that bed and/or bank materials are moved and not replaced. Streambed scour is the removal of underwater material by waves or currents, especially at the base or toe of a streambank or shoreline.

Figure 3-1: Types of Soil Erosion



(Source: CEP 1998)

4 METHODOLOGY USED FOR FIELD ASSESSMENT

4.1 DESKTOP ANALYSIS

Prior to the field assessment, a desk top analysis was conducted by SEE to review information provided by NAVFAC and to identify potential sites to be surveyed. Information provided by NAVFAC for the desk top analysis primarily consisted of the most recent INRMPs for each installation and relevant GIS files for each base. Using this information, SEE identified areas to be investigated during the field assessment. These areas consisted of primary stormwater drainage ditches, natural streams, channelized natural streams, and lake and pond shorelines. The primary resources utilized by SEE were Water Resource Maps from the INRMPs (GMI 2006 and 2008) and the Wetland Centerline GIS layers (GMI 2002), provided by NAVFAC in October and November 2012. Additional clarification regarding survey areas was provided by Michael Wright, Navy Natural Resources Specialist, during a site tour held on November 13, 2012, at the onset of site assessment activities. This site tour consisted of a daylong driving tour of NASO, NASO-DNA, NALFF, and NSA-NWA.

4.2 FIELD SURVEY

The field assessment was performed by SEE between the dates of November 13, 2012 and January 23, 2013. A total of five nonconsecutive weeks of field assessment was conducted to complete the field survey at all four facilities.

Field assessment activities consisted of the field location of survey areas, visual inspection of these areas, and documentation of any notable erosion features observed upon inspection. Investigation methods included walking inspections, driving inspections where practical, and investigation by means of canoe. When possible, the surveys were conducted by starting downstream and continuing upstream so that any discharge of sediment from erosion to the receiving stream would be identified early in the survey. The identification of erosion features was primarily based on the visual observation of typical erosion features such as sparse vegetation, occurrences of sheet erosion, erosion rills and gullies, slope failures, and scour. The general process employed by SEE was conducted as follows:

- Follow shoreline of watercourse or surface water until an erosion feature was identified.
- Take one or more photographs of the erosion feature showing the extent of erosion.
- Document each feature's location using a Trimble GeoXH 3000 GPS device. GPS measurements were recorded manually in decimal format and also stored on the unit. The GPS measurements collected represent the center of the erosion feature. The target accuracy was three meters or less.
- Complete a field inspection form.
- Repeat the process for the remainder of watercourse or surface water features.

Field documentation of erosion features included the following information:

- General description;
- GPS coordinates that were both manually and digitally recorded;
- Designated use of the surrounding area (e.g. agricultural, training, recreational, etc.);
- Apparent usage level of the surrounding area (e.g. heavy, moderate, light);
- Vegetative condition of the surrounding area (e.g. sparse grass, dense brush, etc.)
- Photographic documentation;
- Nature of erosion and sedimentation issues observed;
- Condition of drainage structure, if applicable;
- Apparent cause of the erosion; and
- Physical dimensions pertaining to the erosion feature.

Initially, SEE sought to perform a direct visual inspection of every area, regardless of impediments such as heavy brush and thickly forested areas. This approach, while very labor intensive and time consuming, proved worthwhile in that it allowed SEE to confirm that major erosion issues were not of primary concern in these densely vegetated areas where natural occurrences of erosion were present. Upon reporting this and with NAVFAC approval, SEE limited direct visual inspection to areas that were reasonably accessible by foot, vehicle, or canoe.

Areas identified in the field for which mitigation cost estimates were not provided generally consisted of occurrences of natural erosion along drainage ditches or channelized natural streams located within wooded areas where mitigation of the erosion would result in greater disturbance of surrounding areas if the present condition were to be addressed.

A summary of the surface water locations surveyed at each installation is provided in Table 4-1. These surface water locations and erosion features for NASO, NASO DNA, NALFF, and NSA NWA are shown in figures 5-1, 5-2, 5-3, and 5-4 respectively.

Table 4-1: Survey Summary by Installation

Installation	Total Length of Surface Water Surveyed	Surface Water Areas Surveyed	No. of Photographs (incl. in Appendix A)	No. of Erosion Features Identified
NASO	32 miles	Outfalls, Aeropines Golf Course Ponds and Mitigation Site, Runway Ditches, Agricultural Ditches, West Neck Creek, Weapons Compound Ditches, Oceana Pond, Owls Creek, Sand Pit Ponds, Base Perimeter Ditches, Roadside Ditches, Concrete Ponds, Skeet Range, VACAPES Area	173	20
NASO DNA	9 miles	MACS 24 Area, DEVGRU Area, Lake Christine, Redwing Lake, Lake Tecumseh, Sadler Pond, Lotus Pond, Lily Pond, Roadside Ditches, Main Ditch between Redwing Lake and Lake Tecumseh	11	3
NALFF	11 miles	Pocaty Creek, Runway Ditches, Agricultural Ditches, Chesapeake City Channel	18	3
NSA NWA	11 miles	Mill Stream, Lunker Lake, Brig Area, ROTHF Ditches, Agricultural Ditches, Roadside Ditches	12	6

Notes:

DEVGRU – Development Group

MACS – Marine Air Control Squadron

NALFF – Naval Auxiliary Landing Field Fentress

NASO – Naval Air Station Oceana

NASO DNA – Naval Air Station Oceana Dam Neck Annex

NSA NWA – Naval Support Activity Hampton Roads Northwest Annex

ROTHR - Relocatable Over-the Horizon Radar

VACAPES – Virginia Capes

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5 ASSESSMENT RESULTS

The following sections present and discuss the results of the erosion survey by installation. Figures for each installation are provided at the end of this section. The primary causes of each erosion feature and the GPS coordinates are shown in Table 5-1.

5.1 NASO

A total of 20 erosion features, designated as NASO 01 through NASO 20, were identified during field assessment activities at NASO. The surface waters surveyed and locations of these 20 erosion features are shown in Figure 5-1 (end of section).

5.1.1 NASO 01

Erosion feature NASO 01 consists of multiple erosion features located along an approximate 500 foot reach of an agricultural field drainage ditch west of West Neck Creek. These features are designated as NASO 01(a) through NASO 01(d) and are discussed in further detail below.

5.1.1.1 NASO 01(a)

Erosion feature NASO 01(a) is located approximately 0.27 miles upstream of Outfall 001 via an agricultural ditch west of West Neck Creek. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-1. The GPS coordinates for this feature are latitude 36.7892 and longitude -76.0438. All GPS coordinates represent the center of the erosion feature.

NASO 01(a) is characterized by occurrences of sheet erosion and erosion rills at the southeast corner of the intersection of the main agricultural drainage ditch and a tributary ditch to the south. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to the concentration of upgradient drainage over the sparsely vegetated area adjacent to the ditch.

Erosion at this feature extends southeast of the intersection of the main and tributary ditches and has an area of about 175 SF. The erosion rills are an average of 6 inches deep.



Photograph 5-23: NASO 20, Ditch Scour and Embankment Erosion at Outfall 005

5.2 NASO DNA

A total of three erosion features, designated as NASO DNA 01 through NASO DNA 03, were identified during field assessment activities at NASO DNA. The surface waters surveyed and the three erosion features identified are shown in Figure 5-2. These erosion features are discussed in detail in the following subsections.

5.2.1 NASO DNA 01

Erosion feature NASO DNA 01 is located at a bend along a small roadside drainage ditch. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-2 and a photograph is provided as Photograph 5-24. The GPS coordinates for this feature are latitude 36.8147 and longitude -75.9707.

NASO DNA 01 is characterized by the occurrence of minor streambank scour along a ninety degree bend in the drainage ditch and undermining of the adjacent security fence. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to the abrupt change in flow direction, which is likely only an issue under peak flow conditions.

Approximately 20 feet of erosive scour is present along the three feet deep streambank. The total eroded area is approximately 60 SF.



Photograph 5-24: NASO DNA 01, Streambank Scour along Roadside Ditch

5.2.2 NASO DNA 02

Erosion feature NASO DNA 02 is located along the southern shoreline of Lake Christine. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-2 and a photograph is provided as Photograph 5-25. The GPS coordinates for this feature are latitude 36.8145 and longitude -75.9769.

NASO DNA 02 is characterized by occurrences of limited embankment scour and failure along a relatively small section of the lake shoreline. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to wave action from the lake.

Approximately 500 feet of erosion is present along the shoreline, which varies in height from one to four feet above the water. Assuming an average height of 2.5 feet, the total eroded area of shoreline that is visible above the water is 1,250 SF.



Photograph 5-25: NASO DNA 02, Shoreline Erosion at Lake Christine

5.2.3 NASO DNA 03

Erosion feature NASO DNA 03 is located at the outlet of a drainage ditch culvert that passes beneath an unpaved roadway, approximately 0.60 miles upstream of Redwing Lake. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-2 and a photograph is provided as Photograph 5-26. The GPS coordinates for this feature are latitude 36.8035 and longitude -75.9698.

NASO DNA 03 is characterized by failure of the culvert embankment, resulting in potential blockage of the culvert outlet and roadway stability concerns. The soil type present at this feature is silty loam. The embankment failure is likely due to the concentration of upgradient drainage from the overlaying unpaved roadway at the point immediately above the culvert.

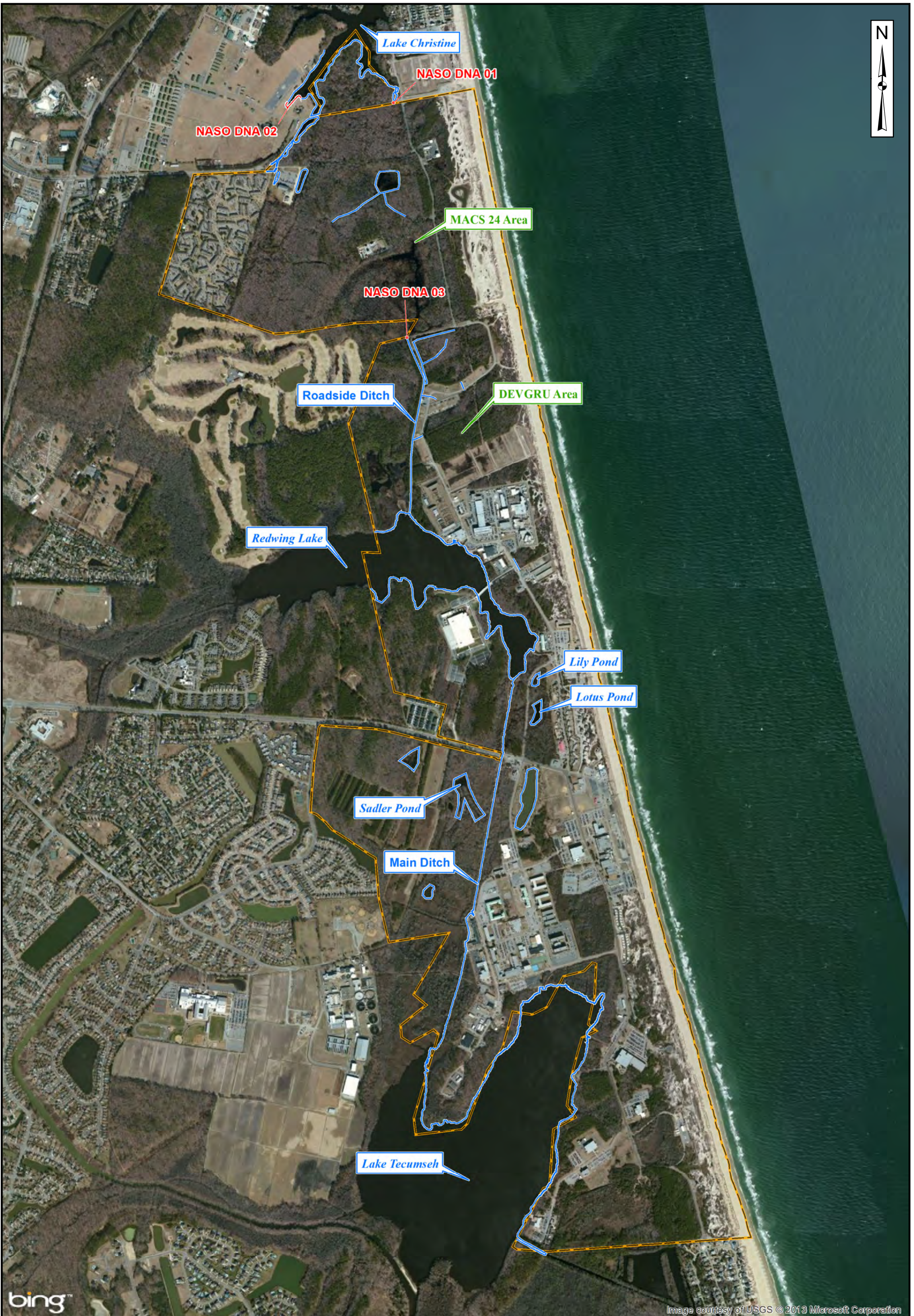
A section of the embankment above the culvert approximately 10 feet wide has collapsed. The embankment height is approximately three feet. The total eroded area is approximately 30 SF.

Table 5-1: Primary Causes of Erosion for Each Erosion Feature

Area of Erosion	Latitude	Longitude	Poor Agricultural Practices	Recent Land Development or Human Activity	Poor Drainage Structure Design	Severe Storm Event	Little or No Maintenance	Natural Erosion or Steep Slopes
NASO-01	36.7892	-76.0438	X					
NASO-02	36.8125	-76.0384				X		X
NASO-03	36.7911	-76.0382			X			
NASO-04	36.7914	-76.0406					X	X
NASO-05	36.7980	-76.0291			X	X		
NASO-06	36.7967	-76.0277				X		X
NASO-07	36.7996	-76.0294			X		X	
NASO-08	36.8006	-76.0281				X		X
NASO-09	36.7988	-76.0447					X	
NASO-10	36.7933	-76.0408			X		X	
NASO-11	36.8048	-76.0477					X	
NASO-12	36.7986	-76.0573				X	X	
NASO-13	36.8025	-76.0608					X	
NASO-14	36.8259	-75.9861		X				
NASO-15	36.8323	-76.0121						X
NASO-16	36.8304	-76.0113		X	X			
NASO-17	36.8287	-76.0200			X	X		
NASO-18	36.7983	-76.0575				X		X
NASO-19	36.8305	-76.0454				X		X
NASO-20	36.8375	-76.0391			X	X		
NASO DNA-01	36.8147	-75.9707				X		X
NASO DNA-02	36.8145	-75.9769						X
NASO DNA-03	36.8035	-75.9698			X		X	
NALFF-01	36.6758	-76.1507		X	X			
NALFF-02	36.6765	-76.1501	X				X	

FIGURE 5-2
NASO – DAM NECK ANNEX EROSION SURVEY FEATURES

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Image courtesy of USGS © 2013 Microsoft Corporation

- Installation Boundary
- Surveyed Surface Water
- Erosion Feature

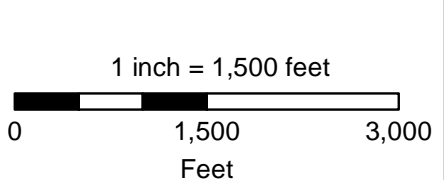


FIGURE 5-2
Naval Air Station Oceana Dam Neck Annex
Erosion Survey & Features
 EROSION CONTROL PLAN
 VIRGINIA BEACH, VIRGINIA

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6 DISCUSSION AND RECOMMENDATIONS

Based on the survey results discussed in Section 5.0 of this report, SEE has provided recommendations to address each erosion feature with an emphasis to stop any current erosion and downstream transport of sediment. The recommendations utilize proven methods and technologies that meet the following primary criteria: effectiveness in controlling erosion, implementability from an engineering standpoint, and cost effectiveness.

6.1 NASO

A total of 20 erosion features, designated as NASO 01 through NASO 20, were identified during field assessment activities at NASO and presented in Section 5.1 of this report. The following subsections discuss SEE's recommendations for addressing these erosion features. Estimated costs are also provided for each recommended approach with supporting documentation provided in Appendix C. Cost estimates are turnkey and include planning, supplies, equipment, and manpower for implementation, in addition to any required maintenance costs.

6.1.1 NASO 01

Erosion feature NASO 01 consists of multiple erosion features located along an approximate 500 foot span of an agricultural field drainage ditch that discharges into West Neck Creek. These features are designated as NASO 01(a) through NASO 01(d). For cost estimate purposes, these features are addressed as a single unit because of their close proximity to each other, similar erosion characteristics, and use of similar methods to address them.

A temporary silt fence should be placed upgradient of any land disturbing activities to prevent runoff from reaching disturbed areas. Where erosion rills and gullies are present, the recommended mitigation approach is to restore the areas to their original grade and reestablish vegetation to prevent erosion from recurring. Soil fill will be required to bring the areas up to grade. Grading work can be performed using a backhoe loader or similar equipment. Final grades should have a uniform surface with no irregularities to prevent drainage from concentrating and causing erosion to reoccur.

Where slope failure occurs along the streambank, the recommended mitigation approach is to restore the streambank to a stable condition. This can be accomplished by reducing the slope and revegetating the streambank. In the area where slope failure occurs, the streambank should be cut back to reduce the slope and minimize the potential for future failure. Where slope reduction is performed, the final grade of the newly sloped area should gradually taper into the existing undisturbed sections of the streambank to minimize abrupt irregularities that could lead to further erosion. In general, final slopes exceeding three horizontal to one vertical should be avoided when implementing these mitigation approaches.

The eight inch drain pipes associated with these erosion features should be addressed by removing the obstruction present at NASO 1(b) and by repairing or replacing the damaged section present at NASO 1(c). Maintenance of the planted vegetation and good agricultural practices will prevent the erosion from reoccurring.

6.1.20 NASO 20

The recommended approach to mitigating erosion feature NASO 20 is to apply riprap where erosion is present at the outfall and along the drainage ditches parallel to the roadway, and install a concrete headwall where erosion undercuts the culvert embankment.

A temporary silt fence should be placed upgradient of any land disturbing activities to prevent runoff from reaching disturbed areas. Riprap should be placed at the convergence of the roadside drainage ditches and the pipe culverts. The riprap should extend up to and slightly beyond where any erosion occurs within the ditches and on the culvert embankment. The riprap should also extend to where erosion occurs beneath the security fence. The activities associated with adding riprap in this area would be to strip existing vegetation where riprap will be placed, regrade the area to the extent necessary to provide uniform slopes, install a layer of geotextile filter fabric on the graded surface, and place riprap to a final grade matching the regraded surface. Final slopes should not exceed three horizontal to one vertical. A backhoe loader or similar equipment can be used to perform the grading and riprap placement.

Where erosion occurs above and between the concrete pipe culvert that extend beneath the road, a cast-in-place concrete headwall reinforced with structural steel should be installed to prevent undercutting of the embankment that supports the overlaying roadway. This will require some additional excavation of the culvert embankment, but should not require any disturbance of the road itself. The headwall can be prepared by constructing a form to encase the top and sides of the existing concrete pipe culvert.

The application of riprap should be in accordance with the specifications of VA ESC Handbook Chapter 3, Section 3.19. A layer of geotextile filter fabric should be installed and appropriately anchored where riprap is to be placed. The geotextile will help to stabilize the subgrade and protect against future scour. The geotextile will also prevent the migration of soils from the subgrade into the riprap and will minimize plant growth through the riprap.

This mitigation approach will require approximately two weeks to execute, excluding the planning and preparation time prior to field work. There are no maintenance activities associated with this approach.

The total estimated cost of mitigating erosion feature NASO 20 is \$33,700. This estimate includes planning and construction costs.

6.2 NASO DNA

A total of three erosion features, designated as NASO DNA 01 through NASO DNA 03, were identified during field assessment activities at NASO DNA and presented in Section 5.2 of this report. The following subsections discuss SEE's recommendations for addressing these erosion occurrences. Estimated costs are provided for each recommended approach. The documentation for all NASO DNA areas are in Appendix C.

6.2.1 NASO DNA 01

The recommended approach to mitigating erosion feature NASO DNA 01 is to apply riprap where erosion has occurred along the bend in the drainage ditch. The riprap should also extend to where erosion has occurred around the security fencepost.

A temporary silt fence should be placed upgradient of any land disturbing activities to prevent runoff from reaching disturbed areas. The activities associated with adding riprap in this area include stripping existing vegetation where riprap will be placed, regrading the area to the extent necessary to provide uniform slopes, installing a layer of geotextile filter fabric on the graded surface, and placing riprap to a final grade matching the regraded surface. Final slopes should not exceed three horizontal to one vertical. This work can be performed with a backhoe or similar equipment.

The application of riprap should be in accordance with the specifications of VA ESC Handbook Chapter 3, Section 3.19. A layer of geotextile filter fabric should be installed and appropriately anchored where riprap is to be placed. The geotextile will help to stabilize the subgrade and protect against future scour. The geotextile will also prevent the migration of soils from the subgrade into the riprap and will minimize plant growth through the riprap.

This mitigation approach will require approximately two days to execute, excluding the planning and preparation time prior to field work. There are no maintenance activities associated with this approach.

The total estimated cost of mitigating erosion feature NASO DNA 01 is \$9,200. This estimate includes planning and construction costs.

6.2.2 NASO DNA 02

Although some minor erosion is occurring along this section of shoreline at Lake Christine, no significant erosion or downstream impacts were observed in this area and there are no signs of collapse or sloughing along the embankment. It is recommended that this area be monitored annually by conducting a visual survey for erosion to determine if additional erosion control measures are required.

The total estimated cost of addressing erosion feature NASO DNA 02 is \$950 per year for monitoring.

6.2.3 NASO DNA 03

Difficulty was encountered in assessing the condition of the culvert at NASO DNA 03 due to the collapsed embankment material obscuring direct inspection, but it is assumed that some degree of blockage is present. The size and construction details associated with the existing culvert are unknown. In addition to blockage concerns, the stability and future use of the overlaying unpaved roadway is a concern, as erosion is likely to continue in this area.

The first step would be to clear the area adjacent to and within the culvert and dispose the material in an on-site (preferred) or off-site landfill. This will facilitate inspection of the culvert

so that an accurate assessment can be made. A temporary measure to mitigate erosion until further action can be determined is to place crushed stone along the section of road crossing over the culvert. The crushed stone should be underlain by geotextile filter fabric. The approach would require a backhoe loader or similar equipment.

This mitigation approach will require approximately two days to execute, excluding the planning and preparation time prior to field work. There are no maintenance activities associated with this approach.

The total estimated cost of removing overlying debris and installing the temporary measure for the roadway at NASO DNA 03 is \$6,900. This estimate includes planning and construction costs. Once debris is removed and the current status of the erosion feature can be evaluated, additional recommendations may be required to mitigate the erosion.

6.3 NALFF

A total of three erosion features, designated as NALFF 01 through NALFF 03, were identified during site assessment activities at NALFF and presented in Section 5.3 of this report. The following subsections discuss SEE's recommendations for addressing these erosion occurrences. Estimated costs are provided for each recommended approach. The documentation for all the NALFF costs is provided in Appendix C.

6.3.1 NALFF 01

Significant erosion exists at erosion feature NALFF 01. Erosion of this scale can be indicative of larger problems, such as inadequate channel or culvert capacity and changes in upstream conditions that affect high flow conditions. For larger scale erosion such as this, it is recommended that peak flow volumes be reevaluated prior to mitigation to ensure that proper design options are evaluated.

The recommended approach to mitigating erosion feature NALFF 01 is to utilize the existing eroded area as a catchment basin by regrading the impacted area and lining it with riprap. Removal of the debris from the culvert inlet will also be required as a part of mitigation. This approach would minimize mitigation costs by eliminating the need to import fill material that would be required to restore the area to its original condition. Also, restoring the area to its original condition with soil would increase the likelihood of the same erosion recurring.

The catchment basin upstream of the culvert will provide additional capacity to retain and temporarily store peak flow volumes, as well as provide energy dissipation that will reduce erosion potential downstream. The catchment basin would have the added benefit of acting as a small sedimentation pond by capturing any sediment or debris prior to entering the culvert and preventing sediment transport downstream.

Prior to initiating and land disturbing activities, a temporary silt fence will be placed around the eroded area and any areas disturbed by excavation. The activities associated with creating the catchment basin include cutting back the steeply sloped southwestern streambank and regrading the area to the extent necessary to provide uniform slopes. The excess material generated from cutting back the slopes could be used to restore the equally steep slopes along the northeastern

7 BEST MANAGEMENT PRACTICES

Best Management Practices (BMPs) are devices, systems, and procedures that reduce or eliminate pollutants and sediment from being released into the environment, particularly surface water features. BMPs generally fall into two categories: 1) physical devices or structures that involve construction, landscaping, and agricultural practices; and 2) systems and procedures that include stormwater management, training, regular monitoring, and natural resources management.

7.1 CONSTRUCTION

Uncontrolled stormwater runoff from construction sites can significantly impact rivers, lakes and estuaries. Sediment in water bodies from construction sites can transport pollutants that have a high affinity through adsorption on soil particles, reduce the amount of sunlight reaching aquatic plants, and smother aquatic habitats and fish spawning areas. Stormwater Management Control at construction sites is generally viewed as temporary erosion and sediment (E&S) control measures that provide benefit during the construction phase. Effective stormwater runoff control can be achieved through BMPs that consider future site usage, growth, inspection, and maintenance of the stormwater drainage controls implemented at the site. BMPs at construction sites can be implemented prior to construction activities, during construction activities, after following completion of construction activities as discussed below.

7.1.1 Pre-Construction BMPs

Construction activities that potential release sediment to streams are required to comply with federal National Pollutant Discharge Elimination System (NPDES) construction site stormwater regulations. These regulations include developing SWPPPs and preparing erosion and sediment control plans (ESCPs). The VA ESC Handbook requires an erosion and sediment control plan for all projects where the area of disturbed soil or vegetation exceeds 10,000 SF. In some cases, it may be good practice to prepare an ESCP for areas less than 10,000 SF. Such areas include: sites with steep slopes, areas that will be denuded for extended periods of time, and riparian areas. Due to the of the proposed repairs in this report to surface water, E&S controls are included for areas where land disturbance is proposed. Good construction management is as important as the physical BMPs. The following are management considerations that are recommended prior to construction:

- Include E&S controls as an agenda item during the pre-construction meeting;
- Sequence construction activities so that no area remains exposed for unnecessarily long periods of time;
- Consider the time of year: be prepared for thunderstorms, use straw mulch during poor germination periods;
- Limit land disturbance to only those that need to be disturbed and barricade vegetated areas that are not to be disturbed since construction workers tend to drive on and use more area than is required; and
- Designate one individual to be responsible for implementing E&S measures.

7.1.2 Construction Activities

Two general types of E&S controls that can be implemented during the construction phase of projects: structural and vegetative controls. A complete description of all available E&S controls is beyond the scope of this project but the structural controls recommended for NASO, NALFF, NASO DNA, and NSA NWA include: sediment barriers such as silt fencing; riprap; installing new culverts, retaining walls, excavation and filling; regrading to reduce slope; catchment basins, and in-stream sediment barriers such as check dams. The selection of the most appropriate controls is highly site-specific and needs to be evaluated for each erosion feature. The vegetative controls consist of seeding, over-seeding, sodding, soil stabilization blankets, and landscaping, which also need to be evaluated for each erosion feature. Most erosion control measures utilize a combination of structural and vegetative controls.

7.1.3 Post-Construction Activities:

Adequate BMP performance requires not only proper installation, but also regular maintenance and inspection. Maintenance needs are best determined by a self-inspection program since local agencies require advance notice to schedule an inspection. Stormwater control BMPs require regular inspections to ensure their effectiveness, and many permitting authorities require self-inspection for construction projects. Three types of BMP inspections can be performed: routine inspections, inspections performed before rain events, and inspections performed after rain events.

Routine inspections are an integral part of regular maintenance activities, such as debris removal, repair, and replacement necessary to ensure the integrity and effectiveness of BMPs. Construction site activities can damage BMPs. Earthmoving equipment, for example, can easily dislodge an entrenched silt fence. Routine inspection and maintenance minimizes the work required to prepare a site before a rain event.

After a rain event, prepare the site for the next rain event. Typically within 48 hours after a rain event, inspect, clean, and repair the site's BMPs. To prevent health and safety hazards, remove mud in traffic areas and remove mosquito-breeding standing water. Clean mud and debris from silt fences and other BMPs. Clogged BMP structures will not prevent sediment releases during subsequent rain events, so the contractor needs to clean, repair, or replace them as quickly as possible.

7.2 TRAINING

One of the most important factors in determining whether BMPs are properly installed and maintained is knowledge and experience of the contractor implementing and inspecting them. To ensure a high level of expertise, many naval facilities require formal certification for on-site contractors. These certified private contractors can then be used to lessen the community's inspection burden.

Any contractor who wishes to construct a BMP involving a land-disturbing activity in Virginia must complete the training and pass an exam as part of the *Responsible Land Disturber Certificate of Competence Program* (VDCR n.d.). This program was established through revisions to the VA ESC Law (VA Code of Regulations 1988). The VDCR administers this program which became effective in July 2001. The code states that any person responsible for

implementing the E&S plan must provide the name of an individual holding an RLD Certificate who will be in charge of and responsible for carrying out a regulated "land-disturbing activity."

7.3 LANDSCAPING

Proper landscaping practices help stabilize disturbed areas, minimize sediment transport from stormwater, and improve the overall aesthetics of a stormwater BMP. Landscaped areas can provide significant reductions in sediment transport from developed sites through biological uptake of nutrients, sediment trapping, filtering, and infiltration.

7.3.1 Landscaping Practices

The sites for this project are located primarily in riparian zones that experience both wet and dry soil conditions and periodic inundation. The vegetation in riparian zones serves the following purposes:

- reduce re-suspension of newly deposited sediments;
- prevent erosion; and
- provide habitat and food for wildlife,

The following are recommended landscaping practices at NASO, NALFF, NASO DNA, and NSA NWA to help prevent occurrence of future erosion:

- Do not mow vegetation within 5 feet of the surface water edge. Where there is a definite embankment, the 5 feet buffer starts from the top of the embankment and extends away from the channel.
- Do not mow vegetation too short. This will prevent it from drying or burning out, which can cause bare spots.
- Follow the instructions for adding fertilizer and other soil amendments in the applicable landscaping plan or design document so that the addition of phosphorous, nitrogen and other chemicals to the land surface are minimized.
- If fertilizer is needed, apply 10-20-10 fertilizer at a rate of 500 pounds per acre or 12 pounds per 1,000 SF.

7.3.2 Plants for Erosion Control

Plants selected for a stormwater BMP must tolerate stresses such as pollutants, variable soil types and soil moisture fluctuations, climate, and topography. When selecting plants, native plant species should always be used. Non-native plants require more care to adapt to the hydrology, climate, exposure, soil, or other conditions. Also, some non-native plants can become invasive, especially those used for stabilization, and may ultimately choke out the native plant population.

The placement of trees and larger shrubbery on an embankment is discouraged. The root system of large trees and shrubs can threaten the structural integrity of the embankment and possibly cause its failure. The side slopes of BMPs are usually compacted during the construction process to ensure stability and the density of these compacted soils is often such that plant roots cannot

penetrate to an adequate depth, leading to premature mortality or loss of vigor. In addition, planting trees will take from several years to a decade before any benefits are achieved.

Technical Bulletin No. 4 (VDCR 2003) identifies permanent seeding specifications for new plantings in Coastal Plain areas, such Virginia Beach, VA. For low-maintenance areas with a steep slope, the Bulletin recommends the following:

<u>SPECIES</u>	<u>APPLICATION RATES (lbs/acre)</u>
Tall Fescue	93–108
Bermudagrass	0-15
Red Top Grass or Creeping Red Fescue	2
Seasonal Nurse Crop	20
Sericea Lespedeza	20

The seed mixture recommended in section 6 conforms to the species and rates shown above. Other types of seed mixes may also be appropriate for coastal areas in Virginia. Although the seed mixture is important, it is also important that the plants be naturally occurring in coastal Virginia and that they be low maintenance and durable.

The success of any landscape plan depends on the selection of the proper specifications that are subsequently implemented by the contractor. The specifications should include procedures for installing the plants. They should also provide details for the steps to be taken before and after installation, such as any special instructions for the preparation for planting, fertilization, and watering requirements. Any seasonal requirements for installation should also be specified.

A maintenance schedule should be provided in the project plans and/or specifications. This is particularly important for BMPs that have a vegetative component that is integral to the pollutant removal efficiency. The schedule should include guidance regarding methods, frequency, and time of year for landscape maintenance and fertilization. Specific plant communities may require different levels of maintenance. Upland and floodplain terrace areas require very little maintenance, while aquatic or emergent vegetation may need periodic thinning or reinforcement plantings. After the first growing season it should be obvious if reinforcement plantings are needed. If they are, reinforcement plantings should be installed at the onset of the second growing season after construction (VDCR 2012).

7.4 AGRICULTURAL PRACTICES

The VDCR, U.S. Department of Agriculture, and other water conversation partners spend a large portion of their time and budgets installing, promoting and tracking agricultural BMPs. These include practices to control cropland runoff, animal waste dispersal, streambank erosion, improper use of fertilizers and pesticides, and other non-point source pollutant reduction actions. This is accomplished by constructing control devices such as riparian buffers, diversions, grass buffer strips, and chemical and fertilizer handling facilities. BMPs also include activities such as rotational grazing, planting of cover crops, practicing integrated pest management, nutrient management plan implementation, and other similar proven actions.

SEE recommends the following agricultural BMPs for NASO, NALFF and NSA NWA:

- Maintain a 5 foot buffer vegetation strip between planted crop areas and any stream embankment, ditch, channel, pond, or other surface water features. Do not mow the vegetation strip but allow the vegetation to reach maximum height.
- Construct feeder drainage ditches that are perpendicular to the direction of runoff rather than in the same direction as runoff.
- Maintain access roads in the agricultural fields so ruts do not develop associated with vehicle traffic.
- Follow the instructions for adding chemicals, fertilizer, and other soil amendments in the applicable landscaping plan or design document.

7.5 STORMWATER MANAGEMENT

One of the first considerations in selecting a stormwater BMP is the functional goal of the BMP. In general, stormwater BMPs can be categorized into water quality (sediment and pollution control) and water quantity (stream channel erosion and flooding) BMPs. The use of some BMPs is limited by site or watershed feasibility factors such as environmental impacts, drainage area or watershed size, and topographic constraints. The BMPs designed for water quality control provide varying levels of pollutant removal and are suited for specific development densities.

The decision making process of choosing a stormwater BMP must weigh the goals of the proposed activity against the limiting site feasibility factors of the proposed site or BMP location. The limiting site feasibility factors include:

- Topographic and geologic constraints;
- Contributing drainage area size;
- Environmental impacts; and
- Access for maintenance.

The possible stormwater management requirements that influence BMP selection include:

- Stormwater quality, stream channel erosion, flooding, and environmental mitigation;
- Multiple discharge points;
- Pollutant removal capability; and
- Performance-based versus technology-based water quality criteria.

7.6 NATURAL RESOURCE MANAGEMENT

Successful implementation of a watershed management plan will also depend on the ability to obtain the appropriate permits from state and federal agencies. An inventory of natural resource features in the watershed will promote a BMP development approach that minimizes or avoids impacts on environmental resources to the maximum extent practicable. Natural resource features to be considered prior to implementing BMPs depend on the characteristics of the watershed being studied and could include:

- Wetlands
- Floodplains
- Stream corridors and greenways
- Steep slopes
- Erodible soils
- Rare and endangered species
- Sensitive habitats
- Fish and wildlife resources
- Recreational areas
- Sources of water supply

Although all of the above resources apply to NASO, NALFF, NASO DNA, and NSA-NWA to some extent; the following natural resources should be carefully considered prior to implementing BMPs.

Wetlands. Protecting the natural functions of wetlands is a critical element of the site development process and watershed management planning. Wetlands provide unique habitats for both plants and wildlife, including many threatened and endangered species. Some BMPs, such as check dams, can retain more water in streams and could negatively impact down-stream wetlands by preventing water from reaching the normally saturated areas. For the repair projects recommended by this report, only the erosion areas associated with the Chesapeake City Channel at NALFF have a recommendation for the installation of check dams and there are no wetlands near that channel.

Floodplains and Stream Corridors. Floodplains and stream corridors include waterways and adjacent riparian lands that may be subject to flooding. Natural waterways provide habitat for fish, aquatic plants, and benthic (bottom dwelling) organisms. Vegetated riparian land adjacent to streams stabilize the stream bank; filter pollutants from storms and floods; and provide habitats for a variety of amphibians, aquatic birds, and mammals that depend on the proximity to water for their life functions. A riparian buffer should be preserved or created along the banks of streams, where possible.

Steep Slopes. Steep slopes, such as those on steam embankments, cause instability of the soil on the slopes. High runoff velocities from exposed steep slopes could result in destructive and unsightly erosion, denuded slopes that may be difficult to revegetate, and sediment deposition in sensitive areas both on and off the site. Stabilizing vegetation should be protected to the maximum extent practicable and disturbed areas should be immediately revegetated. Maintenance or revegetated areas, including removal of debris and mowing of non-slope areas is critical to the long-term growth and propagation of the planted vegetation. Some of the recommendations in this report directly address steep slopes by recommending reconstruction to a 3:1 (horizontal to vertical) slope.

Fish and Wildlife Resources. In accordance with Navy Instruction 5090.1C, installations must improve the quantity, function, sustainable productivity, and distribution of aquatic resources for increased recreational fishing opportunities by restoring degraded habitat, fostering conservation, and providing access to and awareness of opportunities for recreational fishing. Although hunting is a significant activity at NASO, hunting does not impact water quality by erosion.

There are no water bodies at NALF Fentress managed for recreational fishing. Oceana Pond at NASO is currently the only water body at NASO managed for recreational fishing. Freshwater fishing is permitted at Lake Tecumseh, Redwing Lake, and Sadler Pond at DNA. Fishing is also allowed in the ditches that drain DNA. Appropriate state licenses and a base permit for freshwater fishing are required for fishing at DNA.

Although three recreational fishing ponds were excavated during the 1960s at NSA NWA, there are no authorized fishing lakes at NSA NWA. Past fisheries assessments of Lunker Lake suggest that the pond is too small, steep-sided, and lacks shallow spawning grounds needed to support a self-sustaining, balanced fish population and that extensive reconstruction would be required to establish a fishing program (USFWS 1987).

Recreational Areas. An inventory of recreational areas and sources of water supply will also facilitate, and in some cases mandate, the goals of the watershed. This information will also be important in the selection of models that would be needed to identify sources of pollution, understand the hydrologic and hydraulic characteristics of the watershed, and evaluate alternatives to meet the watershed goals and manage water quality.

Types of outdoor recreation available at NSA NWA include hunting, fishing, picnicking, bird watching, hiking, jogging, and camping. The MWR at NSA NWA administers a number of these activities, whereas the fishing, hunting, and environmental awareness programs are administered as part of the regional natural resources program under the Regional Environmental Group. Fishing is the recreational activity most impacted by erosion due to sedimentation and should be a criterion in identifying the appropriate BMP for an area.

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**APPENDIX A
PHOTOLOG
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**APPENDIX B
FIELD SURVEY FORMS
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**APPENDIX C
COST ESTIMATES
INCLUDED ON COMPACT DISK**

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Enclosure 13. Forest Inventory



Final 2014 Forest Inventory Report

Naval Air Station Oceana-Dam Neck Annex
Virginia Beach, Virginia



Prepared for

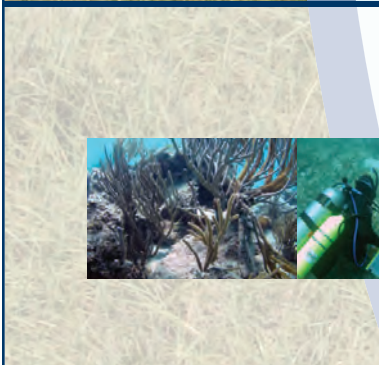
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Task Order TO-0002



Prepared by
CH2MHILL.



FINAL

2014 Forest Inventory Report

**Naval Air Station Oceana-Dam Neck Annex
Virginia Beach, Virginia**

Task Order 0002

JUNE 2015

Prepared for

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Prepared by



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Acronyms and Abbreviations

BA	basal area (in square feet per acre)
BAF	basal area factor
cm	centimeter
DBH	diameter at breast height
DNA	Dam Neck Annex
ft ² /ac	square feet per acre
ft ³	cubic feet
FVS-SN	Forest Vegetation Simulator Southern Variant
GIS	geographic information system
GPS	global positioning system
KCFAST	Kansas City Fire Access Software
km	kilometer
m	meter
Navy	United States Navy
SI	site index
RAWS	Remote Access Weather Station
ROMAN	Real Time Observation and Monitor Network
USDA	United States Department of Agriculture
UTM	Universal Transverse Mercator

1 Introduction

The purpose of this work was to collect and analyze baseline forest inventory data associated with Naval Air Station Oceana-Dam Neck Annex (DNA) in Virginia Beach, Virginia. Data were collected at this site between March 1 and May 30, 2014. Although the forest resource at DNA had not been previously inventoried at the stand level, geographic information system (GIS) polygons for broad vegetation cover types were classified and used as the basis for delineating stands for forest management purposes. A detailed methodology of data collection and analytical methods is provided below. Higher level summary data are provided in the body of the report. Additionally, a more detailed summary and raw data are described in the body and provided in full throughout attached appendices.

2 Methods

2.1 Forest Inventory Methodology

Using the existing ortho-photography provided by the United States Navy (Navy) (photograph dates: DNA 03/2011), DNA stand boundaries were delineated from ortho-photographic interpretation and from field observations using ArcGIS. Data are summarized at multiple aggregated levels, including the entire facility (installation), cover type, and stand.

- In 2014, the field crew visited every stand delineated at DNA (**Appendix A, “DNA Forest Stands”** map). Refer to **Appendix B** (Table B-1) for notes on the ‘forest_stand_area’ feature class in the geodatabase (prior to updating) and Table B-2 for description of all fields in the ‘DNA_Stands’ feature class.
- After a review of existing forest classification maps and a preliminary cruise layout and design, a timber cruise was made by a two-person field crew¹ in each stand to acquire the forest information.
- Standard forest mensuration criteria and sampling techniques were used as the foundation for developing the 2014 Forest Inventory.
 - The plot layout was designed using a double-sampling method with more intensive sampling at every tenth plot.
 - A 20 basal area factor (BAF) prism was used when average tree diameter at breast height (DBH) was greater than 10 inches, and a 10 BAF prism when the average tree DBH was less than 10 inches.
 - Cruise points were equally distributed throughout each stand. At each variable radius prism plot, every tree was identified to species, measured for DBH, and product data collected (such as pulpwood, sawlog, and chip-n-saw).
 - At the intensively sampled plots, the field crew measured the height (total height and merchantable heights) of all trees determined to be within the plot using a laser hypsometer.
- Site index values were generated empirically based on tree height, tree DBH, and tree age for a representative dominant species (generally loblolly pine, but hardwood species were used as appropriate). See **Section 2.2** for analytical methods used to calculate height and volume estimates. **Appendix C** presents geographically appropriate site index curve figures for loblolly pine and sweetgum for management reference.
- Prior measurements were not available at this installation to use in estimating growth rates. Stand-level estimates of growth rates were made by using the inventory data collected in a peer-reviewed, regionally specific forest growth and yield model calibrated to local conditions. A detailed explanation of this process is provided in **Section 2.2**.
- Fuel moisture and fuel load assessments were conducted at the intensive sampling plots. **Section 2.3** provides detailed description of the method used. The additional tree and stand data that were collected on the

¹ Gary Roller and Travis Kay-Rugen from Spatial Informatics Group.

intensively sampled plots were used for developing statistical relationships between tree heights, DBH, and tree species for the purpose of estimating commercial volumes.

- **Appendix A ('DNA Forest Stands')** shows the final layout of sampling plots for DNA. The plots were established to allow at least 100 meters (m) between sampling locations. **Table 1** lists a summary of the inventoried sample plots.
 - The layout represents an approximate location of the variable radius plot center as the exact location may have been shifted to account for stand edges created by roads or other features such as water bodies.
 - The number of variable radius plots sampled was adjusted from the original estimate based on field reconnaissance.
 - Reasons for plot elimination included location no longer forested, location was too close to a stand boundary and was unable to be relocated.
 - Larger stands that were homogenous also had plot sample size reduced if the interim statistical analyses showed less than a 10 percent error around the mean for key variables such as basal area and mean DBH at the 90 percent confidence interval.
 - Field data were recorded electronically on a hand-held device. Copies of raw data are included in tabular form in **Appendix D**. Summaries of all the codes and abbreviations used in the tables and appendices are in **Appendix E**. Fuel plot photos (four at each intensively sampled plot) are included in **Appendix F** (no other photo data was collected in the field).

TABLE 1
Summary of Inventoried Forested Acres, Stands, and Variable Radius Sample Plots

Location	# of Stands	# of Variable Radius Sample Plots	Total Forest Acres (from GIS)
DNA	32 ²	261	710

2.2 Calculation of Height, Volume, and Summary Statistics for Variables of Interest

Merchantable Height

Merchantable height, rather than total bole length to particular top diameter, was used to estimate merchantable volume.

- **Sawlog-diameter trees (14-inch DBH class and greater):** The Richards model (Yaussey and Dale 1991) of the form was used:

$$\text{Merchantable Sawlog Height} = b_1 SI^{b_2} (1 - e^{(b_3(DBH-TD))}) + 17.5$$

Where

SI = Site Index

DBH = outside bark diameter at breast height

TD = top diameter

The model exhibited the best performance when fit separately to species of excurrent and decurrent growth habit and included factors such as the inventory's minimum merchantability standards for log length.

² While the DNA geodatabase provided had polygons roughly corresponding to various natural areas in the 'forest_stand_area' feature class, they were not accompanied by a prior comprehensive forest management plan. This, along with changes in forest area and type due to natural disturbances or human processes, explains any variation from prior estimates of forested area and number of stands. See Section 2.3.2, sub-section Feature Update and Projection Procedures, for a detailed explanation on the stand boundary delineation process.

- **Pulpwood and Chip-N-Saw Diameter Trees (6- to 12-inch DBH classes):** This class was best predicted by total height, using an equation of the form:

$$\text{Merchantable pulp/CNS height} = \frac{b_1 e^{(b_2 + b_3 \cdot THT)}}{1 + e^{(b_2 + b_3 \cdot THT)}}$$

Where

THT = Total height (Bolker 2008)

- **Sawtimber and Chip-N-Saw Trees:** Once total sawtimber height in feet from the ground was estimated, a 1-foot stump was deducted, and after accounting for a minimum of one 16-foot log, upper log merchandising was applied to mimic a logger's bucking decisions, maximizing log lengths in 2-foot increments (one-eighth of log) with 6-inch trim for each log.
- **Pulpwood:** The number of full 8-foot sticks in each tree was estimated from the calculated merchantable height, less a 1-foot stump. Volume in cords was calculated following the volume methods outlined below.

Board-Foot Volume

Once merchantable height and DBH was known, board-foot volume of sawlog and chip-n-saw trees could be calculated. The appropriate log rule was selected based on the species and product. A formulation of Mesavage and Girard's form class tables (Wiant and Castaneda 1977) was used to calculate board-foot volume, in the appropriate log rule, in form class 78. To be consistent with the prior inventory (conducted in 1997) on nearby installations, form class 78 was used to calculate hardwood sawlog board-foot volume, and form class 80 used to calculate softwood sawlog and chip-n-saw board-foot volume. The estimate of board-foot volume was adjusted upward by 3 percent for each deviation above form class 78 (Avery and Burkhardt 2002) as necessary for softwood species. This is an acceptable method when used for a relatively narrow range of form classes, as in this case (Brooks and Goerlich 2000).

Weight

To calculate the weight of wood in the merchantable portions of the trees, it was necessary to first tabulate cubic volume. Equations developed by Clark et al. (1991) were used to estimate the inside-bark volume in cubic feet (ft³) between a 1-foot stump and the tree's merchantable height, and were corroborated using the NVEL (Wang 2013). Using values provided by Miles and Smith (2009), the volume of bark was calculated and added to the volume of wood. This volume was used to calculate the number of cords, using a conversion rate of 80 ft³ of solid wood and bark to each cord. Miles and Smith (2009) also provided coefficients for calculating the green weight of wood and bark from cubic volume.

Inventory Data

Methods consistent with variable radius point double sampling where the measure plots are a subset of the count plots were used to summarize the inventory data.

- Horvitz-Thompson estimators were used to summarize non-volume and non-weight variables (such as basal area and trees per acre).
- Ratio of means (volume/weight to basal area) estimators were used to summarize volume and weight.
- Variance and sampling error for volume and weight variables was calculated using the variance of residuals method (Gregoire and Valentine 2008), and cross-checked using the covariance method.
- Small differences in volume and weight totals across categories were ignored, as non-additivity across subcategories is a feature of ratio estimators (Oderwald 1994).
- Quadratic mean diameter was estimated from stand, compartment, and forest type total basal area and trees per acre.

- Total height was estimated using non-linear regression of height on DBH from observations at the measure plots. Lorey's mean (basal-area weighted) height was calculated using the trees selected by variable radius sampling (Husch et al. 2003).
- Site index values were generated empirically based on tree height (as calculated above), tree DBH, and tree age for a representative dominant species (generally loblolly pine, but hardwood species were used as appropriate) and were calculated from coefficients presented in Carmean et al. (1989, p. 125). **Appendix C** presents geographically appropriate site index curve figures for loblolly pine and sweetgum for management reference.

Market Value

Market values were applied to sawtimber and chip-n-saw products using volume (board-foot) estimates and average stumpage prices in the appropriate log rule, for the appropriate region. Pulpwood prices were applied to weighted estimates of pulpwood products, again using average values for the appropriate region. All prices were obtained from the *Timber Mart-South 2nd Quarter, 2014* publication of Virginia stumpage prices, reported for Region 2. Pine sawtimber prices were applied to all species of softwood sawtimber, and pine chip-n-saw prices were applied to all species of softwood chip-n-saw timber. Oak sawtimber prices were applied to all species of oak sawtimber, and mixed hardwood sawtimber prices were applied to all other species of hardwood sawtimber. Pine pulpwood prices, by ton, were applied to the weight estimates of softwood pulpwood, and hardwood pulpwood prices were applied to estimates of hardwood pulpwood in a similar fashion.

Growth Rates

Unlike other nearby installations, prior inventory data were unavailable to use as a baseline for estimating forest growth. Thus, the Forest Vegetation Simulator Southern Variant (FVS-SN), a peer-reviewed model using regionally calibrated growth models that cover eastern Virginia, was used to estimate stand growth over 10 years. The model was calibrated to local conditions using plot-specific information, and model results were evaluated against the United States Forest Service's Forest Inventory and Analysis databases to ensure growth rates were within the range of local observations.

The inventory data was entered into the model and, after calibration as described above, "grown forward" for 10 years in the model. The model accounts for various factors such as site productivity, stand density, and species interaction. The change in quadratic mean stand diameter was compared at the time of inventory to the value modeled 10 years later using the formula:

$$Growth (\%) = \frac{V_2 - V_1}{n * V_1}$$

Where

V_2 = the measurement at the end of the period of interest

V_1 = the measurement at the beginning of the period

n = the number of years in the period of interest

The growth increment for the trees in these stands projected by the model was then used to estimate stand-level growth rates for each stand at DNA.

2.3 Fuel Moisture and Fuel Loading Assessment Methods

2.3.1 Fuel Loading Assessment

Surface fuel loading was quantified using a combination of field-based fuel transects and *Photograph Series Guides*.

Field Based Transects

Surface fuel loading was assessed on two random azimuth 11.3 m transects at the intensive sampling plots using the line-intercept method (van Wagner 1968; Brown 1974). For each transect, 1-hour (0–0.64 centimeter [cm]) and 10-hour (0.64–2.54 cm) fuels were sampled from 0 to 2 m, 100-hour (2.54–7.62 cm) fuels from 0–3 m, and

1,000-hour (greater than 7.62 cm) and larger fuels from 0 to 11.3 m on each transect. Duff and litter depth in cm were measured at 3 m and 10 m on each transect. Fuel depth (cm) was measured at two points along each transect (Stephens and Moghaddas 2005). From these measurements, surface and ground fuel loads were calculated using appropriate equations using the Brown's Planer Intercept Method (Brown 1974). Fuel loading data were summarized by forest cover type and stand in English units with 90 percent confidence intervals.

Plot Photograph Series

On each intensively sampled plot, the dominant fuel model (Scott and Burgan 2005) was classified using the appropriate *Photograph Series Guides* for the vegetation types present (Ottmar et al. 2000, 2003). The *Photograph Series Guides* allow the user to compare field conditions and field photographs with a systematic visual guide to determine the fuel type at a given plot. Plot photographs were used to help identify fuel types not represented within the *Photograph Series Guides*, if necessary. Four high-quality digital photographs were taken at each intensively sampled plot (one in each of the cardinal directions from plot center). The plot locations are identified with each photograph and are provided electronically in **Appendix F**.

Fuel Moisture Assessments

Fuel moistures were quantified using archived weather streams from local remote access weather stations (RAWS) using the Fire Family Plus Program (United States Department of Agriculture [USDA] 2009; Main et al. 1990). Three RAWS stations are within the vicinity of the inventory area (Mesowest 2014), which allowed for detailed fuel moisture calculations for several fuel classes from a broad data source. The three nearest RAWS with archived fuel moisture data are Back Bay, Virginia (Station Number 449905); Great Dismal Swamp NWR, Virginia (Station Number 449801); and Elizabeth City, North Carolina (Station Number 311503). Each of these RAWS is approximately 50 kilometers (km) or less from the project areas (**Table 2**). These stations were identified from a RAWS location maps (Desert Research Institute 2014) as well as other GIS data from Mesowest (2014). Typical data collected and used from RAWS stations include wind speed and direction, precipitation, air temperature, relative humidity, and fuel moisture. The full range of available data for each station was downloaded using the Kansas City Fire Access Software web portal (KCFAST 2014). Station metadata and weather data were imported into a database using Fire Family Plus version 4.0 (Main et al. 1990).

The climatology report feature of Fire Family Plus was used to create summary statistics and graphs for daily and monthly 1-hour, 10-hour, 100-hour, 1,000-hour, live woody, and herbaceous fuel moistures. Data from each station were then imported into a separate Microsoft Excel spreadsheet. The fire weather conditions specified as graphing thresholds in Fire Family Plus were 90th percentile (only 10 percent of values are lower) and 97.5th percentile (only 3 percent of values are lower). Outputs were saved as image files (.jpg) and presented in **Appendix G**. In addition to data summarized from each station listed above, a special interest group was created in Fire Family Plus that combines weather data from all three stations. The data for this unique fourth RAWS were summarized in the same way described above.

This historical fuel moisture data can be used in conjunction with real time RAWS data to assess period of potential high fire danger as well plan prescribed burn and other vegetation management activities.

- Real-time data streamed from RAWS stations can be viewed via the Real Time Observation and Monitor Network "ROMAN" (<http://raws.wrh.noaa.gov/roman/>).
- Detailed daily weather forecasts for the Virginia Beach area, including DNA, can be found here: (<http://forecast.weather.gov/>).
- The most up-to-date trends from the RAWS stations, including forecasts, 7-day, and monthly trends, and other data can be viewed at the links provided for each station in **Table 2**. Historical data can be downloaded here (<https://fam.nwcg.gov/fam-web/kcfast/html/wxhmenu.htm>) by entering the Station Identification Number provided in **Table 2**.

All of these data sources can be used in conjunction with long-term and recent weather trends to determine potential windows for implementation of various vegetation management activities.

TABLE 2
Remote Access Weather Stations
Remote Access Weather Stations

Station Name	Station Identification Number	Years of Data Available and Assessed	Current Weather Trend Viewing	Distance from RAWS (kilometers):
				DNA
Back Bay, Virginia	449905	1997-2014	http://www.raws.dri.edu/cgi-bin/rawMAIN.pl?txVBAC	11.38
Great Dismal Swamp NWR, Virginia	449801	2006-2014	http://www.raws.dri.edu/cgi-bin/rawMAIN.pl?txVGDR	56.11
Elizabeth City, North Carolina	311503	2006-2014	http://www.raws.dri.edu/cgi-bin/rawMAIN.pl?laNELI	30.28

Source: Desert Research Institute. 2014. *RAWS USA Climate Archive*. Downloaded from www.raws.dri.edu. Accessed 07/15/2014

2.3.2 Geodatabase Development and Management

Geodatabase File System

A template geodatabase and documentation were provided on December 16, 2014, by the GIS POC and were used as the basis for determining which database feature classes and tables could be updated. This report includes two ESRI ArcGIS file geodatabases as follows.

- **'Forest_Inventory_Stands_Compliant.gdb'**, adheres to the United States Navy SDSFIE 3.01 Data Model. As appropriate, previous geographic and tabular data from the prior cruises were updated, and data from the data collection and analysis components of this project were loaded into the feature classes below. The updated compliant data can be linked to the supplemental data described below using the 'Linking Attribute Keys', if desired. Detailed information on the attribute fields used to link field data with data in the geodatabase, and on the attribute tables in general and associated attribute fields that were updated are provided in **Appendix B**, Tables B-2 through B-7. The compliant feature classes within the NaturalResources feature dataset are as follows:
 - ForestStand – Navy-specified feature class containing stand polygons for DNA stands created for the 2014 inventory, and the specified fields (see Table B-2). Linking Attribute Key: forestStandIDPK.
 - NaturalResourceSurveyP - Navy-specified feature class containing approximate inventory point locations from the 2014 inventory for the DNA installation, and specified fields (Table B-3). Linking Attribute Key: naturalResourceSurveyIDPK.

Note that the "dataTableNames" fields were not populated because of the abundance of additional external noncompliant feature classes and tabular data as described below.

- **'Forest_Inventory_Stands.gdb'**, contains additional geographic and tabular data as was requested in the scope of work, but which did not have a specific placeholder within the Navy SDSFIE 3.01 data model (that is, feature class, table, or field). The tables and brief descriptions below outline this supplementary information and how to associate it with the existing compliant Navy feature classes, and supplemental data, using the 'Linking Attribute Keys', if desired. Additional detailed supplementary information are provided in **Appendix B**, Tables B-2 through B-7, as follows:
 - Table B-2. Crosswalk between fields in the compliant ForestStands feature class, populated with geometry and information that are relevant to the Navy-specified fields, and the SIG-supplied feature classes (DNA_Stands).
 - Table B-3. Crosswalk between fields in the compliant NaturalResourceSurveyP feature class, populated with geometry and information that are relevant to the Navy-specified fields, and the SIG-supplied feature classes (DNA_Inv_Plots).
 - Table B-4. Crosswalk between fields in the supplemental stands feature classes (DNA_Stands) that contain installation-specific geometry and data about stands from the inventory not explicitly contained in the Navy geographic data model for stands (ForestStands).
 - Table B-5. Crosswalk between fields in the supplemental plot feature classes (DNA_Inv_Plots) that contain installation-specific geometry and data about plots used in the inventory not explicitly contained in the Navy geographic data model (NaturalResourceSurveyP).
 - Table B-6. Description of supplemental tables and relationship classes provided in the noncompliant geodatabase and fields that can be used to link tabular data to geospatial data in the appropriate feature classes.
 - Table B-7. Table of additional metadata describing non-geospatial tables contained in noncompliant geodatabase.

- Feature classes in the NaturalResources feature dataset include:
 - DNA_Stands – Supplemental polygon feature classes for DNA and additional variables from the 2014 DNA forest inventory. See Table B-4 (and metadata associated with feature class) for detailed description. Linking Attribute Keys: forestStandIDPK, STAND_ID.
 - DNA_Inv_Plots – Supplemental point feature classes showing approximate locations of variable radius sample plots and fuel transect locations from the 2014 DNA forest inventory. See Table B-5 (and metadata associated with feature class) for detailed description. Linking Attribute Keys: naturalResourceSurveyIDPK, STAND_ID, PLOT_ID.
- File geodatabase tables include:
 - DNA_Point_Sample – Supplemental tables describing information about the points at which trees were sampled at DNA in the 2014 forest inventory. Linking Attribute Keys: STAND_ID, POINT_ID.
 - DNA_Tree_List – Supplemental tables containing the complete list of sampled trees and their characteristics to measure basal area and volume at DNA in the 2014 forest inventory. Linking Attribute Keys: STAND_ID, POINT_ID.
 - DNA_Site_Tree – Supplemental tables containing the complete list of sampled trees and their characteristics to measure site index at DNA in the 2014 forest inventory. Linking Attribute Keys: STAND_ID, POINT_ID.
 - DNA_Fuel_Load – Supplemental tables containing the mean fuel loading by forest type at DNA as sampled in the 2014 forest inventory. Linking Attribute Keys: Tree_Type.
 - DNA_Value_Per_Acre_By_Species – Supplemental table containing the mean dollar value per acre by species for stands at DNA as sampled during the 2014 forest inventory. Linking Attribute Keys: Std_ValID.
 - DNA_Table_Metadata – (see also Table B-7 and metadata associated with tables) Supplemental table containing detailed descriptions of the fields in each installation’s Point_Sample, Tree_List, Site_Tree, Value_Per_Acre_By_Species, and Fuel_Load tables.
- File geodatabase relationship class names include:
 - DNA_Stand_Plot – Supplemental relationship class linking the installation stand feature class and Inv_Plots tables.
 - DNA_Plot_Tree – Supplemental relationship class linking the installation Inv_Plots tables and the Tree_List tables.
 - DNA_Plot_SiteTree – Supplemental relationship class linking the installation Inv_Plots and Site_Tree tables.
 - DNA_Stand_Value – Supplemental relationship class linking the installation Stands feature classes and the Value_Per_Acre_By_Species tables.
 - DNA_Stand_Fuel_Load – Supplemental feature class linking the installation Stands feature classes and the Fuel_Load tables.

Note: For detailed descriptions of the table and relationship classes, see Table B-6.

Feature update and projection procedures

As part of the 2014 forest inventory development update, SIG personnel reviewed the available printed and digital data from DNA, and visited each stand delineated for the inventory. SIG personnel created the new boundaries of each stand. SIG personnel created the stand boundary geometry in the feature classes using field notes and available remotely sensed data (typically, 75 millimeter [mm] resolution color aerial photographs acquired in March 2011). Non-contiguous stands of similar characteristics, separated by short distances, may have

been assigned the same stand number. The existing geospatial data was provided by the GIS POC in a series of installation-specific geodatabases in WGS_1984_UTM_Zone_18N projection; the same projection required for geospatial data deliverables in the scope of work. The projection details are as follows:

Projection details for WGS_1984_UTM_Zone_18N

WKID: 32618 Authority: EPSG
 Projection: Transverse_Mercator
 False_Easting: 500000.0
 False_Northing: 0.0
 Central_Meridian: -75.0
 Scale_Factor: 0.9996
 Latitude_Of_Origin: 0.0
 Linear Unit: Meter (1.0)
 Geographic Coordinate System: GCS_WGS_1984
 Angular Unit: Degree (0.0174532925199433)
 Prime Meridian: Greenwich (0.0)
 Datum: D_WGS_1984
 Spheroid: WGS_1984
 Semimajor Axis: 6378137.0
 Semiminor Axis: 6356752.314245179
 Inverse Flattening: 298.257223563

Point location and field data collection

The sampling scheme used a randomly established, systematic grid overlaid on the installation. To collect field data, a Microsoft Excel tool was used to generate Universal Transverse Mercator (UTM) coordinates corresponding with the corners of the grid cells. The coordinates were in UTM Zone 18N, the projection of the supplied geospatial data from the 1997 forest inventories at other Navy bases sampled for this project, and that required for the geospatial deliverables. The coordinates created by the tool are based on a cell size established to allocate the appropriate number of sample locations in the forested area of each installation to meet statistical accuracy goals. The point sample coordinates (that is, waypoint locations) were uploaded to a Garmin GPSMap 62st handheld global positioning system (GPS) unit set to use the WGS84 geographic coordinate system and UTM Zone 18N projection. That unit was used to navigate to each point in the field with an accuracy of 2 to 4 m as stated by the unit. For points that needed to be relocated because of field conditions (for example, stand boundary changed, too close to stand boundary, etc.), they were relocated a distance of up to one-half the original plot spacing in a manner to avoid edge effects and bias. The GPS was used to collect the location of the relocated plot, and no post-processing was done on the geospatial data associated with those relocated plots. Less than 10 percent of the final plots were plots that had to be relocated in this manner. Otherwise, the GPS was not used to collect geometry data that was represented in the geodatabase deliverables. The plot locations represented in the compliant and noncompliant geodatabases are thus those laid out in the original grid that were able to be located and sampled in the field, supplemented the small number of points that needed to be relocated whose location was collected by GPS.

3 DNA Inventory Summaries

3.1 Forest Resource Summary

The origin of many of the forest stands at DNA was through natural colonization of abandoned agricultural fields by pioneer species such as loblolly pine, natural succession of areas inundated with water for long periods, and to a lesser degree through direct planting. The 1997 inventory report from nearby Naval Air Station Oceana (Geo Marine 1998), noted that much of the forest resource there was already transitioning to hardwood from the early domination by loblolly pine. In the absence of forest management activity or natural disturbances, this transition is expected as species more tolerant of shade than loblolly pine become established in the understory and gradually increase in volume and importance in the stands. These species include oaks (*Quercus* spp.), sweetgum (*Liquidambar styraciflua*), and, to some degree, red maple (*Acer rubrum*). Table 3 shows the 2014 forest cover type distribution in terms of acreage and as a percent of total acreage. DNA stands have continued a transition to

a greater component of hardwood mixed with loblolly pine. In 2014, only 12 percent of the acreage has a pure loblolly pine composition and 74 percent of the acreage is hardwood dominated.

TABLE 3
DNA Forest Type Summary of Inventoried Forested Acres (Total Acreage, Percent of Total)

Forest Type	Acres	% of Total Area
Hardwood (H)	352	50%
Hardwood - Pine (HP)	173	24%
Pine (P)	87	12%
Pine - Hardwood (PH)	98	14%
Total	710	

Looking more closely at the composition of the species and commercial products (expressed by weight), the field crew found that loblolly pine makes up 32 percent of the total weight, with sweetgum, bald cypress, red oak, red maple, and other small diameter hardwoods (pulpwood) comprising the majority of the forest resource at DNA (**Table 4**). A similar relationship holds when the market value of the timber resource is considered (**Table 4**). Loblolly pine represents 52 percent of the total market value of the current timber resource of DNA.

TABLE 4
DNA Stocking class distribution by total weight (in tons) and total market value (\$)

Stock Class	Total Weight (t)	Total \$ Value
loblolly pine sawtimber	18,274	646,491
hardwood pulpwood	13,887	98,741
sweetgum sawtimber	9,099	175,558
bald cypress sawtimber	4,272	82,433
soft maple sawtimber	3,768	69,322
chip-n-saw	2,994	66,880
red oak sawtimber	1,390	35,366
laurel oak sawtimber	916	17,031
black gum sawtimber	635	9,427
softwood pulpwood	600	7,878
swamp chestnut		
oak sawtimber	208	5,289
tulip-poplar sawtimber	161	3,107
green ash sawtimber	67	1,237
unknown hardwood sawtimber	67	1,237
willow oak sawtimber	38	731

Recent evidence of silvicultural treatments was not observed on any of the stands (apart from several potential stands containing planted but sub-merchantable size trees). Generally, the stands have been allowed to develop without direct forest management interventions. As such, natural stand dynamics such as mortality through

disease, insect infestation, and competition have altered stand composition in recent years. When evaluated against typical forest stand stocking tables, the data presented below show that the absence of forest management has led to stands that are considered “overstocked” and are not being maximized for the commercial potential (including quality), particularly for the most valuable species such as loblolly pine and red oak sawtimber. The average stocking expressed in basal area is over 151 square feet per acre (ft²/ac) – which is considered fully stocked for both pine and hardwood types. Silviculture is generally employed to direct the trajectory of a stand to promote conditions that favor commercially desirable species and maximize growth rates and quality of residual trees. The development of a detailed management plan would be required to identify specific management objectives for each stand or groups of stands. The data presented here are designed to provide natural resource managers with detailed information to make management decisions regarding the timber resource.

Comprehensive data on the DNA forest inventory are provided below in a series of tables. Each table is described in detail with references to the location. For the most detailed tables, these are provided in **Appendices H through J**.

- **Summary Tables.** These tables provide a general overview of data summarizing the forestland at the installation, compartment, forest type, and stand level. Reported are average per acre and total values for variables of interest like tree count, volume, and value each by product class and species group; and at the stand level, summary variables illustrating the productivity, character, and condition of the woodland like age, area, and productivity.
 - **Table 5. Entire Forest Summary – DNA.** This table summarizes, at the installation level, basal area and number of trees; volume and weight by hardwood/softwood and product category (sawtimber, chip-n-saw, and pulpwood); and value, both per acre and for the entire installation. Total area is provided as well. Installation means and totals are based on stratification by forest type.
 - **Table 6. Forest Cover Type Summary – DNA.** This table summarizes, at the forest type level, basal area and number of trees; volume and weight by hardwood/softwood and product category (sawtimber, chip-n-saw, and pulpwood); and value, both per acre and for the entire installation.
- **Appendix H. DNA Stand Summary Table.** This table summarizes, at the stand level, basal area and number of trees; volume and weight by hardwood/softwood and product category (sawtimber, chip-n-saw, and pulpwood); and value, both per acre and for the entire installation. Additional variables describing the inherent productivity, character, and condition of the stand such as site index species, site index, growth, forest type, age, and size class are reported.
- **Appendix I. DNA Statistical Summary Table.** This table provides sampling error for overall quadratic mean diameter, and basal area, volume, and weight for hardwoods, softwoods, and product categories (sawtimber, chip-n-saw, and pulpwood). Sampling error is reported as the 90 percent confidence limit half-width expressed as a percent of the mean, for each compartment, forest type, and installation. Installation sampling error is stratified based on forest type.
- **Appendix J. DNA Stock Tables.** These tables provide information on how volume, weight, and value are distributed among various species, product classes, and tree diameter classes at the installation, compartment, forest type, and stand level.
 - **Table J-1. DNA Forest Installation Stock Tables.** These tables summarize at the installation level, for each stock class (hardwood pulpwood, softwood pulpwood, chip-n-saw, and sawtimber by species) and 2-inch DBH class, the mean number of trees per acre, mean basal area per acre (ft²/ac), mean volume per acre (cords for pulp, board-feet Doyle log rule for hardwood sawlog volume, or board-feet International 0.25-inch log rule for softwood sawlog and chip-n-saw volume), and mean weight per acre (short tons, green volume basis, wood and bark in merchandised portion of tree); as well as the total number of trees and total weight using the above units, and total value. Installation means and totals are based on stratification by forest type, and thus vary from totals aggregated from compartment subtotals.

- **Table J-2. DNA Forest Compartment Stock Tables.** These tables summarize at the compartment level, for each stock class (hardwood pulpwood, softwood pulpwood, chip-n-saw, and sawtimber by species) and 2-inch DBH class, the mean number of trees per acre, mean basal area per acre (ft²/ac), mean volume per acre (cords for pulp, mean board-feet Doyle log rule for hardwood sawlog volume, or board-feet International 0.25-inch log rule for softwood sawlog and chip-n-saw volume), and mean weight per acre (short tons, green volume basis, wood and bark in merchandised portion of tree); as well as the total number of trees and total weight using the above units, and total value. The total area of the compartment is also provided. No stratification is performed to arrive at means and totals at this hierarchical level.
- **Table J-3. DNA Forest Type Stock Tables.** These tables summarize at the forest type level, for each stock class (hardwood pulpwood, softwood pulpwood, chip-n-saw, and sawtimber by species) and 2-inch DBH class, the mean number of trees per acre, mean basal area per acre (ft²/ac), mean volume per acre (cords for pulp, board-feet Doyle log rule for hardwood sawlog volume, or board-feet International 0.25-inch log rule for softwood sawlog and chip-n-saw volume), and mean weight per acre (short tons, green volume basis, wood and bark in merchandised portion of tree); as well as the total number of trees and total weight using the above units, and total value. The total area of the type contained in the installation is also provided.
- **Table J-4. DNA Forest Stand Stock Tables.** These tables summarize at the forest stand level, for each stock class (hardwood pulpwood, softwood pulpwood, chip-n-saw, and sawtimber by species) and 2-inch DBH class, the mean number of trees per acre, basal area per acre (ft²/ac), mean volume per acre (cords for pulp, board-feet Doyle log rule for hardwood sawlog volume, or board-feet International 0.25-inch log rule for softwood sawlog and chip-n-saw volume), and mean weight per acre (short tons, green volume basis, wood and bark in merchandised portion of tree); as well as the total number of trees and total weight using the above units, and total value. The total area of the stand is also provided.

TABLE 5
Entire Forest Summary – DNA

Installation acres	710.14
Basal area (BA, sq. ft.)/acre	151.3
Hardwood BA/acre	97.9
Softwood BA/acre	53.4
Trees/acre	194
QMD (inches) ²	12.0
Average height ³	68.6
Sawtimber BA/acre	82.0
Hardwood sawtimber BA/acre	45.6
Softwood sawtimber BA/acre	36.4
Sawtimber volume (board-feet)/acre	9,883
Hardwood sawtimber volume (board-feet)/acre	4,264
Softwood sawtimber volume (board-feet)/acre	5,620
Sawtimber tons/acre	55.5
Hardwood sawtimber tons/acre	29.8
Softwood sawtimber tons/acre	25.7
Sawtimber \$/acre	\$1,493.55

TABLE 5
Entire Forest Summary – DNA

Chip-n-saw BA/acre	13.7
Chip-n-saw volume (board-feet)/acre	805
Chip-n-saw tons/acre	4.2
Chip-n-saw \$/acre	\$94.18
Pulp BA/acre	55.6
Hardwood pulp BA/acre	52.4
Softwood pulp BA/acre	3.2
Pulp volume (cords) per acre	9.8
Hardwood pulp volume (cords)/acre	9.4
Softwood pulp volume (cords)/acre	0.4
Pulp tons/acre	20.4
Hardwood pulp tons/acre	19.6
Softwood pulp tons/acre	0.8
Pulp \$/acre	\$150.14
Total \$/acre	\$1,737.86
Total number of trees	137,550
Total sawtimber volume (board-feet)	7,018,374
Total hardwood sawtimber volume (board-feet)	3,027,687
Total softwood sawtimber volume (board-feet)	3,990,687
Total sawtimber tons	39,415.2
Total hardwood sawtimber tons	21,104.4
Total softwood sawtimber tons	18,274.7
Total sawtimber \$	\$1,060,627.05
Total chip-n-saw volume (board-feet)	571,625
Total chip-n-saw tons	2,994.2
Total chip-n-saw \$	\$66,880.08
Total pulp volume (cords)	6,985.2
Total hardwood pulp volume (cords)	6,693.0
Total softwood pulp volume (cords)	292.2
Total pulp tons	14,487.2
Total hardwood pulp tons	13,887.7
Total softwood pulp tons	599.5
Total pulp \$	\$106,619.18
Total \$	\$1,234,126.31

TABLE 6.
Forest Cover Type Summary – DNA. P = Pine (> 75% pine basal area); PH = Pine-Hardwood (50-75% pine basal area); H = Hardwood (<25% pine basal area); HP = Hardwood-Pine (25-49% pine basal area).

Forest type	H	HP	PH	P
Acres	352.26	172.92	98.05	86.91
Basal area (BA, sq. ft.)/acre	152.5	141.5	166.1	149.5
Hardwood BA/acre	133.0	88.7	62.0	14.7
Softwood BA/acre	19.5	52.8	104.1	134.7
Trees/acre	192	169	222	216
QMD (inches)	12.1	12.4	11.7	11.3
Average height	69	70	69	66
Sawtimber BA/acre	85.1	81.4	85.4	67.1
Hardwood sawtimber BA/acre	68.2	36.0	16.6	5.8
Softwood sawtimber BA/acre	16.9	45.4	68.8	61.3
Sawtimber volume (board-feet)/acre	9,012	10,321	12,163	9,971
Hardwood sawtimber volume (board-feet)/acre	6,405	3,319	1,558	518
Softwood sawtimber volume (board-feet)/acre	2,607	7,002	10,605	9,454
Sawtimber tons/acre	56.7	55.0	59.7	46.9
Hardwood sawtimber tons/acre	44.8	22.9	11.1	3.6
Softwood sawtimber tons/acre	11.9	32.1	48.6	43.3
Sawtimber \$/acre	\$1,295.20	\$1,583.21	\$1,951.98	\$1,601.86
Chip-n-saw BA/acre	2.0	6.8	29.3	57.1
Chip-n-saw volume (board-feet)/acre	118	400	1,722	3,360
Chip-n-saw tons/acre	0.6	2.1	9.0	17.6
Chip-n-saw \$/acre	\$13.77	\$46.86	\$201.51	\$393.16
Pulp BA/acre	65.4	53.3	51.5	25.3
Hardwood pulp BA/acre	64.8	52.8	45.4	8.9
Softwood pulp BA/acre	0.5	0.6	6.1	16.3
Pulp volume (cords) per acre	11.7	9.7	9.1	3.6
Hardwood pulp volume (cords)/acre	11.6	9.6	8.3	1.5
Softwood pulp volume (cords)/acre	0.1	0.1	0.8	2.1
Pulp tons/acre	24.1	20.2	19.0	7.4
Hardwood pulp tons/acre	24.0	20.1	17.4	3.1
Softwood pulp tons/acre	0.1	0.1	1.6	4.2
Pulp \$/acre	\$172.18	\$144.70	\$144.51	\$77.97
Total \$/acre	\$1,481.15	\$1,774.77	\$2,297.99	\$2,072.98

TABLE 6.
Forest Cover Type Summary – DNA. P = Pine (> 75% pine basal area); PH = Pine-Hardwood (50-75% pine basal area); H = Hardwood (<25% pine basal area); HP = Hardwood-Pine (25-49% pine basal area).

Forest type	H	HP	PH	P
Total number of trees	67,768	29,230	21,751	18,801
Total sawtimber volume (board-feet)	3,174,474	1,784,740	1,192,543	866,616
Total hardwood sawtimber volume (board-feet)	2,256,096	573,869	152,741	44,980
Total softwood sawtimber volume (board-feet)	918,377	1,210,872	1,039,802	821,636
Total sawtimber tons	19,983.1	9,504.1	5,854.9	4,073.1
Total hardwood sawtimber tons	15,777.6	3,959.1	1,093.2	310.6
Total softwood sawtimber tons	4,205.6	5,545.0	4,761.6	3,762.6
Total sawtimber \$	\$456,248.66	\$273,769.49	\$191,391.52	\$139,217.38
Total chip-n-saw volume (board-feet)	41,457	69,250	168,870	292,048
Total chip-n-saw tons	217.2	362.7	884.6	1,529.8
Total chip-n-saw \$	\$4,850.51	\$8,102.19	\$19,757.81	\$34,169.58
Total pulp volume (cords)	4,104.7	1,676.1	890.3	314.1
Total hardwood pulp volume (cords)	4,080.4	1,664.0	814.4	134.2
Total softwood pulp volume (cords)	24.4	12.2	75.8	179.8
Total pulp tons	8,488.1	3,498.1	1,860.9	640.1
Total hardwood pulp tons	8,438.1	3,473.1	1,705.3	271.1
Total softwood pulp tons	50.0	25.0	155.6	369.0
Total pulp \$	\$60,652.08	\$25,022.03	\$14,169.00	\$6,776.06
Total \$	\$521,751.25	\$306,893.71	\$225,318.32	\$180,163.02

QMD is quadratic mean diameter, the diameter of the tree of average basal area

Average height is Lorey's mean height (BA-weighted height), the arithmetic average of the trees selected by variable radius point sampling. Site index (SI) values are all reported with base age of 50, and growth is calculated from Δ Mean Stand Diameter, a method more robust than counting rings on individual trees.

Size class is assigned based on majority basal area, and can take the values sawtimber, chip-n-saw, or pulpwood.

3.2 Forest Management Opportunities

Access to forest stands for management activities is quite good throughout DNA. Several areas held standing water throughout the spring inventory (March 2014), however, and access to these sites is uncertain. The site index is high throughout DNA, indicating good productivity and the potential for high growth rates. Stands with high site indices can be used to guide management priorities. **Appendix C** presents site index curves for loblolly pine appropriate to the coastal plain of Virginia (Carmean et al. 1989) that can be used to estimate maximum height growth expected based on the site indices presented in **Table 3**, **Table 4** and **Appendix H**. A number of silvicultural practices could be employed to reduce stocking density and improve the residual tree quality, particularly where high value hardwoods such as red oak are present. The maintenance of loblolly pine in future stands will require deliberate practices to regenerate this species through planting or natural regeneration in an even-aged system (such as clearcut or seed tree harvests). The fuel and moisture data presented below can also be used in decision-making regarding both the threat of high-severity wildfire and the use of prescribed fire to achieve management objectives.

3.2.1 Next Steps

1. Identify management objectives for DNA forest cover types based on forest inventory results and resource priorities.
2. Develop forest resource management plan based on specific management objectives for each forest type.
3. Evaluate role of prescribed fire as a management tool using fuel moisture and fuel loading data.
4. Implement forest resource management plan.

3.3 Fuel Moisture and Fuel Loading Summaries

3.3.1 Fuel Moisture

For each RAWS station (**Table 2**), figures presented in **Appendix G** (Figures G-1 through G-18) are shown on an annual basis, including the average, maximum, and minimum trends: 1-hour, 10-hour, 100-hour, woody, and herbaceous fuel moistures. The data across these different fuel classes over the three RAWS stations and combined data from these stations give a complete profile of fuel moisture characteristics for each facility in the Inventory Area. Data are classified to the stand level at DNA in the corresponding geodatabase created based on these data.

3.3.2 Assessment of Surface Fuel Loading

For total fuel loadings (**Table 7A** and **Table 7B**), the hardwood and hardwood-pine type generally had the lowest surface fuel loading and the pine types had the highest. Within individual fuel classes, the combined 1-, 10-, and 100-hour fuel class, which typically carries the flaming front in wildland and prescribed fires (Marshall et al. 2008), averaged 1.5 tons per acre, with the exception of the hardwood-pine type, where it was 0.8 ton per acre. The 1,000-hour rotten and sound material fuels were found at low levels across all vegetation types. The 1,000-hour sound material fuel peaked at 1.9 tons per acre in the pine-hardwood type and rotten material at 1.3 tons per acre in the pine types. Total average fuel depths were similar across all vegetation types. The average 1-, 10-, and 100-hour fuel loadings at DNA were comparable or lower than fuel loadings previously reported for loblolly (*Pinus taeda*) and shortleaf (*Pinus echinata*) pine stands that had undergone prescribed burns, which were effective at reducing fuel loads and related fire hazard (Waldrop et al. 2004; Mohr et al. 2004). While a detailed fire modeling assessment could be conducted in *FlamMap* (Finney 2006) to determine the geo-spatial distribution of the current fire hazard and risk, from the fuel loading data, it appears that current surface fuel loadings are generally low.

Table 7A
Summary of Fuel Depth, 1-, 10-, and 100-hour¹ Fuel Loadings with 90 Percent Confidence Interval by Vegetation Type - DNA

Vegetation Type	Number of Transects	Fuel Depth (Inches)	Fuel Depth-90% CI (+/-) (Inches)	1 Hour Fuel Load (Tons Per Acre)	1 Hour Fuel Load-90% CI (+/-) (Tons Per Acre)	10 Hour Fuel Load (Tons Per Acre)	10 Hour Fuel Load-90% CI (+/-) (Tons Per Acre)	100 Hour Fuel Load (Tons Per Acre)	100 Hour Fuel Load-90% CI (+/-) (Tons Per Acre)
Hardwood	10	1.8	0.3	0.06	0.02	0.5	0.2	1.3	0.5
Hardwood-Pine	8	2.1	0.5	0.08	0.03	0.4	0.2	0.4	0.3
Pine	8	2.3	0.4	0.08	0.01	0.5	0.1	1.1	0.7
Pine-Hardwood	6	2.2	0.5	0.08	0.02	0.4	0.2	1.0	0.6
All Vegetation Types	32	2.1	0.4	0.07	0.02	0.5	0.2	1.0	0.5

TABLE 7B
Summary of 1,000-Hour¹ Sound Material, 1,000-Hour Rotten Material, Litter, Duff, and All Fuel Types Combined with 90 Percent Confidence Interval by Vegetation Type - DNA

Vegetation Type	Number of Transects	1,000 Hour Sound Material Fuel Load (Tons Per Acre)	1,000 Hour Sound Material Fuel Load-90% CI (+/-) (Tons Per Acre)	1,000 Hour Rotten Material Fuel Load (Tons Per Acre)	1,000 Hour Rotten Material Fuel Load-90% CI (+/-) (Tons Per Acre)	Litter (Tons Per Acre)	Litter-90% CI (+/-) (Tons Per Acre)	Duff (Tons Per Acre)	Duff-90% CI (+/-) (Tons Per Acre)	All Fuel Types Combined (Tons Per Acre)	All Fuel Types Combined-90% CI (+/-) (Tons Per Acre)
Hardwood	10	0.2	0.3	0.6	0.6	1.7	0.2	2.5	0.4	7.0	1.2
Hardwood-Pine	8	0.9	1.0	0.3	0.4	1.8	0.1	3.8	1.1	7.7	2.1
Pine	8	0.6	0.7	1.3	0.6	2.1	0.2	5.1	1.3	10.8	2.3
Pine-Hardwood	6	1.9	1.5	1.3	0.7	1.7	0.2	3.7	0.8	10.1	2.1
All Vegetation Types	32	0.8	0.9	0.9	0.6	1.8	0.2	3.7	1.0	8.7	1.9

¹Dead fuel moisture responds to ambient environmental conditions and is critical in determining fire potential. Dead fuel moistures are classed by timelag. A fuel's timelag is proportional to its diameter and is loosely defined as the time it takes a fuel particle to reach 2/3 of its way to equilibrium with its local environment, i.e. lose 66% of its current moisture content. There are four timelag classes:

1-hour: Less than 0.25 inch diameter, fine fuels that respond quickly to weather changes.

10-hour: 0.25-1 inch diameter

100-hour: 1-3 inch diameter

1,000-hour: 3-8 inch diameter.

3.4 Fuel Load Models

For each forest cover type (hardwood, hardwood-pine, pine, and pine-hardwood), a representative photo and dominant fuel load model(s) as derived from field photos for all plots in that vegetation type are shown in **Figures 1** through **4**.

FIGURE 1
Representative Hardwood Stand (H) and Dominant Fuel Models - DNA



Fuel Model Name	Fuel Model Number	Fuel Model Abbreviation	Description
Low Load Broadleaf Litter	182	TL2	The primary carrier of fire in TL2 is broadleaf litter. Spread rate is very low; flame length very low.
Moderate Load Broadleaf Litter	186	TL6	The primary carrier of fire in TL6 is moderate load broadleaf litter, less compact than TL2. Spread rate is moderate; flame length low.

Source: Scott and Burgan, 2005

FIGURE 2
 Representative Hardwood-Pine (HP) Stand and Dominant Fuel Models - DNA



Fuel Model Name	Fuel Model Number	Fuel Model Abbreviation	Description
Moderate Load, Humid Climate Timber-Shrub	162	TU2	The primary carrier of fire in TU2 is moderate litter load with shrub component. High extinction moisture. Spread rate is moderate; flame length low.
Moderate Load, Humid Climate, Timber-Grass-Shrub	163	TU3	The primary carrier of fire in TU3 is moderate load litter, with grass and shrub components. High extinction moisture. Spread rate high; flame length moderate.
Moderate Load Broadleaf Litter	186	TL6	The primary carrier of fire in TL6 is moderate load broadleaf litter, less compact than TL2. Spread rate is moderate; flame length low.

Source: Scott and Burgan, 2005

FIGURE 3
 Representative Pine Stand (P) and Dominant Fuel Models - DNA



Fuel Model Name	Fuel Model Number	Fuel Model Abbreviation	Description
Moderate Load, Conifer Litter	183	TL3	The primary carrier of fire in TL3 is moderate load conifer litter, light load of coarse fuels. Spread rate is very low; flame length low.
Moderate Load, Broadleaf Litter	186	TL6	The primary carrier of fire in TL6 is moderate load broadleaf litter, less compact than TL2. Spread rate is moderate; flame length low.
Long Needle Litter	188	TL8	The primary carrier of fire in TL8 is moderate long-needle pine litter, May include small amount of herbaceous load. Spread rate is moderate; flame length low.

Source: Scott and Burgan, 2005

FIGURE 4
 Representative Pine Hardwood (PH) Stand and Dominant Fuel Models - DNA



Fuel Model Name	Fuel Model Number	Fuel Model Abbreviation	Description
Low Load, Broadleaf Litter	182	TL2	The primary carrier of fire in TL2 is low load broadleaf litter. Spread rate is very low; flame length is very low.
Moderate Load, Conifer Litter	183	TL3	The primary carrier of fire in TL3 is moderate load conifer litter, light load of coarse fuels. Spread rate is very low; flame length low.
Moderate Load Broadleaf Litter	186	TL6	The primary carrier of fire in TL6 is moderate load broadleaf litter, less compact than TL2. Spread rate is moderate; flame length low.

Source: Scott and Burgan, 2005

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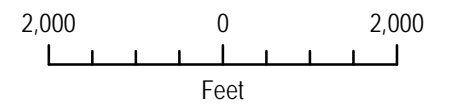
Appendix A

Installation Maps

DNA Forest Stands

Forest stand types are from field work conducted from 4/2014 – 5/2014 (plot centers shown); and stand boundaries are based on field review of 1997 forest inventory stand maps and GIS review of orthophotography dated 3/2011. No compartments were identified in prior inventory/GIS data. Non-contiguous stands of similar characteristics, separated by short distances, may have the same stand number.

Stand identification codes as follows:
Compartment # - Stand # / Type Code - Size Class Code



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□ Installation area

Forest inventory (2014) points

Plot Type

- ▲ Basal area
- Basal area/Height/Fuels

DNA Stands: Forest type

- H**ardwood: < 25% pine BA
- H**ardwood/**P**ine/: ≥25-< 50% pine BA
- P**ine/**H**ardwood/: ≥50-< 75% pine BA
- P**ine: ≥75% pine BA

Size class code	Code meaning	Stand average basal area criteria
4	sawtimber	majority of basal area in sawtimber size (dbh ≥13") trees
3	chip-n-saw	majority of basal area in chip-n-saw size (softwoods only: dbh ≥9-<13") trees
2	pulpwood	majority of basal area in pulpwood size (softwoods: dbh ≥6-<9"; hardwoods: dbh ≥6-<13") trees
1 (WL)	seedling/sapling (wildlife)	majority of basal area in trees <6" dbh

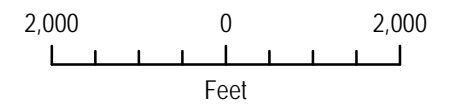
DNA Fuel Loading

Forest stand types are from field work conducted from 4/2014 – 5/2014 (plot centers shown); and stand boundaries are based on field review of 1997 forest inventory stand maps and GIS review of orthophotography dated 3/2011.

Fuel loading based on mean values for forest type. No compartments were identified in prior inventory/GIS data. Non-contiguous stands of similar characteristics, separated by short distances, may have the same stand number.

Stand identification codes as follows:

Compartment # - Stand # / Type Code - Size Class Code



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□ Installation area

● Forest inventory (2014) points

Plot Type

- ▲ Basal area
- Basal area/Height/Fuels

Fuel loading (all fuels)

- 7.0 tons/acre
- 7.7 tons/acre
- 10.1 tons/acre
- 10.8 tons/acre

Size class code	Code meaning	Stand average basal area criteria
4	sawtimber	majority of basal area in sawtimber size (dbh ≥13") trees
3	chip-n-saw	majority of basal area in chip-n-saw size (softwoods only: dbh ≥9-<13") trees
2	pulpwood	majority of basal area in pulpwood size (softwoods: dbh ≥6-<9"; hardwoods: dbh ≥6-<13") trees
1 (WL)	seedling/sapling (wildlife)	majority of basal area in trees <6" dbh

Appendix B

Geospatial Data

Table B-1. Comparison of prior polygons and new stand boundaries delineated by SIG personnel at DNA installation.

OID in geodatabase provided	Notes	New stand number
NOTE: Unlike NASO, NALFF, and NWA, DNA had no prior stands delineated as part of a comprehensive forest management plan. Prior stands were not assigned numbers; stand polygons in the GIS had only sequential ID numbers. Thus, those prior polygons' simple sequential ID number is being used as the reference in this table to allow for comparisons as were made for other installations.		
295	Most of polygon incorporated into new stand 8; small areas are now non-forest along western and northern edges.	8
296	Most of polygon incorporated into new stand 8 and a very small part into stand 9; some now mapped as non-forest.	8, 9
297	Most of polygon incorporated into new stand 9; some areas along western and northern edges now mapped as non-forest.	9
298	Most of polygon incorporated into new stand 7; some areas along western and northern edges now mapped as non-forest.	7
299	Most of polygon incorporated into new stand 7; some area along western edge now mapped as non-forest.	7
300	Northern part of polygon incorporated into stand 7, and southern parts incorporated into stand 10; some parts of the western and eastern sections are now mapped as non-forest.	7, 10
301	Most of polygon incorporated into stand 10; portions along western and southern edge now mapped as non-forest.	10
302	Polygon eliminated - non-forest	
362	Polygon eliminated - non-forest	
363	Central portion of polygon incorporated into stand 12; large sections of north and south now mapped as non-forest.	12
364	Most of polygon incorporated into stand 11; small area in the south now mapped as non-forest.	11
365	Most of polygon incorporated into stand 11; western edge now mapped as non-forest.	11
366	Most of polygon incorporated into stand 11; eastern part now mapped as non-forest.	11
367	Central portion of polygon incorporated into stand 13; western part mapped as stand 11. Northeastern and southern parts now mapped as non-forest.	11, 13
368	Small area of northern portion now part of stand 11. Small area of eastern portion incorporated into stand 14. Small areas of southern portion now mapped as stand 15. Most of central part of polygon now mapped as non-forest.	11, 14, 15
369	Almost all of polygon incorporated into stand 11. Very small portion along western edge now mapped as non-forest.	11
370	Most of polygon incorporated into stand 16. Small portions in the northerly part now mapped as non-forest.	16
371	Most of polygon incorporated into stand 17. Small areas along the western edge now mapped as non-forest.	17
372	Most of polygon incorporated into stand 16. Some area along the southern and southwestern edges now mapped as non-forest.	16
373	Polygon eliminated - non-forest	
374	Polygon eliminated - non-forest	
375	Most of polygon incorporated into stand 22. Boundaries revised significantly and central portion now mapped as non-forest.	22
376	Northern part of polygon incorporated into stand 19; eastern part incorporated into stand 21; and southern part now mapped as stand 20. Boundaries revised to reflect current edge of woodland.	19, 20, 21
377	Northern part of polygon incorporated into stand 18; much of southern and northwestern edges now mapped as non-forest.	18
378	Northern and southern parts of polygon incorporated into stand 18. Northern and central parts now mapped as non-forest.	18
379	Most of polygon incorporated into stand 18. Areas along northern and southern edges now mapped as non-forest.	18
380	Western and southern parts of this polygon now incorporated into stand 18. Majority of northeastern and central parts now mapped as non-forest.	18
381	Most of southern part of polygon incorporated into stand 31. Northwestern section now mapped as non-forest.	31
382	Polygon eliminated - non-forest	
383	Northwestern part of polygon incorporated into stand 30; eastern part incorporated into stand 32; and southwestern part into stand 31. Small areas along the northwestern, western, and southern edges now mapped as non-forest.	30, 31, 32
384	Polygon incorporated into stand 30.	30
385	Nearly all of polygon eliminated and mapped as non-forest except small area in northwestern section incorporated into stand 31.	31
386	Northern and central parts of polygon incorporated into stand 29. Southern and central sections, as well as areas along the northern edges, now mapped as non-forest.	29
387	Small portions of the northern and central parts of this polygon incorporated into stand 29; vast majority now mapped as non-forest.	29
388	Most of northern, central, and southern parts of polygon incorporated into stand 27. Large section in the northeast, and areas along the central and southern edges now mapped as non-forest.	27
389	Most of central and eastern part of polygon incorporated into stand 28. Areas along western edges now mapped as non-forest.	28
390	Polygon eliminated - non-forest	
391	Northeastern section of polygon incorporated into stand 25; southern part incorporated into stand 26; and northwestern part incorporated into stand 24. areas along the eastern, southern, and western edges now mapped as non-forest.	24, 25, 26
392	Most of polygon incorporated into stand 20; small areas along northern and northwestern edges now mapped as non-forest.	20

Table B-1 (continued). Comparison of prior stand boundaries and new stand boundaries delineated by SIG personnel at DNA installation.

OID in geodatabase provided	Notes	New stand number
393	Eastern and western parts of polygon incorporated into stand 23; southeastern edge incorporated into stand 24. Most of central part of polygon, and areas along the northeasterly and westerly edges now mapped as non-forest.	23, 24
394	Polygon eliminated - non-forest	
395, 727	These are duplicate polygons. Northeastern and southern portions incorporated into stand 9; areas along northerly edge now mapped as non-forest.	9
676	Vast majority of polygon now mapped as non-forest, except for small area in the central section of the westerly edge incorporated into stand 8.	8
677	Vast majority of polygon now mapped as non-forest, except for very small area along the southwesterly edge incorporated into stand 6.	6
678	Most of polygon incorporated into stand 6; small areas along the northern and westerly edges now mapped as non-forest.	6
679	Most of polygon incorporated into stand 7 except for small area along the northwestern edge now mapped as non-forest.	7
680	Most of polygon incorporated into stand 9 except for small areas along the western and southerly edge now mapped as non-forest.	9
709	Polygon eliminated - non-forest	
710	Northern section and parts of the edges in the central part of the polygon now mapped as stand 14. Central part of polygon now mapped as stand 15. Area in the southwestern part of polygon incorporated into stand 13. Areas along edges and in the northwestern part of polygon now mapped as non-forest.	13, 14, 15
711	Most of polygon incorporated into stand 11. Small areas along the edges in the southwestern part of the polygon are now mapped as non-forest.	11
712	Most of polygon now mapped as non-forest, except for small portions in the northern section and along the easterly edges now incorporated into stand 11.	11
713	Polygon eliminated - non-forest	
714	Northeasterly part of polygon incorporated into stand 17. Areas along the northern edges, and the western part of the polygon, are now mapped as non-forest.	17
715	Most of the eastern, southern, and western parts of the polygon incorporated into stand 14. Areas in the center of the polygon incorporated into stand 15. Areas along the eastern and southern edges now mapped as non-forest.	14, 15
716	Polygon eliminated - non-forest	
717	Northwestern part of polygon incorporated into stand 19. Small areas along the southern edges incorporated into stand 20. Most of the central part of the polygon, and a small area along the western edge now mapped as non-forest.	19, 20
718	Most of polygon incorporated into stand 18. Areas along the western, southern, and northern edges now mapped as non-forest.	18
719	Most of polygon incorporated into stand 18. Areas along the northern and westerly edge now mapped as non-forest.	18
720	Most of polygon incorporated into stand 31. Small area along the western edge now mapped as non-forest.	31
721	Most of polygon now mapped as non-forest. Small area along the northeastern edge now mapped as stand 30.	30
722	Most of polygon now mapped as stand 28. Areas along the northwestern, western, and southern edges now mapped as non-forest.	28
723	Most of polygon now mapped as non-forest. Small area along the north-central part of the western edge now mapped as stand 28. Small area along the south-central part of the western edge now mapped as stand 32.	32
724	Most of polygon incorporated into stand 28. Small areas along the northern, western, and southern edges now mapped as non-forest.	28
725	Most of the northern and central parts of polygon mapped as stand 25. Small areas along the southern and southwestern edge now mapped as stand 26. Small area in northwestern part of polygon incorporated into stand 24. Areas along the northern, northeastern, central, and northwestern edges now mapped as non-forest.	24, 25, 26
726	Most of polygon incorporated into stand 30. Areas in the central part of polygon and along the southern edges now mapped as non-forest.	30
	New stand mapped in northerly part of installation; does not overlap any part of any polygon in the previous feature class.	1
	New stand mapped in northerly part of installation; does not overlap any part of any polygon in the previous feature class.	2
	New stand mapped in northerly part of installation; does not overlap any part of any polygon in the previous feature class.	3

Table B-1 (continued). Comparison of prior stand boundaries and new stand boundaries delineated by SIG personnel at DNA installation.

OID in geodatabase provided	Notes	New stand number
	New stand mapped in northerly part of installation; does not overlap any part of any polygon in the previous feature class.	4
	New stand mapped in northerly part of installation; does not overlap any part of any polygon in the previous feature class.	5

General notes:

Unlike NASO, NALFF, and NWA, DNA had no prior stands delineated as part of a comprehensive forest management plan. Prior stands were not assigned numbers; stand polygons in the GIS had only sequential ID numbers. Thus, those prior polygons' simple sequential ID number is being used as the reference in this table to allow for comparisons as were made for other installations.

Polygon eliminated indicates that the area inside the polygon is not included in any stand delineated by the new inventory.

Area incorporated indicates some of the area inside the polygon from the old geodatabase is included in a stand delineated by the new inventory.

Area mapped as non-forest indicates that some of the area inside the polygon from the old geodatabase was not delineated as a forest stand at the time of the new inventory.

Table B-2. Crosswalk between fields in the Navy ForestStand feature class, populated with geometry and information that is relevant to the Navy-specified fields, and the SIG-supplied feature class (DNA_Stands).

Navy feature class field name	Description	Field from SIG feature classes from where information was drawn
OBJECTID	Internal feature number	—
Shape	Feature geometry	—
forestStandIDPK	Unique identifier for stand populated from prior shapefile's STAND_ID field; missing values for new stands populated using similar pattern. Non-contiguous stands of similar characteristics, separated by short distances, may have been assigned the same stand number.	STAND_ID forestStandIDPK
sdsID	Null	—
sdsFeatureName	forest stand	—
sdsFeatureDescription	Alphanumeric code describing the stand populated from prior shapefile's FEAT_DESC field. Describes the stand's compartment, stand ID number, forest type, and size class. Non-contiguous stands of similar characteristics, separated by short distances, may have been assigned the same stand number.	FEAT_DESC
sdsMetadataID	Null	—
installationID	Used to link the record to the applicable installation record. A version of this is contained within the prior data's INSTLN_ID field	INSTLN_ID (partial)
commerciallyProductive	True	—
forestCategory	Left null, the domain specified in the Navy data model required far more detailed information that was specified to be collected. A more generalized forest type can be obtained from SIG's TREE_TYPE field in the Stand feature classes.	TREE_TYPE (partial)
standID	A unique-to-installation code identifying the stand. Populated using values from prior shapefile where available. Information contained in the STAND_ID, FEAT_DESC, and STAND_NUM fields in the SIG-supplied stand feature classes. Non-contiguous stands of similar characteristics, separated by short distances, may have been assigned the same stand number.	STAND_ID (embedded) FEAT_DESC (embedded) STAND_NUM
silviculturePractice	Null	—
dataFK	Null	—
dataTable	Null	(Note: too many to populate)
forestCompartmentIDFK	A value uniquely identifying the compartment (geographic division using natural or man-made features) in which the forest stand is located. Populated from values directly obtained (when stand existed in prior shapefile) or inferred (for new stands) from prior shapefile.	FEAT_DESC (embedded) STAND_NUM (embedded) COMP_NO
conservationIDFK	Null	—
editor	Name of person who last edited the data	—
dateEdited	Date that the feature was edited from its original or previous value	—
collectionSource	Describes how the data was collected and mapped	—
locAccy	Describes the location accuracy of the data	—
metaNotes	Text supplied by SIG staff indicating when the data was most recently edited and on what the edits were based	—
GLOBALID	N/A	—
SHAPE_Length	Length of feature in internal units	—
SHAPE_Area	Area of feature in internal units	—

Table B-3. Crosswalk between fields in the Navy NaturalResourceSurveyP feature class, populated with geometry and information that is relevant to the Navy-specified fields, and the SIG-supplied feature class (DNA_Inv_Plots).

Navy feature class field name	Description	Field from SIG feature classes from where information was drawn
OBJECTID	Internal feature number	—
Shape	Feature geometry	—
naturalResourceSurveyIDPK	Unique identifier for inventory point populated using the stand's unique identifier (Navy's forestStandIDPK field, the prior/current STAND_ID field), concatenated with the plot's unique (to installation) identification number using a colon	naturalResourceSurveyIDPK
sdsID	Null	—
sdsFeatureName	forest inventory point	—
sdsFeatureDescription	Narrative describing the feature	—
sdsMetadataID	Null	—
installationID	Used to link the record to the applicable Installation record	—
dataFK	Null	—
dataTableName	Null	(Note: too many to populate)
surveyDate	Date the point was sampled	DATE_
suveyOrSampleMethod	A description of the survey or sample method used	Based on inventory design in scope of work
suveyOrSamplePurpose	A discriminator that indicates the purpose of survey or sample	Based on inventory design in scope of work
suveyYear	The year of the survey	DATE_
conservationIDFK	Null	—
editor	Name of person who last edited the data	—
dateEdited	Date that the feature was edited from its original or previous value	—
collectionSource	Describes how the data was collected and mapped	—
locAccy	Describes the location accuracy of the data	—
metaNotes	Text supplied by SIG staff indicating when the data was most recently edited and on what the edits were based	—

Table B-4. Crosswalk between fields in the supplemental stands feature classes (DNA_Stands) that contain installation-specific geometry and data about stands from the inventory not explicitly contained in Navy geographic data model for stands (ForestStand).

SIG feature class field	Description	Field from Navy feature class (ForestStand) containing similar information
OBJECTID_1	Internal feature number	—
Shape	Feature geometry	—
OBJECTID	Identifier for the stand created by software during post-processing	—
STAND_ID	Identification number for the stand; also used as the forestStandIDPK code, and when concatenated with plot numbers using a colon, is used as the naturalResourceSurveyIDPK. Non-contiguous stands of similar characteristics, separated by short distances, may have been assigned the same stand number.	forestStandIDPK
MAP_ID	Was a field contained in the prior stand dataset	—
META_ID	Was a field contained in the prior stand dataset; populated from prior data if stand was pre-existing; values of date of last edit used for new stands	—
AREA_SIZE	Was a field contained in the prior stand dataset	—
PERIM	Was a field contained in the prior stand dataset	—
FEAT_DESC	Alphanumeric code describing the stand populated from prior shapefile's FEAT_DESC field. Describes the stand's compartment, stand ID number, forest type, and size class Used as the Navy's sdsFeatureDescription value. Non-contiguous stands of similar characteristics, separated by short distances, may have been assigned the same stand number.	sdsFeatureDescription standID (partial) forestStandIDPK (partial)
USER_FLAG	Was a field contained in the prior stand dataset	—
INSTLN_ID	Was a field contained in the prior stand dataset. Used to help determine a value for the Navy's installationID field.	—
FACIL_ID	Was a field contained in the prior stand dataset	—
FOR_ACRES	Was a field contained in the prior stand dataset	—
TREE_SIZE	Code indicated the tree size class with the predominance of basal area in the stand; 4=sawlog; 3=chip-n-saw; 2=pulpwood	—
TREE_TYPE	Code indicating the forest type; P=>75% softwood BA; PH= 50-75% softwood BA; HP=25-50% softwood BA; H= <25% softwood BA. This is a very generalized forest type as compared to what the Navy would use to populate its forestCategory field.	forestCategory (partial)
BA_AC	Average basal area (square feet) of trees 6" dbh and up per acre	—
TPA	Average trees per acre	—
TOT_VALUE	Total value (USD\$) of sawlogs, chip-n-saw, and pulpwood in the stand	—
PINE_BA	Softwood basal area per acre	—
COMP_NO	Compartment number	forestCompartmentIDFK sdsFeatureDescription (partial)
FEAT_ID	Was a field contained in the prior stand dataset	—
FEAT_NAME	Was a field contained in the prior stand dataset	—
NARRATIVE	Was a field contained in the prior stand dataset	—
SERVICE_D	Was a field contained in the prior stand dataset	—
SCHEMA_SRC	Was a field contained in the prior stand dataset	—
AREA_AC	Area (acres) of the stand polygon as updated by SIG staff based on 2014 forest inventory	—
SI_SP	Site index species	—
SI50	Site index (base age 50)	—
GROWTH	Growth (%)	—
AGE	Age	—
SIZECL	Size class by predominance of basal area	—
HWBA	Hardwood basal area per acre	—
QMD	Quadratic mean diameter	—
AVGHT	Average stand height (Lorey's)	—

Table B-4 (cont'd). Crosswalk between fields in the supplemental stands feature classes (DNA_Stands) that contain installation-specific geometry and data about stands from the inventory not explicitly contained in Navy geographic data model for stands (ForestStand).

SIG feature class field	Description	Field from Navy feature class (ForestStand) containing similar information
SAWBA	Average basal area (square feet) per acre of sawtimber size trees as determined by 2014 forest inventory	—
SAHWBBA	Average basal area (square feet) per acre of hardwood sawtimber size trees as determined by 2014 forest inventory	—
SAWSWBA	Average basal area (square feet) per acre of softwood sawtimber size trees as determined by 2014 forest inventory	—
SAWBFAC	Average board-feet per acre in sawtimber size trees as determined by 2014 forest inventory	—
SAHWBFAC	Average board-feet per acre in hardwood sawtimber size trees as determined by 2014 forest inventory	—
SAWSBFAC	Average board-feet per acre in softwood sawtimber size trees as determined by 2014 forest inventory	—
SAWTNAC	Average tons per acre in merchantable sawtimber size trees as determined by 2014 forest inventory	—
SAHWTNAC	Average tons per acre in merchantable hardwood sawtimber size trees as determined by 2014 forest inventory	—
SAWSWTNAC	Average tons per acre in merchantable softwood sawtimber size trees as determined by 2014 forest inventory	—
SAWVALAC	Average value per acre in merchantable sawtimber size trees as determined by 2014 forest inventory	—
CNSBA	Average basal area (square feet) per acre of chip-n-saw size trees as determined by 2014 forest inventory	—
CNSBFAC	Average board-feet per acre in chip-n-saw size trees as determined by 2014 forest inventory	—
CNSTNAC	Average tons per acre in merchantable chip-n-saw size trees as determined by 2014 forest inventory	—
CNSVALAC	Average value per acre in merchantable chip-n-saw size trees as determined by 2014 forest inventory	—
PLPBA	Average basal area (square feet) per acre of pulpwood size trees as determined by 2014 forest inventory	—
PLPHWBA	Average basal area (square feet) per acre of hardwood pulpwood size trees as determined by 2014 forest inventory	—
PLPSWBA	Average basal area (square feet) per acre of softwood pulpwood size trees as determined by 2014 forest inventory	—
PLPCDAC	Average cords per acre of pulpwood size trees as determined by 2014 forest inventory	—
PLPHWCDAC	Average cords per acre of hardwood pulpwood size trees as determined by 2014 forest inventory	—
PLPSWCDAC	Average cords per acre of softwood pulpwood size trees as determined by 2014 forest inventory	—
PLPTNAC	Average tons per acre in merchantable pulpwood size trees as determined by 2014 forest inventory	—
PLPHWTNAC	Average tons per acre in merchantable hardwood pulpwood size trees as determined by 2014 forest inventory	—
PLPSWTNAC	Average tons per acre in merchantable softwood pulpwood size trees as determined by 2014 forest inventory	—
PLPVALAC	Average value per acre in merchantable pulpwood size trees as determined by 2014 forest inventory	—
VALAC	Average value per acre of trees of all product classes	—
TOTTREES	Total number of trees	—
SAWBFTOT	Total sawtimber volume (board-feet) in stand area	—
SAHWBFTOT	Total hardwood sawtimber volume (board-feet) in stand area	—
SAWSBFTOT	Total softwood sawtimber volume (board-feet) in stand area	—

Table B-4 (cont'd). Crosswalk between fields in the supplemental stands feature classes (DNA_Stands) that contain installation-specific geometry and data about stands from the inventory not explicitly contained in Navy geographic data model for stands (ForestStand).

SIG feature class field	Description	Field from Navy feature class (ForestStand) containing similar information
SAWTNTOT	Total weight (tons) of wood and bark in merchantable sawlog portions of trees in stand area	—
SAHWNTOT	Total weight (tons) of wood and bark in merchantable sawlog portions of hardwood trees in stand area	—
SAWSWNTOT	Total weight (tons) of wood and bark in merchantable sawlog portions of softwood trees in stand area	—
SAWVALTOT	Total value of sawtimber	—
CNSBFTOT	Total volume (board-feet) in chip-n-saw trees in stand area	—
CNSTNTOT	Total weight (tons) in chip-n-saw trees in stand area	—
CNSVALTOT	Total value of chip-n-saw timber	—
PLPCDTOT	Total volume (cords) in pulpwood trees in stand area	—
PLPHWCDTOT	Total volume (cords) in hardwood pulpwood trees in stand area	—
PLPSWCDTOT	Total volume (cords) in softwood pulpwood trees in stand area	—
PLPTNTOT	Total weight (tons) in pulpwood trees in stand area	—
PLPHWNTOT	Total weight (tons) in hardwood pulpwood trees in stand area	—
PLPSWNTOT	Total weight (tons) in softwood pulpwood trees in stand area	—
PLPVALTOT	Total value of pulpwood	—
STAND_NUM	Numeric stand number (exclusive of other codes) for joining. Non-contiguous stands of similar characteristics, separated by short distances, may have been assigned the same stand number.	standID forestStandIDPK (partial) sdsFeatureDescription (partial)
forestStan	Same as Stand_ID; Identification number for the stand; also used as the forestStandIDPK code, and when concatenated with plot numbers using a colon, is used as the naturalResourceSurveyIDPK. Non-contiguous stands of similar characteristics, separated by short distances, may have been assigned the same stand number.	forestStandIDPK (partial)
Shape_Length	Length of feature in internal units	—
Shape_Area	Area of feature in internal units squared	—
Std_ValID	Same as Stand_Num; Numeric stand number (exclusive of other codes) for joining. Non-contiguous stands of similar characteristics, separated by short distances, may have been assigned the same stand number.	
ACRU_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for soft maple (<i>Acer rubrum</i>)	Note - only present if species was sampled at the installation
FRCA_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for Carolina ash (<i>Fraxinus caroliniana</i>)	Note - only present if species was sampled at the installation
FRPE_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for green ash (<i>Fraxinus pennsylvanica</i>)	Note - only present if species was sampled at the installation
ILOP_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for American holly (<i>Ilex opaca</i>)	Note - only present if species was sampled at the installation
LIST_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for sweetgum (<i>Liquidambar styraciflua</i>)	Note - only present if species was sampled at the installation
LITU_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for tulip-poplar (<i>Liriodendron tulipifera</i>)	Note - only present if species was sampled at the installation
NYAQ_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for water tupelo (<i>Nyssa aquatica</i>)	Note - only present if species was sampled at the installation
NYSY_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for blackgum (<i>Nyssa sylvatica</i>)	Note - only present if species was sampled at the installation

Table B-4 (cont'd). Crosswalk between fields in the supplemental stands feature classes (DNA_Stands) that contain installation-specific geometry and data about stands from the inventory not explicitly contained in Navy geographic data model for stands (ForestStand).

SIG feature class field	Description	Field from Navy feature class (ForestStand) containing similar information
PIPA_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for longleaf pine (<i>Pinus palustris</i>)	Note - only present if species was sampled at the installation
PITA_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for loblolly pine (<i>Pinus taeda</i>)	Note - only present if species was sampled at the installation
QUAL_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for white oak (<i>Quercus alba</i>)	Note - only present if species was sampled at the installation
QULA_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for laurel oak (<i>Quercus laurifolia</i>)	Note - only present if species was sampled at the installation
QUMI_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for swamp chestnut oak (<i>Quercus michauxii</i>)	Note - only present if species was sampled at the installation
QUNI_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for water oak (<i>Quercus nigra</i>)	Note - only present if species was sampled at the installation
QUPH_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for willow oak (<i>Quercus phellos</i>)	Note - only present if species was sampled at the installation
QURU_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for red oak (<i>Quercus rubra</i>)	Note - only present if species was sampled at the installation
TADI_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for bald cypress (<i>Taxodium distichum</i>)	Note - only present if species was sampled at the installation
ULAM_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for American elm (<i>Ulmus americana</i>)	Note - only present if species was sampled at the installation
UNHW_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for unidentified hardwoods	Note - only present if species was sampled at the installation

Table B-5. Crosswalk between fields in the supplemental plots feature class (DNA_Inv_Plots) that contain installation-specific geometry and data describing inventory points from the inventory not explicitly contained in Navy geographic data model for inventory points (NaturalResourceSurveyPoints).

SIG feature class field name	Description	Field from Navy feature class (NaturalResourceSurveyP) containing similar information
OBJECTID	Internal feature number	
Shape	Feature geometry	
UTM_X	X-coordinate (meters) of the point in the UTM Zone in which the point is located	
UTM_Y	Y-coordinate (meters) of the point in the UTM Zone in which the point is located	
PointID	Unique (to installation) identification number of the inventory point	
OBJECTID_1	Identifier for the stand created by software during post-processing	
STAND_ID	Unique (to installation) stand identification number of the stand in which the inventory point is located	
POINT_ID	Duplicate point identification field for joining and relationships. Can be used to join tabular date of sampled trees.	
STPT_ID	Concatenation of stand and point identification numbers. Can be used to join tabular date of sampled trees.	
BAF	Basal area factor (BAF) used to select trees for sampling at the point	
DATE_	Date on which the point was sampled	surveyDate
CREW	Initials of the inventory crew that conducted the sampling	
naturalResourceSurveyIDPK	Unique identification number for the plot, consisting of a concatenation of the Stand ID/forestStandIDPK (a unique stand identifier) and the plot number	naturalResourceSurveyIDPK

Table B-6. Information about supplemental stand-alone/non-geographic data tables and relationship classes included in the geodatabase.

Data tables for non-geographic information

Name	Description
DNA_Point_Sample	Table describing information about the points at which trees were sampled at DNA.
DNA_Tree_List	Table containing the complete list of sampled trees and their characteristics, to measure basal area and volume, at DNA, in the 2014 forest inventory.
DNA_Site_Tree	Table containing the complete list of sampled trees and their characteristics, to measure site index, at DNA, in the 2014 forest inventory.
DNA_Fuel_Load	Table containing summary of mean fuel loadings by forest type from data collected during the 2014 forest inventory at DNA.
DNA_Value_Per_Acre_By_Species	Table containing a summary of the value per acre, across all product groups, of each species at DNA, from data collected during the 2014 forest inventory using mean stumpage values from the Timber Mart-South 2014 Q2 report.
DNA_Table_Metadata	Table containing detailed descriptions of the fields in the DNA_Point_Sample, DNA_Tree_List, and DNA_Site_Tree tables.

Table B-6 (continued). Information about supplemental stand-alone/non-geographic data tables and relationship classes included in the geodatabase.

Relationship classes

NAME	Description
DNA_Stand_Plots	Establishes the one-to-many relationship between the DNA_Stands feature class and DNA_Inv_Plots table using the STAND_NUM and STAND_ID field, respectively, so that information about plots sampled within stands can be ascertained rapidly.
DNA_Plot_Tree	Establishes the one-to-many relationship between the DNA_Inv_Plots feature class and DNA_Tree_List table using the PointID and POINT_ID field, respectively, so that information about trees sampled for basal area and/or height at each plot can be ascertained rapidly.
DNA_Plot_SiteTree	Establishes the one-to-many relationship between the DNA_Inv_Plots feature class and DNA_Site_Tree table using the PointID and POINT_ID field, respectively, so that information about trees sampled for site index at selected plots can be ascertained rapidly.
DNA_Stand_Value	Establishes the one-to-many relationship between the DNA_Stands feature class and DNA_Value_Per_Acre_By_Species_For_Stands table using the StandVal_ID field in each table, so that information about each stand's value can be quickly ascertained.
DNA_Stand_Fuel_Load	Establishes the one-to-many relationship between the DNA_Stands feature class and the DNA_Fuel_Load table using the TREE_TYPE and Tree_Type fields, respectively, so that information about fuel loading in the various stands can be ascertained rapidly.

Table B-7. Table of additional metadata describing non-geospatial tables contained in non-compliant geodatabase.

Table name	Attribute/field	Description
DNA_Point_Sample	STAND_ID	Numeric stand ID code, unique to installation, consistent w/prior inventory; new stands have new numbers.
DNA_Point_Sample	POINT_ID	Sequential sample point identifier for location where data are collected; unique to installation.
DNA_Point_Sample	STPT_ID	Concatenation of stand and point ID codes for joining.
DNA_Point_Sample	BAF	Basal area factor used to sample the trees at the plot.
DNA_Point_Sample	DATE	Date plot was inventoried.
DNA_Point_Sample	CREW	Initials of the inventory crew.
DNA_Tree_List	STAND_ID	Numeric stand ID code, unique to installation, consistent w/prior inventory; new stands have new numbers.
DNA_Tree_List	POINT_ID	Sequential sample point identifier for location where data are collected.
DNA_Tree_List	STPT_ID	Concatenation of stand and point ID codes for joining.
DNA_Tree_List	TREE_NUM	Tree ID code; unique to installation; sequential.
DNA_Tree_List	TREE_SPP	Four letter species code (first two letters of genus and first two letters of species).
DNA_Tree_List	TREE_DBH	Tree diameter outside bark (inches) at breast height (typically 4.5' above ground).
DNA_Tree_List	TREE_VGR	Acceptable Growing Stock (AGS), Unacceptable Growing Stock (UGS), Cull (dead).
DNA_Tree_List	TREE_PRDG	Pulpwood, Chip-n-Saw, Sawtimber.
DNA_Tree_List	4IN_TOPHT	The height (feet) at which the tree is 4 in. dob; measured for trees classified as pulpwood by the inventory scheme.
DNA_Tree_List	6IN_TOPHT	The height (feet) at which the tree is 6 in. dob; measured for trees classified as chip-n-saw by the inventory scheme.
DNA_Tree_List	8IN_TOPHT	The height (feet) at which the tree is 8 in. dob; measured for trees classified as sawtimber by the inventory scheme.
DNA_Tree_List	TOT_HT	Total tree height (feet).
DNA_Tree_List	DATE	Date of measurements.
DNA_Site_Tree	STAND_ID	Numeric stand ID code, unique to installation, consistent w/prior inventory; new stands have new numbers.
DNA_Site_Tree	POINT_ID	Sequential sample point identifier for location where data are collected.
DNA_Site_Tree	STPT_ID	Concatenation of stand and point ID codes for joining.
DNA_Site_Tree	TREE_NUM	Unique tree ID code (same as above if tree was sampled for BA or height; new sequence beginning at 100000 if not).
DNA_Site_Tree	TREE_SPP	Four letter species code (first two letters of genus and first two letters of species).
DNA_Site_Tree	TREE_DBH	Tree diameter outside bark (inches) at breast height (typically 4.5' above ground). If null or zero, tree was not sampled for BA/height; only for age and total height for site index calculations.
DNA_Site_Tree	TREE_VGR	Acceptable Growing Stock (AGS), Unacceptable Growing Stock (UGS), Cull (dead).
DNA_Site_Tree	TREE_PRDG	Three-letter code indicating the product classification of the tree assigned by the inventory scheme; pulpwood (PLP), chip-n-Saw (CNS), sawtimber (SAW).
DNA_Site_Tree	4IN_TOPHT	The height (feet) at which the tree is 4 in. dob; measured for trees classified as pulpwood by the inventory scheme.
DNA_Site_Tree	6IN_TOPHT	The height (feet) at which the tree is 6 in. dob; measured for trees classified as chip-n-saw by the inventory scheme.
DNA_Site_Tree	8IN_TOPHT	The height (feet) at which the tree is 8 in. dob; measured for trees classified as sawtimber by the inventory scheme.
DNA_Site_Tree	TOT_HT	Total tree height (feet).
DNA_Site_Tree	TREE_AGE	Age of tree as measured by increment core sampled using standard procedures.
DNA_Fuel_Load	Tree_Type	1 or 2 letter code representing Vegetation_Type.
DNA_Fuel_Load	Vegetation_Type	Code indicating the forest type; P=>75% softwood BA; PH= 50-75% softwood BA; HP=25-50% softwood BA; H=<25% softwood BA. This is a very generalized forest type as compared to what the Navy would use to populate its forestCategory field.
DNA_Fuel_Load	F1_Hr_Tons_Acre	Down woody debris measured in Tons per acre that is up to 1/4 inch in diameter.
DNA_Fuel_Load	F10_Hr_Tons_Acre	Down woody debris measured in Tons per acre that is 1/4 inch to 1 inch in diameter.
DNA_Fuel_Load	F100_Hr_Tons_Acre	Down woody debris measured in Tons per acre that is 1 inch to 3 inches in diameter.
DNA_Fuel_Load	F1000_Hr_Sound_Tons_Acre	Down woody debris measured in Tons per acre that is over 3 inches in diameter and Sound.
DNA_Fuel_Load	F1000_Hr_Rotten_Tons_Acre	Down woody debris measured in Tons per acre that is over 3 inches in diameter and Rotten.
DNA_Fuel_Load	F1_10_100_Hr_Tons_Acre	Down woody debris measured in Tons per acre of 1hr, 10hr and 100hr fuel.

Table B-7 (cont'd). Table of additional metadata describing non-geospatial tables contained in non-compliant geodatabase.

Table name	Attribute/field	Description
DNA_Fuel_Load	Litter_Tons_Acre	Litter is the surface layer of the forest floor and consists of freshly fallen leaves, needles, twigs, bark, and fruits measured in Tons per acre.
DNA_Fuel_Load	Duff_Tons_Acre	Duff is the fermentation and humus layers of the forest floor measured in Tons per acre.
DNA_Fuel_Load	All_Fuel_Tons_Acre	All Down woody debris, litter and duff measured in Tons per acre.
DNA_Value_Per_Acre_By_Species_For_Stands	Std_ValID	Numeric stand ID code, unique to installation, consistent w/prior inventory; new stands have new numbers.
DNA_Value_Per_Acre_By_Species_For_Stands	ACRU_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for soft maple (<i>Acer rubrum</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	FRCA_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for Carolina ash (<i>Fraxinus caroliniana</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	FRPE_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for green ash (<i>Fraxinus pennsylvanica</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	ILOP_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for American holly (<i>Ilex opaca</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	LIST_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for sweetgum (<i>Liquidambar styraciflua</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	LITU_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for tulip-poplar (<i>Liriodendron tulipifera</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	NYAQ_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for water tupelo (<i>Nyssa aquatica</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	NYSY_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for blackgum (<i>Nyssa sylvatica</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	PIPA_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for longleaf pine (<i>Pinus palustris</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	PITA_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for loblolly pine (<i>Pinus taeda</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	QUAL_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for white oak (<i>Quercus alba</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	QULA_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for laurel oak (<i>Quercus laurifolia</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	QUMI_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for swamp chestnut oak (<i>Quercus michauxii</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	QUNI_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for water oak (<i>Quercus nigra</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	QUPH_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for willow oak (<i>Quercus phellos</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	QURU_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for red oak (<i>Quercus rubra</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	TADI_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for bald cypress (<i>Taxodium distichum</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	ULAM_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for American elm (<i>Ulmus americana</i>) (only present if species sampled at installation).
DNA_Value_Per_Acre_By_Species_For_Stands	UNHW_ValAc	Mean value (\$) per acre for indicated stand across all product classes (sawtimber, chip-n-saw, and pulpwood) for unidentified hardwoods (only present if species sampled at installation).

Appendix C
Site Index Curves for Loblolly Pine and
Sweetgum

FIGURE C-1.

Loblolly pine site index curves. Source: Carmean et al. 1989.

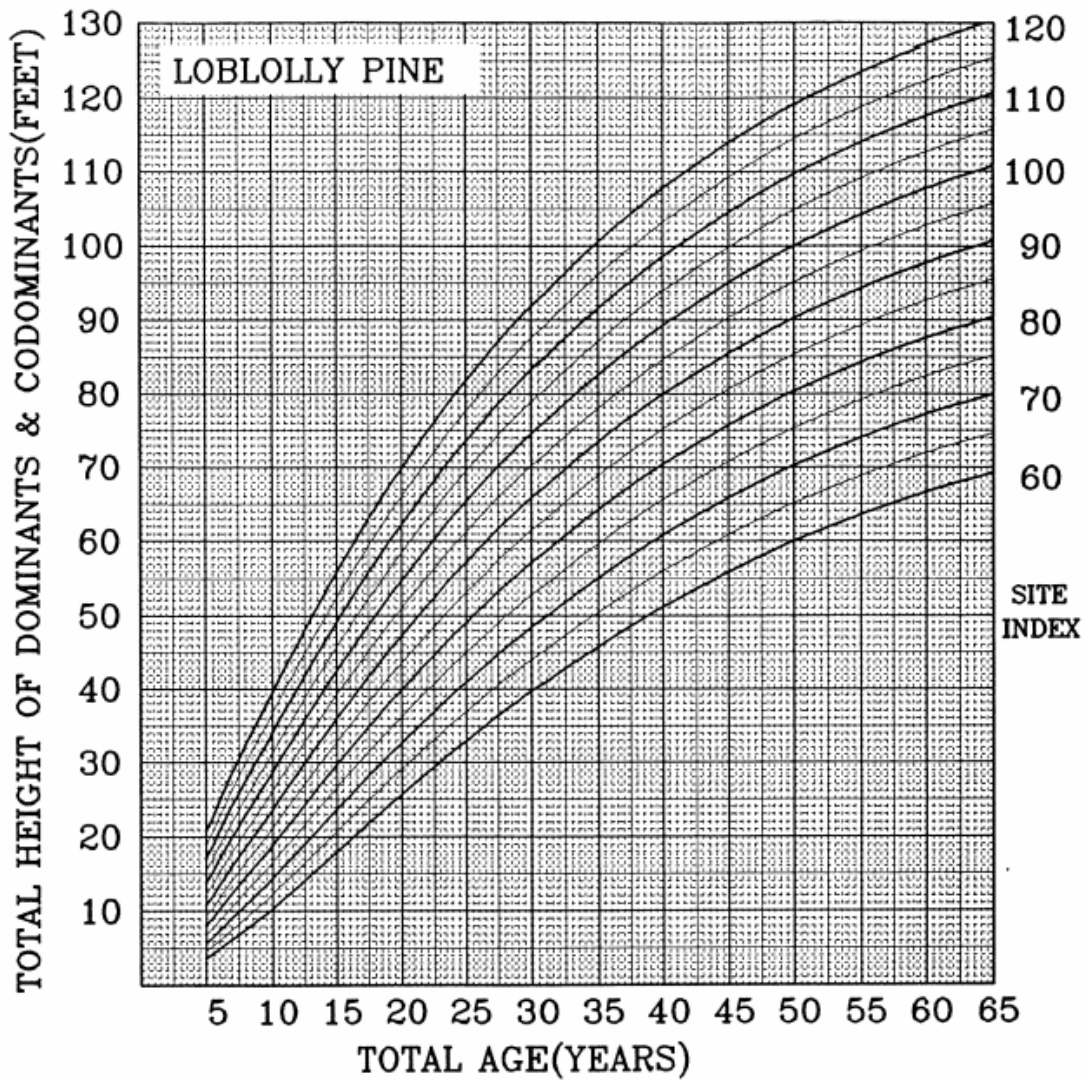


Figure 111.—Loblolly pine (Trousdel, Beck, and Lloyd 1974)
 Coastal Plain of Virginia, North Carolina, and South Carolina
 22 plots having 2 dominant and codominant trees on each plot
 Stem analysis, polymorphic, nonlinear regression
 Convert d.b.h. age to total age by adding years according to site
 index (BH = 0.0):
 SI: 60-75 76+
 Years: 4 3

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	3.0849	0.8076	-0.0341	26.2342	-0.6702	0.99	1.45	5.2
SI	0.5694	1.0415	-0.0204	-1.4874	-0.1242	0.98	2.70	6.5

FIGURE C-2.

Sweetgum site index curves. Source: Carmean et al. 1989.

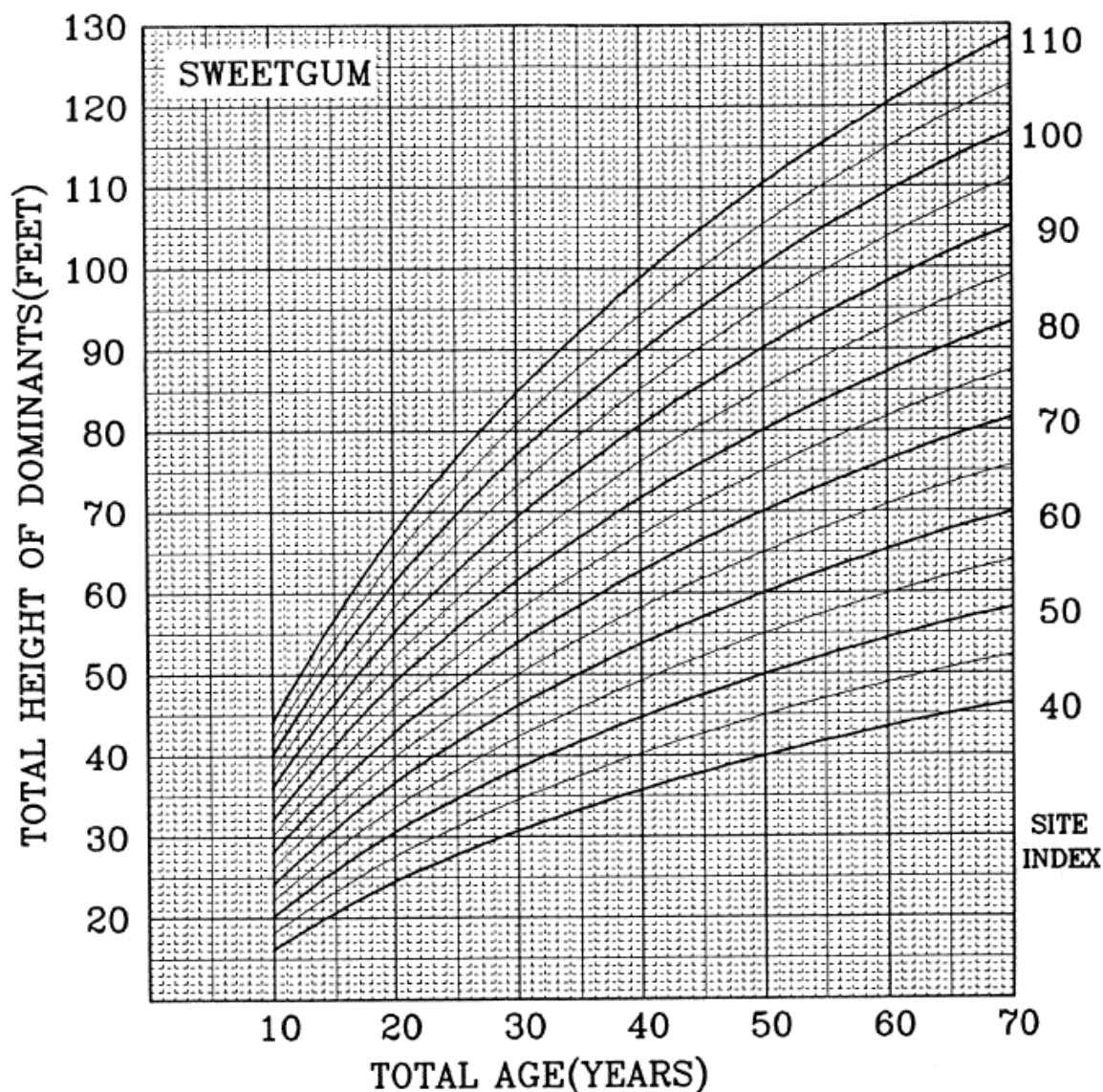


Figure 19.—Sweetgum (Trenk 1929)

Maryland

Number of plots and number of dominant trees not given

Total height and total age, anamorphic, equation not given

Convert d.b.h. age to total age by adding years according to

site index (BH = 0.0):

SI:	40-55	56-75	76+
Years:	5	4	3 (seedlings)
	2	1	1 (sprouts)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.5932	1.0124	-0.0122	0.6245	0.0130	0.99	0.75	3.3
SI	0.6092	0.9895	-0.0113	-0.6219	0.0078	0.99	1.12	5.5

Appendix D
Raw Inventory Data Tables

Appendix D-1: DNA Less-intensive plot data tables: These tables represent the count, species, dbh, vigor, and grade data collected at plots in the point, double sampling for timber attributes protocol employed. Data from all plots is included, but only the count/species/dbh/vigor data is presented. Each record (row) corresponds to a single sampled tree stem. Data collected includes:

Stand #	The stand number in which the plot was located. Existing stand numbers used where available; sequential numbers beginning higher than existing stands assigned to new stands.
Type	Forest type-size class code for stand from prior inventory. At DNA, there was no prior comprehensive forest inventory, so this field was left blank. If data were available, it would have been taken into the field by the field crew to assist in refining and updating stand boundaries. Type code, concatenated with a dash to the size class code, yields the combined forest type-size class code. See Table E-1 for definition of type codes and Table E-2 for definition of size class code.
Plot #	Unique (to installation) plot identification number.
Species	Species code used to uniquely identify the species of tree. See Table E-3 for definition of codes.
DBH	Diameter at breast height (dbh) measured to the nearest tenth of an inch.
Vigor cls	The vigor class of the tree. See Table E-4 for definition of codes.
Grade	The diameter-based product grade of the tree. See Table E-5 for definition of codes.
Date	Date the tree was sampled (MM/DD/YY).
Notes	Miscellaneous notes about the tree represented by record (row) in the table. The most common note, "10BAF", indicates that the plot (and thus tree) was sampled using 10BAF, instead of the default 20BAF, as requested in the scope of work.

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
3		3	ACRU	6.6	AGS	PLP	05/13/14	
3		3	LIST	10.9	AGS	PLP	05/13/14	
3		3	LIST	12.7	AGS	PLP	05/13/14	
3		3	LIST	13.7	AGS	SAW	05/13/14	
3		3	LIST	13.8	AGS	SAW	05/13/14	
3		3	LIST	15.9	AGS	SAW	05/13/14	
3		3	LIST	16.8	AGS	SAW	05/13/14	
3		3	LIST	16.9	AGS	SAW	05/13/14	
3		3	LIST	17.7	AGS	SAW	05/13/14	
3		3	LIST	18	AGS	SAW	05/13/14	
3		4	ACRU	9.1	AGS	PLP	05/13/14	
3		4	LIST	19	AGS	SAW	05/13/14	
3		4	LIST	20.1	AGS	SAW	05/13/14	
3		4	LIST	20.4	AGS	SAW	05/13/14	
3		4	LIST	20.8	AGS	SAW	05/13/14	
3		4	LIST	23.1	AGS	SAW	05/13/14	
3		4	LIST	27.2	AGS	SAW	05/13/14	
3		8	ACRU	14.5	AGS	SAW	05/13/14	
3		8	PITA	15.8	AGS	SAW	05/13/14	
3		8	LIST	16.4	AGS	SAW	05/13/14	
3		8	PITA	16.5	AGS	SAW	05/13/14	
3		8	LIST	17.7	AGS	SAW	05/13/14	
3		8	ACRU	18.5	AGS	SAW	05/13/14	
3		8	PITA	19.1	AGS	SAW	05/13/14	
3		8	QURU	20.5	AGS	SAW	05/13/14	
3		8	QURU	20.8	AGS	SAW	05/13/14	
3		8	PITA	20.9	AGS	SAW	05/13/14	
3		9	LIST	11.5	AGS	PLP	05/13/14	
3		9	LIST	12.2	AGS	PLP	05/13/14	
3		9	LIST	13.7	AGS	SAW	05/13/14	
3		9	LIST	15.4	AGS	SAW	05/13/14	
3		9	LIST	16.7	AGS	SAW	05/13/14	
3		9	LIST	17.3	AGS	SAW	05/13/14	
3		9	LIST	19.6	AGS	SAW	05/13/14	
3		9	LIST	20.1	AGS	SAW	05/13/14	
3		11	QUPH	22.3	AGS	SAW	05/13/14	
3		11	QURU	22.5	AGS	SAW	05/13/14	
3		11	PITA	27.3	AGS	SAW	05/13/14	
3		11	ACRU	31	AGS	SAW	05/13/14	
3		11	LITU	34	AGS	SAW	05/13/14	
3		12	LIST	22.6	AGS	SAW	05/13/14	
3		12	LIST	26.8	AGS	SAW	05/13/14	
3		12	QURU	28.5	AGS	SAW	05/13/14	
3		12	QURU	39.5	AGS	SAW	05/13/14	
3		15	NYSY	6.8	AGS	PLP	05/13/14	
3		15	NYSY	6.8	AGS	PLP	05/13/14	
3		15	ACRU	9.1	AGS	PLP	05/13/14	
3		15	LIST	11.9	AGS	PLP	05/13/14	
3		15	LIST	12.7	AGS	PLP	05/13/14	
3		15	ACRU	13.1	AGS	SAW	05/13/14	
3		15	ACRU	26.4	AGS	SAW	05/13/14	
3		16	LIST	8	AGS	PLP	05/13/14	
3		16	LIST	8.3	AGS	PLP	05/13/14	
3		16	LIST	11.3	AGS	PLP	05/13/14	
3		16	LIST	11.8	AGS	PLP	05/13/14	
3		16	LIST	12.1	AGS	PLP	05/13/14	
3		16	LIST	13.5	AGS	SAW	05/13/14	
3		16	LIST	14.8	AGS	SAW	05/13/14	
3		16	LIST	17.9	AGS	SAW	05/13/14	
3		18	LIST	10.1	AGS	PLP	05/13/14	
3		18	LIST	10.5	AGS	PLP	05/13/14	
3		18	LIST	11.2	AGS	PLP	05/13/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
3		18	LIST	11.3	AGS	PLP	05/13/14	
3		18	LIST	12.4	AGS	PLP	05/13/14	
3		18	LIST	12.6	AGS	PLP	05/13/14	
3		18	LIST	13.9	AGS	SAW	05/13/14	
3		18	LIST	15.5	AGS	SAW	05/13/14	
3		19	NYSY	7	AGS	PLP	05/13/14	
3		19	NYSY	9	AGS	PLP	05/13/14	
3		19	NYSY	10.8	AGS	PLP	05/13/14	
3		19	NYSY	11.3	AGS	PLP	05/13/14	
3		19	NYSY	11.5	AGS	PLP	05/13/14	
3		19	LIST	17.4	AGS	SAW	05/13/14	
3		19	LIST	17.8	AGS	SAW	05/13/14	
3		19	LIST	18.4	AGS	SAW	05/13/14	
3		19	LIST	18.5	AGS	SAW	05/13/14	
3		19	LIST	21	AGS	SAW	05/13/14	
18		22	LIST	9	AGS	PLP	04/30/14	
18		22	LIST	11.5	AGS	PLP	04/30/14	
18		22	LIST	13.2	AGS	SAW	04/30/14	
18		22	LIST	14.5	AGS	SAW	04/30/14	
18		22	LIST	15.2	AGS	SAW	04/30/14	
18		22	ACRU	22.9	AGS	SAW	04/30/14	
18		22	QUMI	24.6	AGS	SAW	04/30/14	
3		25	LIST	8.5	AGS	PLP	05/13/14	
3		25	NYSY	9.1	AGS	PLP	05/13/14	
3		25	LIST	9.6	AGS	PLP	05/13/14	
3		25	LIST	11	AGS	PLP	05/13/14	
3		25	LIST	11.9	AGS	PLP	05/13/14	
3		25	ACRU	13.8	AGS	SAW	05/13/14	
3		25	LIST	14.9	AGS	SAW	05/13/14	
3		25	LIST	16.8	AGS	SAW	05/13/14	
3		25	LIST	19.7	AGS	SAW	05/13/14	
3		26	LIST	6.9	AGS	PLP	05/13/14	
3		26	LIST	8.5	AGS	PLP	05/13/14	
3		26	ACRU	12.1	AGS	PLP	05/13/14	
3		26	LIST	12.3	AGS	PLP	05/13/14	
3		26	LIST	13.1	AGS	SAW	05/13/14	
3		26	LIST	16.2	AGS	SAW	05/13/14	
3		26	ACRU	16.5	AGS	SAW	05/13/14	
3		26	LIST	16.8	AGS	SAW	05/13/14	
3		26	LIST	23.4	AGS	SAW	05/13/14	
3		28	LIST	7.4	AGS	PLP	05/13/14	
3		28	LIST	8.8	AGS	PLP	05/13/14	
3		28	LIST	10.2	AGS	PLP	05/13/14	
3		28	LIST	10.4	AGS	PLP	05/13/14	
3		28	LIST	11.8	AGS	PLP	05/13/14	
3		28	LIST	13.4	AGS	SAW	05/13/14	
3		28	ACRU	21.4	AGS	SAW	05/13/14	
3		29	ACRU	7.4	AGS	PLP	05/13/14	
3		29	ACRU	8.6	AGS	PLP	05/13/14	
3		29	LIST	10	AGS	PLP	05/13/14	
3		29	LIST	10.9	AGS	PLP	05/13/14	
3		29	LIST	11	AGS	PLP	05/13/14	
3		29	LIST	12.8	AGS	PLP	05/13/14	
3		29	LIST	14.1	AGS	SAW	05/13/14	
3		29	LIST	15.5	AGS	SAW	05/13/14	
3		29	LIST	17.1	AGS	SAW	05/13/14	
3		29	ACRU	17.8	AGS	SAW	05/13/14	
3		29	LIST	18.5	AGS	SAW	05/13/14	
3		30	ACRU	8.7	AGS	PLP	05/13/14	
3		30	LIST	14	AGS	SAW	05/13/14	
3		30	LIST	14.7	AGS	SAW	05/13/14	
3		30	PITA	15.5	AGS	SAW	05/13/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
3		30	LIST	16.3	AGS	SAW	05/13/14	
3		30	LIST	16.4	AGS	SAW	05/13/14	
3		30	LIST	16.4	AGS	SAW	05/13/14	
3		30	PITA	21.8	AGS	SAW	05/13/14	
3		31	PITA	14.1	AGS	SAW	05/13/14	
3		31	ACRU	14.9	AGS	SAW	05/13/14	
3		31	LIST	15.1	AGS	SAW	05/13/14	
3		31	ACRU	15.3	AGS	SAW	05/13/14	
3		31	ACRU	18.5	AGS	SAW	05/13/14	
3		31	LIST	18.5	AGS	SAW	05/13/14	
3		31	LIST	19.2	AGS	SAW	05/13/14	
3		31	LIST	19.5	AGS	SAW	05/13/14	
2		33	ACRU	9.9	AGS	PLP	05/14/14	
2		33	PITA	23	AGS	SAW	05/14/14	
2		33	PITA	23.5	AGS	SAW	05/14/14	
2		33	QURU	48	AGS	SAW	05/14/14	
2		34	UNHW	13	AGS	SAW	05/14/14	
2		34	LIST	14.3	AGS	SAW	05/14/14	
2		34	UNHW	14.7	AGS	SAW	05/14/14	
2		34	LIST	16.5	AGS	SAW	05/14/14	
2		34	PITA	16.5	AGS	SAW	05/14/14	
2		34	PITA	16.8	AGS	SAW	05/14/14	
2		34	PITA	17	AGS	SAW	05/14/14	
2		34	LIST	18.9	AGS	SAW	05/14/14	
2		34	LIST	19.2	AGS	SAW	05/14/14	
2		34	PITA	19.6	AGS	SAW	05/14/14	
2		34	PITA	20	AGS	SAW	05/14/14	
2		34	PITA	21.3	AGS	SAW	05/14/14	
2		34	PITA	27.2	AGS	SAW	05/14/14	
18		35	LIST	8.7	AGS	PLP	04/30/14	
18		35	LIST	9.4	AGS	PLP	04/30/14	
18		35	LIST	10	AGS	PLP	04/30/14	
18		35	LIST	14.6	AGS	SAW	04/30/14	
18		35	LIST	16.3	AGS	SAW	04/30/14	
18		35	LIST	18.7	AGS	SAW	04/30/14	
18		35	PITA	21.1	AGS	SAW	04/30/14	
18		35	PITA	23	AGS	SAW	04/30/14	
18		35	PITA	23.5	AGS	SAW	04/30/14	
18		35	QULA	26.9	AGS	SAW	04/30/14	
18		38	LIST	10.5	AGS	PLP	04/30/14	
18		38	QURU	13.3	AGS	SAW	04/30/14	
18		38	QULA	15.4	AGS	SAW	04/30/14	
18		38	PITA	16.6	AGS	SAW	04/30/14	
18		38	LIST	18.3	AGS	SAW	04/30/14	
18		38	PITA	22.5	AGS	SAW	04/30/14	
18		39	QULA	18	AGS	SAW	04/30/14	
18		39	QULA	19.3	AGS	SAW	04/30/14	
18		39	QULA	20.2	AGS	SAW	04/30/14	
18		39	PITA	23	AGS	SAW	04/30/14	
18		39	PITA	23.1	AGS	SAW	04/30/14	
18		39	QULA	23.9	AGS	SAW	04/30/14	
18		39	PITA	25.6	AGS	SAW	04/30/14	
5		40	ACRU	9.8	AGS	PLP	05/13/14	
5		40	ACRU	10.8	AGS	PLP	05/13/14	
5		40	ACRU	11.9	AGS	PLP	05/13/14	
5		40	LIST	12.4	AGS	PLP	05/13/14	
5		40	LIST	13	AGS	SAW	05/13/14	
5		40	LIST	14	AGS	SAW	05/13/14	
5		40	LIST	14.5	AGS	SAW	05/13/14	
5		40	LIST	15.4	AGS	SAW	05/13/14	
5		40	LIST	16.7	AGS	SAW	05/13/14	
3		41	ACRU	7	AGS	PLP	05/13/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
3		41	ACRU	9.8	AGS	PLP	05/13/14	
3		41	ACRU	11.3	AGS	PLP	05/13/14	
3		41	ACRU	11.6	AGS	PLP	05/13/14	
3		41	ACRU	12.4	AGS	PLP	05/13/14	
3		41	LIST	13.8	AGS	SAW	05/13/14	
3		41	ACRU	14.2	AGS	SAW	05/13/14	
3		41	QURU	22.4	AGS	SAW	05/13/14	
3		41	QURU	24	AGS	SAW	05/13/14	
3		42	ACRU	6.1	AGS	PLP	05/13/14	
3		42	ACRU	7.7	AGS	PLP	05/13/14	
3		42	ACRU	8.9	AGS	PLP	05/13/14	
3		42	ACRU	9.6	AGS	PLP	05/13/14	
3		42	LITU	11.6	AGS	PLP	05/13/14	
3		42	PITA	12.8	AGS	CNS	05/13/14	
3		42	PITA	14.2	AGS	SAW	05/13/14	
3		42	PITA	16.2	AGS	SAW	05/13/14	
3		42	PITA	16.7	AGS	SAW	05/13/14	
3		42	PITA	17.4	AGS	SAW	05/13/14	
3		43	ACRU	7.4	AGS	PLP	05/13/14	
3		43	ACRU	7.4	AGS	PLP	05/13/14	
3		43	PITA	7.7	AGS	PLP	05/13/14	
3		43	ACRU	8.2	AGS	PLP	05/13/14	
3		43	ACRU	9	AGS	PLP	05/13/14	
3		43	LIST	11.2	AGS	PLP	05/13/14	
3		43	ACRU	12	AGS	PLP	05/13/14	
3		43	PITA	15.7	AGS	SAW	05/13/14	
3		44	ACRU	7.9	AGS	PLP	05/13/14	
3		44	ACRU	8.6	AGS	PLP	05/13/14	
3		44	LIST	9	AGS	PLP	05/13/14	
3		44	ACRU	9.7	AGS	PLP	05/13/14	
3		44	LIST	15	AGS	SAW	05/13/14	
3		44	LIST	15.4	AGS	SAW	05/13/14	
3		44	LIST	15.5	AGS	SAW	05/13/14	
3		45	LIST	9.8	AGS	PLP	05/13/14	
3		45	ACRU	10.6	AGS	PLP	05/13/14	
3		45	ACRU	13.3	AGS	SAW	05/13/14	
3		45	LIST	14.2	AGS	SAW	05/13/14	
3		45	LIST	15.8	AGS	SAW	05/13/14	
3		45	LIST	16.3	AGS	SAW	05/13/14	
3		45	ACRU	16.7	AGS	SAW	05/13/14	
3		46	ACRU	7.8	AGS	PLP	05/13/14	
3		46	ACRU	9.7	AGS	PLP	05/13/14	
3		46	ACRU	14.4	AGS	SAW	05/13/14	
3		46	LIST	19.3	AGS	SAW	05/13/14	
3		46	PITA	21.9	AGS	SAW	05/13/14	
3		46	PITA	22.1	AGS	SAW	05/13/14	
3		46	PITA	26	AGS	SAW	05/13/14	
3		46	PITA	29.6	AGS	SAW	05/13/14	
2		48	ACRU	6.9	AGS	PLP	05/14/14	
2		48	LITU	11.2	AGS	PLP	05/14/14	
2		48	LITU	14	AGS	SAW	05/14/14	
2		48	ACRU	19.3	AGS	SAW	05/14/14	
2		48	LIST	22	AGS	SAW	05/14/14	
2		48	LIST	22.5	AGS	SAW	05/14/14	
2		48	LIST	27	AGS	SAW	05/14/14	
2		49	LIST	8.4	AGS	PLP	05/14/14	
2		49	LIST	11.7	AGS	PLP	05/14/14	
2		49	ACRU	12.1	AGS	PLP	05/14/14	
2		49	LIST	13.5	AGS	SAW	05/14/14	
2		49	LIST	13.9	AGS	SAW	05/14/14	
2		49	LIST	18.5	AGS	SAW	05/14/14	
2		49	LIST	19.7	AGS	SAW	05/14/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
2		49	PITA	20.5	AGS	SAW	05/14/14	
1		50	ACRU	7.5	AGS	PLP	05/14/14	
1		50	PITA	10.3	AGS	CNS	05/14/14	
1		50	LITU	17.2	AGS	SAW	05/14/14	
1		50	PITA	25.3	AGS	SAW	05/14/14	
1		50	LIST	26	AGS	SAW	05/14/14	
1		50	PITA	30.4	AGS	SAW	05/14/14	
1		51	LIST	11.9	AGS	PLP	05/14/14	
1		51	LITU	12.1	AGS	PLP	05/14/14	
1		51	LIST	15.3	AGS	SAW	05/14/14	
1		51	LIST	16.2	AGS	SAW	05/14/14	
1		51	LIST	16.4	AGS	SAW	05/14/14	
18		52	LIST	10.6	AGS	PLP	04/30/14	
18		52	LIST	11.6	AGS	PLP	04/30/14	
18		52	LIST	11.9	AGS	PLP	04/30/14	
18		52	ACRU	13.3	AGS	SAW	04/30/14	
18		52	LIST	14.5	AGS	SAW	04/30/14	
18		52	ACRU	15.7	AGS	SAW	04/30/14	
18		52	ACRU	16.4	AGS	SAW	04/30/14	
18		52	NYSY	16.7	AGS	SAW	04/30/14	
18		52	ACRU	18.4	AGS	SAW	04/30/14	
18		52	NYSY	18.9	AGS	SAW	04/30/14	
18		52	ACRU	21.2	AGS	SAW	04/30/14	
18		56	QURU	12.9	AGS	PLP	04/30/14	
18		56	QURU	14.3	AGS	SAW	04/30/14	
18		56	QULA	15.7	AGS	SAW	04/30/14	
18		56	QURU	23.2	AGS	SAW	04/30/14	
18		56	QURU	27.2	AGS	SAW	04/30/14	
18		57	LIST	6.3	AGS	PLP	04/30/14	
18		57	LIST	8.9	AGS	PLP	04/30/14	
18		57	QULA	14.8	AGS	SAW	04/30/14	
18		57	PITA	16	AGS	SAW	04/30/14	
18		57	QUMI	16.3	AGS	SAW	04/30/14	
18		57	QULA	18.8	AGS	SAW	04/30/14	
18		57	QULA	21.2	AGS	SAW	04/30/14	
5		60	ACRU	9.8	AGS	PLP	05/13/14	
5		60	LIST	10.6	AGS	PLP	05/13/14	
5		60	ACRU	11.1	AGS	PLP	05/13/14	
5		60	ACRU	11.7	AGS	PLP	05/13/14	
5		60	LIST	13.2	AGS	SAW	05/13/14	
5		60	LIST	14	AGS	SAW	05/13/14	
5		60	LIST	16.5	AGS	SAW	05/13/14	
5		60	LIST	17.8	AGS	SAW	05/13/14	
3		61	ACRU	8.5	AGS	PLP	05/13/14	
3		61	LIST	8.5	AGS	PLP	05/13/14	
3		61	LIST	9	AGS	PLP	05/13/14	
3		61	ACRU	10.1	AGS	PLP	05/13/14	
3		61	LIST	14.8	AGS	SAW	05/13/14	
3		61	PITA	15.6	AGS	SAW	05/13/14	
3		61	PITA	17.9	AGS	SAW	05/13/14	
3		61	QUMI	27.7	AGS	SAW	05/13/14	
3		62	QUMI	7.9	AGS	PLP	05/13/14	
3		62	ACRU	11.8	AGS	PLP	05/13/14	
3		62	PITA	12.1	AGS	CNS	05/13/14	
3		62	PITA	14.2	AGS	SAW	05/13/14	
3		62	PITA	16.4	AGS	SAW	05/13/14	
3		62	LIST	17.7	AGS	SAW	05/13/14	
3		62	PITA	21.2	AGS	SAW	05/13/14	
3		63	ACRU	8.8	AGS	PLP	05/12/14	
3		63	NYSY	9.8	AGS	PLP	05/12/14	
3		63	ACRU	11.3	AGS	PLP	05/12/14	
3		63	NYSY	11.3	AGS	PLP	05/12/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
3		63	ACRU	11.5	AGS	PLP	05/12/14	
3		63	ACRU	13.4	AGS	SAW	05/12/14	
3		63	ACRU	13.8	AGS	SAW	05/12/14	
3		63	NYSY	15	AGS	SAW	05/12/14	
3		63	LIST	15.6	AGS	SAW	05/12/14	
3		64	ACRU	8	AGS	PLP	05/13/14	
3		64	NYSY	11.7	AGS	PLP	05/13/14	
3		64	NYSY	12	AGS	PLP	05/13/14	
3		64	NYSY	12.2	AGS	PLP	05/13/14	
3		64	NYSY	12.5	AGS	PLP	05/13/14	
3		64	NYSY	12.8	AGS	PLP	05/13/14	
3		64	ACRU	16.5	AGS	SAW	05/13/14	
3		64	ACRU	19.3	AGS	SAW	05/13/14	
3		65	ACRU	8.1	AGS	PLP	05/13/14	
3		65	ACRU	8.9	AGS	PLP	05/13/14	
3		65	ACRU	9.8	AGS	PLP	05/13/14	
3		65	LIST	14	AGS	SAW	05/13/14	
3		65	PITA	16.8	AGS	SAW	05/13/14	
3		65	PITA	18.6	AGS	SAW	05/13/14	
3		65	PITA	19.9	AGS	SAW	05/13/14	
3		65	PITA	20.8	AGS	SAW	05/13/14	
2		67	ACRU	6.4	AGS	PLP	05/14/14	
2		67	NYSY	13.1	AGS	SAW	05/14/14	
2		67	LIST	15.8	AGS	SAW	05/14/14	
2		67	LIST	15.8	AGS	SAW	05/14/14	
2		67	LIST	16.4	AGS	SAW	05/14/14	
2		67	LIST	16.8	AGS	SAW	05/14/14	
2		67	LIST	18.7	AGS	SAW	05/14/14	
2		67	LIST	20.6	AGS	SAW	05/14/14	
2		67	QURU	23.6	AGS	SAW	05/14/14	
2		68	ACRU	10.6	AGS	PLP	05/14/14	
2		68	ACRU	14.1	AGS	SAW	05/14/14	
2		68	LIST	19	AGS	SAW	05/14/14	
2		68	LIST	20.1	AGS	SAW	05/14/14	
2		68	ACRU	23.8	AGS	SAW	05/14/14	
2		68	LITU	29.5	AGS	SAW	05/14/14	
1		70	LIST	17	AGS	SAW	05/14/14	
1		70	LIST	23.4	AGS	SAW	05/14/14	
1		70	PITA	24.5	AGS	SAW	05/14/14	
1		70	LIST	31	AGS	SAW	05/14/14	
1		71	ACRU	9.4	AGS	PLP	05/14/14	
1		71	ACRU	9.4	AGS	PLP	05/14/14	
1		71	LIST	12.9	AGS	PLP	05/14/14	
1		71	LIST	14.7	AGS	SAW	05/14/14	
1		71	LIST	14.7	AGS	SAW	05/14/14	
1		71	LIST	18.5	AGS	SAW	05/14/14	
1		72	UNHW	6.9	AGS	PLP	05/14/14	
1		72	PITA	11.9	AGS	CNS	05/14/14	
1		72	PITA	13.5	AGS	SAW	05/14/14	
1		72	LIST	16.4	AGS	SAW	05/14/14	
1		72	PITA	19	AGS	SAW	05/14/14	
1		72	PITA	21.2	AGS	SAW	05/14/14	
1		72	PITA	21.5	AGS	SAW	05/14/14	
1		72	PITA	21.6	AGS	SAW	05/14/14	
1		72	PITA	23.3	AGS	SAW	05/14/14	
18		73	ACRU	6.2	AGS	PLP	04/30/14	
18		73	LIST	8.5	AGS	PLP	04/30/14	
18		73	LIST	9.9	AGS	PLP	04/30/14	
18		73	LIST	10.6	AGS	PLP	04/30/14	
18		73	ACRU	12.7	AGS	PLP	04/30/14	
18		73	ACRU	13.8	AGS	SAW	04/30/14	
18		73	LIST	16.4	AGS	SAW	04/30/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
18		73	PITA	26.9	AGS	SAW	04/30/14	
18		77	ACRU	9.8	AGS	PLP	04/30/14	
18		77	LIST	10.6	AGS	PLP	04/30/14	
18		77	QURU	11.1	AGS	PLP	04/30/14	
18		77	QURU	12.6	AGS	PLP	04/30/14	
18		77	ACRU	12.7	AGS	PLP	04/30/14	
18		77	QURU	16.4	AGS	SAW	04/30/14	
18		77	QULA	16.7	AGS	SAW	04/30/14	
18		77	QULA	18.1	AGS	SAW	04/30/14	
18		77	PITA	18.6	AGS	SAW	04/30/14	
18		77	QUMI	21.9	AGS	SAW	04/30/14	
18		78	LIST	11.6	AGS	PLP	04/30/14	
18		78	LIST	11.8	AGS	PLP	04/30/14	
18		78	QULA	12.9	AGS	PLP	04/30/14	
18		78	QULA	17.5	AGS	SAW	04/30/14	
18		78	PITA	17.6	AGS	SAW	04/30/14	
18		78	QULA	18.5	AGS	SAW	04/30/14	
18		78	PITA	18.7	AGS	SAW	04/30/14	
18		78	PITA	18.7	AGS	SAW	04/30/14	
18		78	PITA	25.8	AGS	SAW	04/30/14	
18		79	ACRU	10.8	AGS	PLP	04/30/14	
18		79	ACRU	11.3	AGS	PLP	04/30/14	
18		79	PITA	15.1	AGS	SAW	04/30/14	
18		79	PITA	16	AGS	SAW	04/30/14	
18		79	PITA	17.7	AGS	SAW	04/30/14	
18		79	PITA	21.3	AGS	SAW	04/30/14	
18		79	PITA	23.7	AGS	SAW	04/30/14	
18		79	PITA	23.9	AGS	SAW	04/30/14	
10		80	LIST	9.5	AGS	PLP	05/06/14	
10		80	NYSY	10.7	AGS	PLP	05/06/14	
10		80	LIST	11.2	AGS	PLP	05/06/14	
10		80	PITA	14	AGS	SAW	05/06/14	
10		80	QUPH	16.6	AGS	SAW	05/06/14	
10		80	PITA	18.8	AGS	SAW	05/06/14	
10		81	LIST	10.2	AGS	PLP	05/06/14	
10		81	LIST	10.6	AGS	PLP	05/06/14	
10		81	PITA	10.8	AGS	CNS	05/06/14	
10		81	LIST	10.9	AGS	PLP	05/06/14	
10		81	PITA	12.7	AGS	CNS	05/06/14	
10		81	LIST	13	AGS	SAW	05/06/14	
10		81	LIST	13.7	AGS	SAW	05/06/14	
10		81	PITA	19.2	AGS	SAW	05/06/14	
10		82	LIST	8.3	AGS	PLP	05/06/14	
10		82	PITA	8.9	AGS	PLP	05/06/14	
10		82	LIST	11.7	AGS	PLP	05/06/14	
10		82	PITA	18.6	AGS	SAW	05/06/14	
10		82	PITA	20.8	AGS	SAW	05/06/14	
10		82	PITA	23	AGS	SAW	05/06/14	
10		82	PITA	23.5	AGS	SAW	05/06/14	
7		83	ACRU	7.1	AGS	PLP	05/06/14	
7		83	PITA	16.1	AGS	SAW	05/06/14	
7		83	PITA	19.2	AGS	SAW	05/06/14	
7		83	PITA	22	AGS	SAW	05/06/14	
7		83	PITA	23.6	AGS	SAW	05/06/14	
7		83	PITA	24.3	AGS	SAW	05/06/14	
7		83	PITA	24.8	AGS	SAW	05/06/14	
7		84	LIST	9.6	AGS	PLP	05/06/14	
7		84	LIST	10.7	AGS	PLP	05/06/14	
7		84	LIST	14.7	AGS	SAW	05/06/14	
7		84	LIST	15.5	AGS	SAW	05/06/14	
7		84	PITA	22.4	AGS	SAW	05/06/14	
7		84	PITA	22.7	AGS	SAW	05/06/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
7		84	PITA	22.9	AGS	SAW	05/06/14	
7		85	LIST	10.2	AGS	PLP	05/06/14	
7		85	LIST	13.6	AGS	SAW	05/06/14	
7		85	PITA	18	AGS	SAW	05/06/14	
7		85	PITA	20.2	AGS	SAW	05/06/14	
7		85	PITA	22.1	AGS	SAW	05/06/14	
7		85	PITA	24.7	AGS	SAW	05/06/14	
7		85	PITA	26.8	AGS	SAW	05/06/14	
7		85	PITA	29.9	AGS	SAW	05/06/14	
7		86	NYSY	9.4	AGS	PLP	05/06/14	
7		86	NYSY	10	AGS	PLP	05/06/14	
7		86	LIST	12	AGS	PLP	05/06/14	
7		86	LIST	12.4	AGS	PLP	05/06/14	
7		86	LIST	13.4	AGS	SAW	05/06/14	
7		86	PITA	21.9	AGS	SAW	05/06/14	
7		86	PITA	24	AGS	SAW	05/06/14	
7		86	PITA	27	AGS	SAW	05/06/14	
5		89	ACRU	10.7	AGS	PLP	05/13/14	
5		89	ACRU	12.3	AGS	PLP	05/13/14	
5		89	LIST	14.8	AGS	SAW	05/13/14	
5		89	LIST	16.1	AGS	SAW	05/13/14	
5		89	PITA	17.1	AGS	SAW	05/13/14	
5		89	PITA	18.7	AGS	SAW	05/13/14	
5		89	PITA	22	AGS	SAW	05/13/14	
3		90	PITA	8	AGS	PLP	05/12/14	
3		90	PITA	8.5	AGS	PLP	05/12/14	
3		90	PITA	9.8	AGS	CNS	05/12/14	
3		90	PITA	11.1	AGS	CNS	05/12/14	
3		90	PITA	11.8	AGS	CNS	05/12/14	
3		90	PITA	13.1	AGS	SAW	05/12/14	
3		90	PITA	15.7	AGS	SAW	05/12/14	
3		90	PITA	17.3	AGS	SAW	05/12/14	
3		91	NYSY	12.3	AGS	PLP	05/12/14	
3		91	ACRU	13.1	AGS	SAW	05/12/14	
3		91	ACRU	14.7	AGS	SAW	05/12/14	
3		91	LIST	15.1	AGS	SAW	05/12/14	
3		91	ACRU	15.2	AGS	SAW	05/12/14	
3		91	NYSY	15.3	AGS	SAW	05/12/14	
3		91	ACRU	19	AGS	SAW	05/12/14	
3		91	LIST	19	AGS	SAW	05/12/14	
3		92	ACRU	9.1	AGS	PLP	05/13/14	
3		92	ACRU	10.7	AGS	PLP	05/13/14	
3		92	LIST	12.9	AGS	PLP	05/13/14	
3		92	LIST	13.8	AGS	SAW	05/13/14	
3		92	PITA	16.7	AGS	SAW	05/13/14	
3		92	PITA	20.7	AGS	SAW	05/13/14	
2		94	ACRU	7.8	AGS	PLP	05/14/14	
2		94	LIST	16.7	AGS	SAW	05/14/14	
2		94	LIST	18.2	AGS	SAW	05/14/14	
2		94	LIST	21.5	AGS	SAW	05/14/14	
2		94	LIST	25.5	AGS	SAW	05/14/14	
2		95	ACRU	16.5	AGS	SAW	05/14/14	
2		95	LIST	28	AGS	SAW	05/14/14	
2		95	ACRU	37	AGS	SAW	05/14/14	
1		97	ACRU	24	AGS	SAW	05/14/14	
1		98	LIST	7.4	AGS	PLP	05/14/14	
1		98	NYSY	13.5	AGS	SAW	05/14/14	
1		98	ACRU	14.3	AGS	SAW	05/14/14	
1		98	ACRU	14.4	AGS	SAW	05/14/14	
1		98	ACRU	14.6	AGS	SAW	05/14/14	
18		99	LIST	12	AGS	PLP	04/30/14	
18		99	LIST	13.1	AGS	SAW	04/30/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
18		99	ACRU	16	AGS	SAW	04/30/14	
18		99	LIST	16.3	AGS	SAW	04/30/14	
18		99	ACRU	17.9	AGS	SAW	04/30/14	
18		99	QURU	21.7	AGS	SAW	04/30/14	
18		100	NYSY	9.5	AGS	PLP	04/30/14	
18		100	ACRU	12	AGS	PLP	04/30/14	
18		100	LIST	12.8	AGS	PLP	04/30/14	
18		100	LIST	13	AGS	SAW	04/30/14	
18		100	LIST	15.1	AGS	SAW	04/30/14	
18		100	NYSY	15.5	AGS	SAW	04/30/14	
18		100	LIST	15.7	AGS	SAW	04/30/14	
18		100	ACRU	16.9	AGS	SAW	04/30/14	
18		100	ACRU	17.7	AGS	SAW	04/30/14	
18		100	NYSY	18	AGS	SAW	04/30/14	
18		104	LIST	7	AGS	PLP	04/30/14	
18		104	LIST	10.4	AGS	PLP	04/30/14	
18		104	LIST	13	AGS	SAW	04/30/14	
18		104	LIST	14.8	AGS	SAW	04/30/14	
18		104	LIST	15.3	AGS	SAW	04/30/14	
18		104	LIST	22.7	AGS	SAW	04/30/14	
18		105	LIST	10.3	AGS	PLP	04/30/14	
18		105	LIST	14.1	AGS	SAW	04/30/14	
18		105	LIST	14.6	AGS	SAW	04/30/14	
18		105	LIST	15.6	AGS	SAW	04/30/14	
18		105	LIST	16.2	AGS	SAW	04/30/14	
18		105	LIST	16.5	AGS	SAW	04/30/14	
18		105	QULA	22.7	AGS	SAW	04/30/14	
18		106	LIST	6.6	AGS	PLP	04/30/14	
18		106	LIST	11	AGS	PLP	04/30/14	
18		106	LIST	11.3	AGS	PLP	04/30/14	
18		106	QURU	11.3	AGS	PLP	04/30/14	
18		106	LIST	11.5	AGS	PLP	04/30/14	
18		106	LIST	14	AGS	SAW	04/30/14	
18		106	QURU	21.7	AGS	SAW	04/30/14	
18		106	PITA	22	AGS	SAW	04/30/14	
11		107	ACRU	9.2	AGS	PLP	05/07/14	
11		107	ACRU	14.1	AGS	SAW	05/07/14	
11		107	QUNI	15.3	AGS	SAW	05/07/14	
11		107	ACRU	15.7	AGS	SAW	05/07/14	
11		107	PITA	18.8	AGS	SAW	05/07/14	
11		107	QUPH	19.3	AGS	SAW	05/07/14	
11		107	ACRU	20	AGS	SAW	05/07/14	
11		108	ACRU	6.4	AGS	PLP	05/07/14	
11		108	ACRU	9.7	AGS	PLP	05/07/14	
11		108	PITA	15.7	AGS	SAW	05/07/14	
11		108	PITA	16.4	AGS	SAW	05/07/14	
11		108	PITA	18	AGS	SAW	05/07/14	
11		108	PITA	18.4	AGS	SAW	05/07/14	
11		108	PITA	19.6	AGS	SAW	05/07/14	
11		108	PITA	19.7	AGS	SAW	05/07/14	
11		108	PITA	21.7	AGS	SAW	05/07/14	
11		108	PITA	23.9	AGS	SAW	05/07/14	
11		108	PITA	25.8	AGS	SAW	05/07/14	
11		109	ACRU	10.5	AGS	PLP	05/07/14	
11		109	ACRU	11.7	AGS	PLP	05/07/14	
11		109	PITA	14.3	AGS	SAW	05/07/14	
11		109	PITA	14.5	AGS	SAW	05/07/14	
11		109	ACRU	15	AGS	SAW	05/07/14	
11		109	PITA	16.9	AGS	SAW	05/07/14	
11		109	PITA	17	AGS	SAW	05/07/14	
11		109	PITA	17.3	AGS	SAW	05/07/14	
11		109	PITA	17.7	AGS	SAW	05/07/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
11		109	PITA	18	AGS	SAW	05/07/14	
11		109	PITA	19.2	AGS	SAW	05/07/14	
11		109	PITA	19.4	AGS	SAW	05/07/14	
11		109	PITA	19.5	AGS	SAW	05/07/14	
11		109	PITA	24.1	AGS	SAW	05/07/14	
7		115	ACRU	11.4	AGS	PLP	05/06/14	
7		115	PITA	15.8	AGS	SAW	05/06/14	
7		115	PITA	18.6	AGS	SAW	05/06/14	
7		115	PITA	19.3	AGS	SAW	05/06/14	
7		115	PITA	19.8	AGS	SAW	05/06/14	
7		115	PITA	20.1	AGS	SAW	05/06/14	
7		115	ACRU	20.4	AGS	SAW	05/06/14	
7		115	ACRU	20.5	AGS	SAW	05/06/14	
7		115	PITA	21.9	AGS	SAW	05/06/14	
7		116	LIST	7.9	AGS	PLP	05/06/14	
7		116	LIST	8.2	AGS	PLP	05/06/14	
7		116	PITA	12.2	AGS	CNS	05/06/14	
7		116	PITA	16.5	AGS	SAW	05/06/14	
7		116	PITA	16.7	AGS	SAW	05/06/14	
7		116	PITA	17.3	AGS	SAW	05/06/14	
7		116	PITA	17.6	AGS	SAW	05/06/14	
7		116	PITA	18	AGS	SAW	05/06/14	
7		116	PITA	18.2	AGS	SAW	05/06/14	
7		116	PITA	21	AGS	SAW	05/06/14	
7		117	LIST	8.2	AGS	PLP	05/05/14	
7		117	LIST	9.7	AGS	PLP	05/05/14	
7		117	LIST	11	AGS	PLP	05/05/14	
7		117	ACRU	11.4	AGS	PLP	05/05/14	
7		117	ACRU	13.4	AGS	SAW	05/05/14	
7		117	QURU	27.2	AGS	SAW	05/05/14	
7		118	LIST	8.8	AGS	PLP	05/05/14	
7		118	LIST	9.2	AGS	PLP	05/05/14	
7		118	LIST	13.5	AGS	SAW	05/05/14	
7		118	QURU	25.8	AGS	SAW	05/05/14	
7		119	ACRU	6.6	AGS	PLP	05/05/14	
7		119	ACRU	8.1	AGS	PLP	05/05/14	
7		119	PITA	12.9	AGS	CNS	05/05/14	
7		119	QURU	20.8	AGS	SAW	05/05/14	
7		119	PITA	22.5	AGS	SAW	05/05/14	
7		119	PITA	22.8	AGS	SAW	05/05/14	
7		120	ACRU	9.6	AGS	PLP	05/05/14	
7		120	ACRU	9.6	AGS	PLP	05/05/14	
7		120	ACRU	11.7	AGS	PLP	05/05/14	
7		120	ACRU	15.6	AGS	SAW	05/05/14	
7		120	ACRU	17.5	AGS	SAW	05/05/14	
7		120	PITA	19.7	AGS	SAW	05/05/14	
7		120	ACRU	20.1	AGS	SAW	05/05/14	
7		120	PITA	20.7	AGS	SAW	05/05/14	
7		120	PITA	21.6	AGS	SAW	05/05/14	
7		120	ACRU	23.4	AGS	SAW	05/05/14	
3		125	NYSY	10.5	AGS	PLP	05/12/14	
3		125	NYSY	10.9	AGS	PLP	05/12/14	
3		125	PITA	18.4	AGS	SAW	05/12/14	
3		125	ACRU	21.1	AGS	SAW	05/12/14	
3		125	ACRU	22.7	AGS	SAW	05/12/14	
3		126	ACRU	7.8	AGS	PLP	05/12/14	
3		126	LIST	8.8	AGS	PLP	05/12/14	
3		126	ACRU	10.9	AGS	PLP	05/12/14	
3		126	ACRU	11.8	AGS	PLP	05/12/14	
3		126	LIST	12.4	AGS	PLP	05/12/14	
3		126	LIST	15.5	AGS	SAW	05/12/14	
2		129	ACRU	12.2	AGS	PLP	05/14/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
2		129	LIST	19.1	AGS	SAW	05/14/14	
2		129	NYSY	19.1	AGS	SAW	05/14/14	
2		129	ACRU	19.5	AGS	SAW	05/14/14	
2		129	ACRU	26	AGS	SAW	05/14/14	
2		130	UNHW	10	AGS	PLP	05/14/14	
2		130	UNHW	10.5	AGS	PLP	05/14/14	
2		130	UNHW	10.5	AGS	PLP	05/14/14	
2		130	ACRU	18.8	AGS	SAW	05/14/14	
2		130	QURU	24	AGS	SAW	05/14/14	
1		132	LIST	6	AGS	PLP	05/14/14	10BAF
1		132	LIST	6.5	AGS	PLP	05/14/14	10BAF
1		132	LIST	6.5	AGS	PLP	05/14/14	10BAF
1		132	LIST	7.5	AGS	PLP	05/14/14	10BAF
1		132	LIST	8.3	AGS	PLP	05/14/14	10BAF
1		132	LIST	9.1	AGS	PLP	05/14/14	10BAF
1		132	NYSY	9.6	AGS	PLP	05/14/14	10BAF
1		132	LIST	9.8	AGS	PLP	05/14/14	10BAF
1		132	NYSY	12.4	AGS	PLP	05/14/14	10BAF
23		134	LIST	10.7	AGS	PLP	05/15/14	
23		134	ACRU	11.8	AGS	PLP	05/15/14	
23		134	FRPE	12.2	AGS	PLP	05/15/14	
23		134	ACRU	13.7	AGS	SAW	05/15/14	
23		134	ACRU	16.4	AGS	SAW	05/15/14	
23		134	TADI	16.9	AGS	SAW	05/15/14	
23		134	LIST	20.7	AGS	SAW	05/15/14	
23		134	TADI	21.1	AGS	SAW	05/15/14	
18		136	LIST	8.1	AGS	PLP	04/30/14	
18		136	ACRU	9.2	AGS	PLP	04/30/14	
18		136	PITA	17.7	AGS	SAW	04/30/14	
18		136	ACRU	22.3	AGS	SAW	04/30/14	
18		136	PITA	22.6	AGS	SAW	04/30/14	
18		136	PITA	25	AGS	SAW	04/30/14	
18		136	PITA	26	AGS	SAW	04/30/14	
18		136	PITA	29.9	AGS	SAW	04/30/14	
18		136	QULA	30.5	AGS	SAW	04/30/14	
18		138	QURU	15.5	AGS	SAW	04/30/14	
18		138	LIST	15.7	AGS	SAW	04/30/14	
18		138	QURU	16.1	AGS	SAW	04/30/14	
18		138	PITA	17.1	AGS	SAW	04/30/14	
18		138	PITA	18	AGS	SAW	04/30/14	
18		138	QULA	18.8	AGS	SAW	04/30/14	
18		138	LIST	19.4	AGS	SAW	04/30/14	
18		138	QULA	20.3	AGS	SAW	04/30/14	
18		138	QULA	23.2	AGS	SAW	04/30/14	
18		138	PITA	25.7	AGS	SAW	04/30/14	
11		139	LIST	12.1	AGS	PLP	05/07/14	
11		139	PITA	14	AGS	SAW	05/07/14	
11		139	LIST	15.8	AGS	SAW	05/07/14	
11		139	PITA	17.6	AGS	SAW	05/07/14	
11		139	PITA	22.4	AGS	SAW	05/07/14	
11		139	PITA	22.9	AGS	SAW	05/07/14	
11		139	PITA	26.2	AGS	SAW	05/07/14	
11		140	ACRU	9.5	AGS	PLP	05/07/14	
11		140	LIST	10.8	AGS	PLP	05/07/14	
11		140	LIST	12.2	AGS	PLP	05/07/14	
11		140	LIST	13.3	AGS	SAW	05/07/14	
11		140	LIST	13.5	AGS	SAW	05/07/14	
11		140	PITA	15.4	AGS	SAW	05/07/14	
11		140	LIST	15.8	AGS	SAW	05/07/14	
11		141	ACRU	9.2	AGS	PLP	05/07/14	
11		141	LIST	11.4	AGS	PLP	05/07/14	
11		141	ACRU	13.8	AGS	SAW	05/07/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
11		141	QUNI	18.2	AGS	SAW	05/07/14	
11		141	PITA	19.2	AGS	SAW	05/07/14	
11		141	QUPH	20.8	AGS	SAW	05/07/14	
11		142	NYSY	6.9	AGS	PLP	05/07/14	
11		142	LIST	7.2	AGS	PLP	05/07/14	
11		142	LIST	8	AGS	PLP	05/07/14	
11		142	NYSY	8.2	AGS	PLP	05/07/14	
11		142	LIST	9.9	AGS	PLP	05/07/14	
11		142	ACRU	11	AGS	PLP	05/07/14	
11		142	LIST	11.6	AGS	PLP	05/07/14	
11		142	QURU	16	AGS	SAW	05/07/14	
11		142	QUPH	16.3	AGS	SAW	05/07/14	
11		142	QUPH	22.1	AGS	SAW	05/07/14	
11		143	LIST	8.8	AGS	PLP	05/07/14	
11		143	PITA	12.4	AGS	CNS	05/07/14	
11		143	PITA	15	AGS	SAW	05/07/14	
11		143	PITA	15.2	AGS	SAW	05/07/14	
11		143	PITA	15.6	AGS	SAW	05/07/14	
11		143	PITA	15.7	AGS	SAW	05/07/14	
11		143	PITA	17.1	AGS	SAW	05/07/14	
11		143	PITA	18	AGS	SAW	05/07/14	
11		143	PITA	18.5	AGS	SAW	05/07/14	
10		145	PITA	20.5	AGS	SAW	05/06/14	
10		145	PITA	18.7	AGS	SAW	05/06/14	
10		145	PITA	18	AGS	SAW	05/06/14	
10		145	ACRU	8.9	AGS	PLP	05/06/14	
10		145	ACRU	10.7	AGS	PLP	05/06/14	
10		145	NYSY	12.2	AGS	PLP	05/06/14	
10		145	LIST	11.4	AGS	PLP	05/06/14	
10		146	PITA	17.8	AGS	SAW	05/06/14	
10		146	PITA	19.9	AGS	SAW	05/06/14	
10		146	ACRU	11.9	AGS	PLP	05/06/14	
10		146	ACRU	10.1	AGS	PLP	05/06/14	
10		146	ACRU	8.7	AGS	PLP	05/06/14	
10		147	ACRU	9.6	AGS	PLP	05/06/14	
10		147	QUPH	11.7	AGS	PLP	05/06/14	
10		147	QUPH	12.4	AGS	PLP	05/06/14	
10		147	PITA	14.2	AGS	SAW	05/06/14	
10		147	PITA	17	AGS	SAW	05/06/14	
10		147	PITA	17.7	AGS	SAW	05/06/14	
10		147	PITA	18	AGS	SAW	05/06/14	
10		147	PITA	18.1	AGS	SAW	05/06/14	
10		147	PITA	22	AGS	SAW	05/06/14	
7		148	LIST	8.4	AGS	PLP	05/06/14	
7		148	NYSY	8.6	AGS	PLP	05/06/14	
7		148	LIST	9.2	AGS	PLP	05/06/14	
7		148	PITA	10.4	AGS	CNS	05/06/14	
7		148	PITA	13	AGS	SAW	05/06/14	
7		148	PITA	13.1	AGS	SAW	05/06/14	
7		148	PITA	13.8	AGS	SAW	05/06/14	
7		148	PITA	14.2	AGS	SAW	05/06/14	
7		148	PITA	14.9	AGS	SAW	05/06/14	
7		148	PITA	15.8	AGS	SAW	05/06/14	
7		148	PITA	20.6	AGS	SAW	05/06/14	
7		148	PITA	21	AGS	SAW	05/06/14	
7		149	NYSY	9.6	AGS	PLP	05/06/14	
7		149	LIST	10.4	AGS	PLP	05/06/14	
7		149	LIST	11.3	AGS	PLP	05/06/14	
7		149	NYSY	11.8	AGS	PLP	05/06/14	
7		149	QURU	23.5	AGS	SAW	05/06/14	
7		149	QURU	34.8	AGS	SAW	05/06/14	
7		150	NYSY	8.1	AGS	PLP	05/05/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
7		150	LIST	8.5	AGS	PLP	05/05/14	
7		150	PITA	10.8	AGS	CNS	05/05/14	
7		150	PITA	11.4	AGS	CNS	05/05/14	
7		150	ACRU	12.9	AGS	PLP	05/05/14	
7		150	ACRU	15.4	AGS	SAW	05/05/14	
7		150	PITA	16.5	AGS	SAW	05/05/14	
7		150	PITA	19.3	AGS	SAW	05/05/14	
7		150	PITA	20.2	AGS	SAW	05/05/14	
7		151	ACRU	6.8	AGS	PLP	05/05/14	
7		151	ACRU	9.1	AGS	PLP	05/05/14	
7		151	PITA	14	AGS	SAW	05/05/14	
7		151	LIST	16.8	AGS	SAW	05/05/14	
7		151	LIST	16.8	AGS	SAW	05/05/14	
7		151	ACRU	22.6	AGS	SAW	05/05/14	
7		152	LIST	9	AGS	PLP	05/05/14	
7		152	LIST	9.7	AGS	PLP	05/05/14	
7		152	ACRU	11.2	AGS	PLP	05/05/14	
7		152	LIST	11.2	AGS	PLP	05/05/14	
7		152	ACRU	14.6	AGS	SAW	05/05/14	
7		152	QUPH	18.5	AGS	SAW	05/05/14	
7		153	ACRU	8.8	AGS	PLP	05/05/14	
7		153	ACRU	11.8	AGS	PLP	05/05/14	
7		153	ACRU	13.2	AGS	SAW	05/05/14	
7		153	ACRU	13.5	AGS	SAW	05/05/14	
7		153	PITA	15.2	AGS	SAW	05/05/14	
7		153	PITA	15.6	AGS	SAW	05/05/14	
7		153	LIST	17.5	AGS	SAW	05/05/14	
7		153	PITA	17.5	AGS	SAW	05/05/14	
7		153	PITA	18.8	AGS	SAW	05/05/14	
3		159	ACRU	10.7	AGS	PLP	05/12/14	
3		159	ACRU	13.2	AGS	SAW	05/12/14	
3		159	LIST	15.1	AGS	SAW	05/12/14	
3		159	LIST	15.7	AGS	SAW	05/12/14	
3		160	ACRU	9.3	AGS	PLP	05/12/14	
3		160	ACRU	9.4	AGS	PLP	05/12/14	
3		160	ACRU	9.5	AGS	PLP	05/12/14	
3		160	LIST	10.1	AGS	PLP	05/12/14	
3		160	LIST	10.4	AGS	PLP	05/12/14	
3		160	LIST	11	AGS	PLP	05/12/14	
3		160	LIST	12	AGS	PLP	05/12/14	
3		160	LIST	12.5	AGS	PLP	05/12/14	
3		160	LIST	13.4	AGS	SAW	05/12/14	
3		160	LIST	13.4	AGS	SAW	05/12/14	
3		161	NYSY	6	AGS	PLP	05/12/14	
3		161	ACRU	6.3	AGS	PLP	05/12/14	
3		161	ACRU	8.7	AGS	PLP	05/12/14	
3		161	ACRU	9.7	AGS	PLP	05/12/14	
3		161	LIST	11	AGS	PLP	05/12/14	
3		161	ACRU	13.5	AGS	SAW	05/12/14	
2		164	NYSY	9.6	AGS	PLP	05/14/14	
2		164	ACRU	10.2	AGS	PLP	05/14/14	
2		164	LIST	14.4	AGS	SAW	05/14/14	
2		164	PITA	15.1	AGS	SAW	05/14/14	
2		164	PITA	16.2	AGS	SAW	05/14/14	
2		164	PITA	20.7	AGS	SAW	05/14/14	
2		164	QRUR	21	AGS	SAW	05/14/14	
26		165	TADI	7.7	AGS	PLP	04/29/14	
26		165	TADI	9.3	AGS	PLP	04/29/14	
26		165	TADI	9.9	AGS	PLP	04/29/14	
26		165	NYSY	10	AGS	PLP	04/29/14	
26		165	TADI	10.1	AGS	PLP	04/29/14	
26		165	ACRU	10.3	AGS	PLP	04/29/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
26		165	TADI	10.6	AGS	PLP	04/29/14	
26		165	NYSY	11.8	AGS	PLP	04/29/14	
26		165	TADI	12	AGS	PLP	04/29/14	
26		165	TADI	12.4	AGS	PLP	04/29/14	
26		165	NYSY	13.7	AGS	SAW	04/29/14	
26		165	TADI	13.7	AGS	SAW	04/29/14	
26		165	TADI	16.2	AGS	SAW	04/29/14	
26		165	TADI	17.6	AGS	SAW	04/29/14	
26		166	ACRU	7.4	AGS	PLP	04/29/14	
26		166	NYSY	8.6	AGS	PLP	04/29/14	
26		166	TADI	12.4	AGS	PLP	04/29/14	
26		166	TADI	12.5	AGS	PLP	04/29/14	
26		166	TADI	14	AGS	SAW	04/29/14	
26		166	TADI	14.3	AGS	SAW	04/29/14	
26		166	TADI	16.1	AGS	SAW	04/29/14	
26		166	TADI	16.6	AGS	SAW	04/29/14	
26		166	TADI	16.8	AGS	SAW	04/29/14	
26		166	TADI	18.5	AGS	SAW	04/29/14	
26		166	TADI	18.9	AGS	SAW	04/29/14	
26		166	TADI	22.9	AGS	SAW	04/29/14	
26		167	ACRU	8	AGS	PLP	04/29/14	
26		167	TADI	9	AGS	PLP	04/29/14	
26		167	TADI	11.3	AGS	PLP	04/29/14	
26		167	TADI	14	AGS	SAW	04/29/14	
26		167	TADI	15	AGS	SAW	04/29/14	
26		167	TADI	15.5	AGS	SAW	04/29/14	
26		167	TADI	15.7	AGS	SAW	04/29/14	
26		167	TADI	16.8	AGS	SAW	04/29/14	
26		167	TADI	17.4	AGS	SAW	04/29/14	
26		167	TADI	20.5	AGS	SAW	04/29/14	
24		169	ACRU	7.6	AGS	PLP	04/29/14	
24		169	ACRU	7.7	AGS	PLP	04/29/14	
24		169	LIST	14.6	AGS	SAW	04/29/14	
24		169	LIST	16.9	AGS	SAW	04/29/14	
24		169	TADI	18	AGS	SAW	04/29/14	
24		169	TADI	18	AGS	SAW	04/29/14	
24		169	TADI	18.9	AGS	SAW	04/29/14	
24		169	TADI	19	AGS	SAW	04/29/14	
24		169	TADI	20.1	AGS	SAW	04/29/14	
24		169	TADI	22.9	AGS	SAW	04/29/14	
24		169	TADI	26.2	AGS	SAW	04/29/14	
24		170	ACRU	12.3	AGS	PLP	04/29/14	
24		170	TADI	13.1	AGS	SAW	04/29/14	
24		170	TADI	15	AGS	SAW	04/29/14	
24		170	TADI	15	AGS	SAW	04/29/14	
24		170	TADI	16	AGS	SAW	04/29/14	
24		170	TADI	16.2	AGS	SAW	04/29/14	
24		170	TADI	19.1	AGS	SAW	04/29/14	
24		170	TADI	21	AGS	SAW	04/29/14	
24		170	TADI	21.2	AGS	SAW	04/29/14	
24		170	ACRU	21.8	AGS	SAW	04/29/14	
24		170	TADI	25.6	AGS	SAW	04/29/14	
20		174	FRPE	14.1	AGS	SAW	05/15/14	
20		174	ACRU	17	AGS	SAW	05/15/14	
20		174	ACRU	17.5	AGS	SAW	05/15/14	
20		174	TADI	18	AGS	SAW	05/15/14	
20		174	LIST	22.6	AGS	SAW	05/15/14	
20		174	TADI	23	AGS	SAW	05/15/14	
11		175	PITA	6.3	AGS	PLP	05/07/14	10baf
11		175	PITA	7	AGS	PLP	05/07/14	10baf
11		175	PITA	7.5	AGS	PLP	05/07/14	10baf
11		175	PITA	7.6	AGS	PLP	05/07/14	10baf

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
11		175	PITA	8.5	AGS	PLP	05/07/14	10baf
11		175	PITA	9.4	AGS	CNS	05/07/14	10baf
11		175	PITA	9.6	AGS	CNS	05/07/14	10baf
11		175	PITA	9.8	AGS	CNS	05/07/14	10baf
11		175	PITA	11.2	AGS	CNS	05/07/14	10baf
11		176	ACRU	7.7	AGS	PLP	05/07/14	
11		176	LIST	8.2	AGS	PLP	05/07/14	
11		176	ACRU	8.5	AGS	PLP	05/07/14	
11		176	ACRU	10.1	AGS	PLP	05/07/14	
11		176	LIST	11	AGS	PLP	05/07/14	
11		176	LIST	11.8	AGS	PLP	05/07/14	
11		176	LIST	11.9	AGS	PLP	05/07/14	
11		176	PITA	16.4	AGS	SAW	05/07/14	
11		177	ACRU	10.2	AGS	PLP	05/07/14	
11		177	QURU	11.5	AGS	PLP	05/07/14	
11		177	QURU	12.6	AGS	PLP	05/07/14	
11		177	PITA	14.5	AGS	SAW	05/07/14	
11		177	LIST	14.9	AGS	SAW	05/07/14	
11		177	LIST	16.3	AGS	SAW	05/07/14	
11		177	QUNI	17.7	AGS	SAW	05/07/14	
11		177	PITA	19.9	AGS	SAW	05/07/14	
11		178	PITA	11	AGS	CNS	05/07/14	
11		178	PITA	13.8	AGS	SAW	05/07/14	
11		178	QUNI	14.4	AGS	SAW	05/07/14	
11		178	PITA	15.7	AGS	SAW	05/07/14	
11		178	PITA	16.5	AGS	SAW	05/07/14	
11		178	PITA	16.8	AGS	SAW	05/07/14	
11		178	PITA	17	AGS	SAW	05/07/14	
11		178	PITA	17.4	AGS	SAW	05/07/14	
11		178	PITA	18	AGS	SAW	05/07/14	
11		178	PITA	21.1	AGS	SAW	05/07/14	
11		178	PITA	21.8	AGS	SAW	05/07/14	
11		179	ACRU	11	AGS	PLP	05/07/14	
11		179	ACRU	12.5	AGS	PLP	05/07/14	
11		179	PITA	14.6	AGS	SAW	05/07/14	
11		179	PITA	15.6	AGS	SAW	05/07/14	
11		179	PITA	17.6	AGS	SAW	05/07/14	
11		179	PITA	19.7	AGS	SAW	05/07/14	
11		179	PITA	20.7	AGS	SAW	05/07/14	
10		181	NYSY	13.4	AGS	SAW	05/06/14	
10		181	NYSY	11.7	AGS	PLP	05/06/14	
10		181	ACRU	14	AGS	SAW	05/06/14	
10		181	ACRU	12.1	AGS	PLP	05/06/14	
10		181	LIST	15	AGS	SAW	05/06/14	
10		181	PITA	19.4	AGS	SAW	05/06/14	
10		182	NYSY	12.7	AGS	PLP	05/06/14	
10		182	PITA	22.3	AGS	SAW	05/06/14	
10		182	PITA	16.8	AGS	SAW	05/06/14	
10		182	ACRU	10.7	AGS	PLP	05/06/14	
10		182	ACRU	12.3	AGS	PLP	05/06/14	
9		183	ACRU	6.4	AGS	PLP	05/05/14	
9		183	LIST	7.4	AGS	PLP	05/05/14	
9		183	LIST	8.7	AGS	PLP	05/05/14	
9		183	ACRU	9.3	AGS	PLP	05/05/14	
9		183	PITA	11.3	AGS	CNS	05/05/14	
9		183	PITA	13	AGS	SAW	05/05/14	
9		183	PITA	13.3	AGS	SAW	05/05/14	
9		183	PITA	13.6	AGS	SAW	05/05/14	
9		183	PITA	14.2	AGS	SAW	05/05/14	
9		183	PITA	14.2	AGS	SAW	05/05/14	
9		183	PITA	14.6	AGS	SAW	05/05/14	
9		183	PITA	14.9	AGS	SAW	05/05/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
9		183	PITA	16.2	AGS	SAW	05/05/14	
9		183	PITA	16.8	AGS	SAW	05/05/14	
9		183	PITA	23.4	AGS	SAW	05/05/14	
6		184	PITA	9.1	AGS	CNS	05/06/14	
6		184	PITA	9.5	AGS	CNS	05/06/14	
6		184	PITA	9.6	AGS	CNS	05/06/14	
6		184	PITA	10.4	AGS	CNS	05/06/14	
6		184	PITA	11.4	AGS	CNS	05/06/14	
6		184	PITA	11.7	AGS	CNS	05/06/14	
6		184	PITA	12.4	AGS	CNS	05/06/14	
6		184	PITA	12.9	AGS	CNS	05/06/14	
6		184	PITA	15.9	AGS	SAW	05/06/14	
6		185	ACRU	19.6	AGS	SAW	05/06/14	
6		185	PITA	24	AGS	SAW	05/06/14	
6		185	PITA	24	AGS	SAW	05/06/14	
6		186	ACRU	10.3	AGS	PLP	05/06/14	
6		186	ACRU	10.8	AGS	PLP	05/06/14	
6		186	PITA	14.8	AGS	SAW	05/06/14	
6		186	ACRU	17	UGS	SAW	05/06/14	rotten
6		186	PITA	19.2	AGS	SAW	05/06/14	
6		186	PITA	19.7	AGS	SAW	05/06/14	
6		186	PITA	22	AGS	SAW	05/06/14	
5		187	NYSY	10.5	AGS	PLP	05/12/14	
5		187	LIST	12.1	AGS	PLP	05/12/14	
5		187	PITA	12.4	AGS	CNS	05/12/14	
5		187	LIST	12.9	AGS	PLP	05/12/14	
5		187	ACRU	13.7	AGS	SAW	05/12/14	
5		187	LIST	14.1	AGS	SAW	05/12/14	
5		187	PITA	15.2	AGS	SAW	05/12/14	
5		187	PITA	18.2	AGS	SAW	05/12/14	
5		188	ACRU	8.9	AGS	PLP	05/12/14	
5		188	ACRU	10	AGS	PLP	05/12/14	
5		188	NYSY	11	AGS	PLP	05/12/14	
5		188	ACRU	11.4	AGS	PLP	05/12/14	
5		188	PITA	14.6	AGS	SAW	05/12/14	
5		188	PITA	16.7	AGS	SAW	05/12/14	
5		188	PITA	16.8	AGS	SAW	05/12/14	
5		188	PITA	19.4	AGS	SAW	05/12/14	
5		188	PITA	23.6	AGS	SAW	05/12/14	
5		189	ACRU	8.8	AGS	PLP	05/12/14	
5		189	NYSY	9.3	AGS	PLP	05/12/14	
5		189	ACRU	11.1	AGS	PLP	05/12/14	
5		189	PITA	13.5	AGS	SAW	05/12/14	
5		189	PITA	14.9	AGS	SAW	05/12/14	
5		189	PITA	15.9	AGS	SAW	05/12/14	
5		190	PITA	18.4	AGS	SAW	05/12/14	
5		190	ACRU	9.5	AGS	PLP	05/12/14	
5		190	ACRU	8.4	AGS	PLP	05/12/14	
5		190	ACRU	8.6	AGS	PLP	05/12/14	
5		190	ACRU	19	AGS	SAW	05/12/14	
5		190	ACRU	10.2	AGS	PLP	05/12/14	
5		190	ACRU	20	AGS	SAW	05/12/14	
5		190	ACRU	9.6	AGS	PLP	05/12/14	
5		190	LIST	14.9	AGS	SAW	05/12/14	
5		192	ACRU	8.9	AGS	PLP	05/12/14	
5		192	ACRU	7.5	AGS	PLP	05/12/14	
5		192	ACRU	10.8	AGS	PLP	05/12/14	
5		192	ACRU	14.3	AGS	SAW	05/12/14	
5		192	LIST	10.9	AGS	PLP	05/12/14	
5		192	LIST	11.7	AGS	PLP	05/12/14	
5		192	LIST	15.1	AGS	SAW	05/12/14	
5		192	LIST	11.3	AGS	PLP	05/12/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
5		192	LIST	12.9	AGS	PLP	05/12/14	
5		192	NYSY	10.9	AGS	PLP	05/12/14	
5		192	NYSY	8.2	AGS	PLP	05/12/14	
5		191	NYSY	8.7	AGS	PLP	05/12/14	
5		191	NYSY	11.1	AGS	PLP	05/12/14	
5		191	ACRU	9.6	AGS	PLP	05/12/14	
5		191	ACRU	7.7	AGS	PLP	05/12/14	
5		191	ACRU	9	AGS	PLP	05/12/14	
5		191	LIST	12.2	AGS	PLP	05/12/14	
5		191	LIST	14.7	AGS	SAW	05/12/14	
5		191	PITA	15	AGS	SAW	05/12/14	
3		193	LIST	9.9	AGS	PLP	05/12/14	
3		193	QURU	11.8	AGS	PLP	05/12/14	
3		193	PITA	12.3	AGS	CNS	05/12/14	
3		193	LIST	12.4	AGS	PLP	05/12/14	
3		193	PITA	12.9	AGS	CNS	05/12/14	
3		193	PITA	14.5	AGS	SAW	05/12/14	
3		194	PITA	10.2	AGS	CNS	05/12/14	
3		194	PITA	11.9	AGS	CNS	05/12/14	
3		194	PITA	12.5	AGS	CNS	05/12/14	
3		194	PITA	13.7	AGS	SAW	05/12/14	
3		194	PITA	13.8	AGS	SAW	05/12/14	
3		194	PITA	13.8	AGS	SAW	05/12/14	
3		194	PITA	14.1	AGS	SAW	05/12/14	
3		194	PITA	14.4	AGS	SAW	05/12/14	
4		195	ACRU	7.7	AGS	PLP	05/12/14	
4		195	PITA	8	AGS	PLP	05/12/14	
4		195	PITA	8.3	AGS	PLP	05/12/14	
4		195	PITA	11.2	AGS	CNS	05/12/14	
4		195	PITA	12.2	AGS	CNS	05/12/14	
4		195	PITA	12.3	AGS	CNS	05/12/14	
4		195	PITA	13.4	AGS	SAW	05/12/14	
2		196	ACRU	12.7	AGS	PLP	05/14/14	
2		196	LIST	12.7	AGS	PLP	05/14/14	
2		196	ACRU	13.2	AGS	SAW	05/14/14	
2		196	LIST	13.2	AGS	SAW	05/14/14	
2		196	LIST	14.9	AGS	SAW	05/14/14	
2		196	PITA	17.2	AGS	SAW	05/14/14	
2		197	NYSY	8.7	AGS	PLP	05/14/14	
2		197	ACRU	10.9	AGS	PLP	05/14/14	
2		197	ACRU	12.4	AGS	PLP	05/14/14	
2		197	ACRU	12.8	AGS	PLP	05/14/14	
2		197	LIST	13.7	AGS	SAW	05/14/14	
2		197	PITA	17.5	AGS	SAW	05/14/14	
2		197	PITA	18.1	AGS	SAW	05/14/14	
26		198	ACRU	7.6	AGS	PLP	04/29/14	
26		198	TADI	10.8	AGS	PLP	04/29/14	
26		198	TADI	11	AGS	PLP	04/29/14	
26		198	TADI	11.3	AGS	PLP	04/29/14	
26		198	TADI	11.8	AGS	PLP	04/29/14	
26		198	TADI	13.6	AGS	SAW	04/29/14	
26		198	TADI	15.6	AGS	SAW	04/29/14	
26		198	TADI	16.8	AGS	SAW	04/29/14	
26		198	TADI	16.9	AGS	SAW	04/29/14	
26		198	TADI	26.5	AGS	SAW	04/29/14	
25		199	LIST	8.2	AGS	PLP	04/29/14	
25		199	LIST	9.9	AGS	PLP	04/29/14	
25		199	PITA	14.4	AGS	SAW	04/29/14	
25		199	LIST	15.5	AGS	SAW	04/29/14	
25		199	ACRU	16.3	AGS	SAW	04/29/14	
25		199	PITA	16.4	AGS	SAW	04/29/14	
25		199	PITA	19	AGS	SAW	04/29/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
25		199	PITA	19.2	AGS	SAW	04/29/14	
25		199	PITA	23.9	AGS	SAW	04/29/14	
25		199	PITA	24	AGS	SAW	04/29/14	
25		200	ACRU	11.7	AGS	PLP	04/29/14	
25		200	TADI	13	AGS	SAW	04/29/14	
25		200	LIST	13.4	AGS	SAW	04/29/14	
25		200	TADI	15.1	AGS	SAW	04/29/14	
25		200	ACRU	15.9	AGS	SAW	04/29/14	
24		201	TADI	6.8	AGS	PLP	04/29/14	
24		201	ACRU	6.9	AGS	PLP	04/29/14	
24		201	TADI	8.8	AGS	PLP	04/29/14	
24		201	ACRU	9.9	AGS	PLP	04/29/14	
24		201	ACRU	11.5	AGS	PLP	04/29/14	
24		201	NYSY	11.5	AGS	PLP	04/29/14	
25		202	ACRU	9.6	AGS	PLP	04/29/14	
25		202	LIST	13	AGS	SAW	04/29/14	
25		202	LIST	13.2	AGS	SAW	04/29/14	
25		202	LIST	15.6	AGS	SAW	04/29/14	
25		202	PITA	16	AGS	SAW	04/29/14	
25		202	LIST	21.1	AGS	SAW	04/29/14	
25		202	PITA	23.2	AGS	SAW	04/29/14	
24		204	ACRU	7.5	AGS	PLP	04/29/14	
24		204	ACRU	12.4	AGS	PLP	04/29/14	
24		204	TADI	13.6	AGS	SAW	04/29/14	
24		204	TADI	14.8	AGS	SAW	04/29/14	
24		204	TADI	15	AGS	SAW	04/29/14	
24		204	ACRU	17	AGS	SAW	04/29/14	
24		204	ACRU	18	AGS	SAW	04/29/14	
24		204	LIST	23.8	AGS	SAW	04/29/14	
23		205	TADI	12.1	AGS	PLP	04/29/14	
23		205	TADI	12.8	AGS	PLP	04/29/14	
23		205	TADI	13	AGS	SAW	04/29/14	
23		205	TADI	13.2	AGS	SAW	04/29/14	
23		205	TADI	14.3	AGS	SAW	04/29/14	
23		205	TADI	15.5	AGS	SAW	04/29/14	
23		205	TADI	16.8	AGS	SAW	04/29/14	
23		205	TADI	21	AGS	SAW	04/29/14	
23		206	ACRU	8.9	AGS	PLP	04/29/14	
23		206	ACRU	10.3	AGS	PLP	04/29/14	
23		206	ACRU	11	AGS	PLP	04/29/14	
23		206	TADI	12.4	AGS	PLP	04/29/14	
23		206	TADI	13.9	AGS	SAW	04/29/14	
23		206	LIST	14.4	AGS	SAW	04/29/14	
23		206	TADI	15.2	AGS	SAW	04/29/14	
23		206	LIST	16.7	AGS	SAW	04/29/14	
23		206	TADI	19.4	AGS	SAW	04/29/14	
23		206	TADI	20.4	AGS	SAW	04/29/14	
20		209	ACRU	7.9	UGS	PLP	05/15/14	
20		209	LIST	8.2	AGS	PLP	05/15/14	
20		209	LIST	8.8	AGS	PLP	05/15/14	
20		209	ACRU	10.5	AGS	PLP	05/15/14	
20		209	TADI	14.8	AGS	SAW	05/15/14	
20		209	TADI	15.1	AGS	SAW	05/15/14	
20		209	TADI	18.4	AGS	SAW	05/15/14	
20		209	TADI	23.2	AGS	SAW	05/15/14	
20		210	LIST	7	AGS	PLP	05/15/14	
20		210	LIST	7.3	AGS	PLP	05/15/14	
20		210	FRPE	7.7	AGS	PLP	05/15/14	
20		210	ACRU	8.9	AGS	PLP	05/15/14	
20		210	TADI	13.2	AGS	SAW	05/15/14	
20		210	TADI	16.4	AGS	SAW	05/15/14	
20		211	ACRU	7.7	AGS	PLP	04/30/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
20		211	ACRU	8.8	AGS	PLP	04/30/14	
20		211	ACRU	9.5	AGS	PLP	04/30/14	
20		211	ACRU	9.6	AGS	PLP	04/30/14	
20		211	LIST	10.2	AGS	PLP	04/30/14	
20		211	ACRU	11.8	AGS	PLP	04/30/14	
20		211	ACRU	14	AGS	SAW	04/30/14	
20		211	PITA	19.2	AGS	SAW	04/30/14	
20		211	TADI	21.2	AGS	SAW	04/30/14	
19		215	ACRU	8.7	AGS	PLP	04/30/14	
19		215	LIST	8.8	AGS	PLP	04/30/14	
19		215	LIST	8.9	AGS	PLP	04/30/14	
19		215	ACRU	9.6	AGS	PLP	04/30/14	
19		215	ACRU	12.2	AGS	PLP	04/30/14	
19		215	ACRU	12.7	AGS	PLP	04/30/14	
19		215	LIST	12.8	AGS	PLP	04/30/14	
19		215	LIST	14.3	AGS	SAW	04/30/14	
19		215	LIST	14.5	AGS	SAW	04/30/14	
13		216	LIST	8.4	AGS	PLP	05/07/14	
13		216	LIST	10.2	AGS	PLP	05/07/14	
13		216	LIST	11.4	AGS	PLP	05/07/14	
13		216	LIST	11.6	AGS	PLP	05/07/14	
13		216	LIST	11.9	AGS	PLP	05/07/14	
13		216	LIST	13.4	AGS	SAW	05/07/14	
13		216	LIST	14.7	AGS	SAW	05/07/14	
13		216	LIST	16.2	AGS	SAW	05/07/14	
13		217	ACRU	7.2	AGS	PLP	05/07/14	10baf
13		217	LIST	8.3	AGS	PLP	05/07/14	10baf
13		217	ACRU	9.8	AGS	PLP	05/07/14	10baf
13		217	ACRU	9.9	AGS	PLP	05/07/14	10baf
13		217	LIST	10.3	AGS	PLP	05/07/14	10baf
13		217	LIST	10.4	AGS	PLP	05/07/14	10baf
13		217	ACRU	10.8	AGS	PLP	05/07/14	10baf
13		217	ACRU	11.3	AGS	PLP	05/07/14	10baf
13		217	LIST	11.6	AGS	PLP	05/07/14	10baf
13		217	LIST	14	AGS	SAW	05/07/14	10baf
9		219	LIST	9.8	AGS	PLP	05/05/14	
9		219	LIST	12.4	AGS	PLP	05/05/14	
9		219	PITA	15.9	AGS	SAW	05/05/14	
9		219	PITA	16.7	AGS	SAW	05/05/14	
9		219	ACRU	17.4	AGS	SAW	05/05/14	
9		219	PITA	17.6	AGS	SAW	05/05/14	
9		219	PITA	17.8	UGS	SAW	05/05/14	rotten
9		219	PITA	18.4	AGS	SAW	05/05/14	
9		219	PITA	18.9	AGS	SAW	05/05/14	
9		219	PITA	20.4	AGS	SAW	05/05/14	
9		219	PITA	21.1	AGS	SAW	05/05/14	
9		220	LIST	7.6	AGS	PLP	05/05/14	
9		220	LIST	10.2	AGS	PLP	05/05/14	
9		220	ACRU	10.7	AGS	PLP	05/05/14	
9		220	PITA	11.5	AGS	CNS	05/05/14	
9		220	ACRU	11.6	AGS	PLP	05/05/14	
9		220	PITA	12.9	AGS	CNS	05/05/14	
9		220	PITA	16.3	AGS	SAW	05/05/14	
9		220	PITA	16.7	AGS	SAW	05/05/14	
9		220	PITA	19.3	AGS	SAW	05/05/14	
9		220	PITA	19.6	AGS	SAW	05/05/14	
9		220	PITA	21.4	AGS	SAW	05/05/14	
9		221	NYSY	7.8	AGS	PLP	05/05/14	
9		221	NYSY	9.4	AGS	PLP	05/05/14	
9		221	NYSY	10.2	AGS	PLP	05/05/14	
9		221	NYSY	10.7	AGS	PLP	05/05/14	
9		221	NYSY	14.5	AGS	SAW	05/05/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
9		221	NYSY	15	AGS	SAW	05/05/14	
6		222	ACRU	10.8	AGS	PLP	05/06/14	
6		222	PITA	12.7	AGS	CNS	05/06/14	
6		222	PITA	14	AGS	SAW	05/06/14	
6		222	PITA	14.8	AGS	SAW	05/06/14	
6		223	ACRU	8	AGS	PLP	05/06/14	
6		223	ACRU	11.3	AGS	PLP	05/06/14	
6		223	ACRU	11.5	AGS	PLP	05/06/14	
6		223	ACRU	13	AGS	SAW	05/06/14	
6		223	ACRU	13.4	UGS	SAW	05/06/14	
6		223	ACRU	13.7	AGS	SAW	05/06/14	
6		223	ACRU	14.2	UGS	SAW	05/06/14	
6		224	ACRU	7	AGS	PLP	05/06/14	
6		224	ACRU	9.2	AGS	PLP	05/06/14	
6		224	LIST	10.6	AGS	PLP	05/06/14	
6		224	LIST	11.7	AGS	PLP	05/06/14	
6		224	ACRU	13.4	AGS	SAW	05/06/14	
6		224	ACRU	13.6	AGS	SAW	05/06/14	
6		224	LIST	13.9	AGS	SAW	05/06/14	
5		225	ACRU	13.5	AGS	SAW	05/12/14	
5		225	PITA	16.3	AGS	SAW	05/12/14	
5		225	ACRU	18.4	AGS	SAW	05/12/14	
5		225	PITA	18.4	AGS	SAW	05/12/14	
5		225	ACRU	18.5	AGS	SAW	05/12/14	
5		225	PITA	18.8	AGS	SAW	05/12/14	
5		225	PITA	21.8	AGS	SAW	05/12/14	
5		225	PITA	23.4	AGS	SAW	05/12/14	
4		227	ACRU	6.4	AGS	PLP	05/12/14	
4		227	NYSY	9.1	AGS	PLP	05/12/14	
4		227	PITA	10	AGS	CNS	05/12/14	
4		227	PITA	10.2	AGS	CNS	05/12/14	
4		227	PITA	10.4	AGS	CNS	05/12/14	
4		227	PITA	11.3	AGS	CNS	05/12/14	
4		227	PITA	12.6	AGS	CNS	05/12/14	
4		228	NYSY	6.3	AGS	PLP	05/12/14	
4		228	PITA	6.4	AGS	PLP	05/12/14	
4		228	PITA	8.8	AGS	PLP	05/12/14	
4		228	PITA	9.7	AGS	CNS	05/12/14	
4		228	LIST	10.4	AGS	PLP	05/12/14	
4		228	PITA	12.1	AGS	CNS	05/12/14	
4		228	PITA	12.7	AGS	CNS	05/12/14	
4		228	PITA	12.8	AGS	CNS	05/12/14	
4		230	LIST	8.1	AGS	PLP	05/12/14	
4		230	PITA	10.2	AGS	CNS	05/12/14	
4		230	PITA	11.5	AGS	CNS	05/12/14	
4		230	PITA	11.7	AGS	CNS	05/12/14	
4		230	PITA	12.3	AGS	CNS	05/12/14	
4		230	PITA	14.2	AGS	SAW	05/12/14	
4		231	PITA	8.2	AGS	PLP	05/12/14	
4		231	PITA	9.6	AGS	CNS	05/12/14	
4		231	PITA	10.5	AGS	CNS	05/12/14	
4		231	PITA	10.8	AGS	CNS	05/12/14	
4		231	PITA	11.4	AGS	CNS	05/12/14	
4		231	PITA	11.7	AGS	CNS	05/12/14	
4		231	PITA	12.4	AGS	CNS	05/12/14	
26		235	TADI	6.7	AGS	PLP	04/29/14	
26		235	ACRU	6.8	AGS	PLP	04/29/14	
26		235	TADI	8.3	AGS	PLP	04/29/14	
26		235	TADI	8.6	AGS	PLP	04/29/14	
26		235	TADI	11	AGS	PLP	04/29/14	
26		235	ACRU	11.3	AGS	PLP	04/29/14	
26		235	TADI	12.4	AGS	PLP	04/29/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
26		235	ACRU	14.9	AGS	SAW	04/29/14	
26		235	LIST	15.6	AGS	SAW	04/29/14	
26		235	TADI	17.5	AGS	SAW	04/29/14	
25		236	PITA	15	AGS	SAW	04/29/14	
25		236	LIST	19.5	AGS	SAW	04/29/14	
25		236	LIST	20	AGS	SAW	04/29/14	
25		236	PITA	22.3	AGS	SAW	04/29/14	
25		236	QURU	22.9	AGS	SAW	04/29/14	
25		236	QURU	26.4	AGS	SAW	04/29/14	
25		236	QURU	31.6	AGS	SAW	04/29/14	
25		237	LIST	7.9	AGS	PLP	04/29/14	
25		237	ACRU	8.4	AGS	PLP	04/29/14	
25		237	PITA	11.9	AGS	CNS	04/29/14	
25		237	LIST	13.3	AGS	SAW	04/29/14	
25		237	LIST	13.9	AGS	SAW	04/29/14	
25		237	LIST	14.4	AGS	SAW	04/29/14	
25		237	LIST	15	AGS	SAW	04/29/14	
25		237	LIST	15.3	AGS	SAW	04/29/14	
25		237	LIST	16.9	AGS	SAW	04/29/14	
25		237	LIST	17.4	AGS	SAW	04/29/14	
25		237	LIST	21.2	AGS	SAW	04/29/14	
24		238	TADI	9.7	AGS	PLP	04/29/14	
24		238	ACRU	9.9	AGS	PLP	04/29/14	
24		238	TADI	12.1	AGS	PLP	04/29/14	
24		238	TADI	13	AGS	SAW	04/29/14	
24		238	TADI	13.6	AGS	SAW	04/29/14	
24		238	TADI	14.3	AGS	SAW	04/29/14	
24		238	TADI	15	AGS	SAW	04/29/14	
24		238	TADI	15.4	AGS	SAW	04/29/14	
24		238	TADI	18	AGS	SAW	04/29/14	
24		238	TADI	18.6	AGS	SAW	04/29/14	
24		238	TADI	20.5	AGS	SAW	04/29/14	
24		239	TADI	10	AGS	PLP	04/29/14	
24		239	TADI	12.2	AGS	PLP	04/29/14	
24		239	TADI	12.9	AGS	PLP	04/29/14	
24		239	TADI	13.8	AGS	SAW	04/29/14	
24		239	TADI	14.3	AGS	SAW	04/29/14	
24		239	TADI	16.9	AGS	SAW	04/29/14	
24		239	TADI	19.3	AGS	SAW	04/29/14	
23		240	TADI	8.9	AGS	PLP	04/29/14	
23		240	TADI	12.8	AGS	PLP	04/29/14	
23		240	TADI	13.7	AGS	SAW	04/29/14	
23		240	TADI	15.5	AGS	SAW	04/29/14	
23		240	TADI	15.8	AGS	SAW	04/29/14	
23		240	TADI	16.2	AGS	SAW	04/29/14	
23		240	TADI	19	AGS	SAW	04/29/14	
23		240	TADI	21.2	AGS	SAW	04/29/14	
20		242	LIST	7.4	AGS	PLP	05/15/14	
20		242	ACRU	10.2	AGS	PLP	05/15/14	
20		242	ACRU	10.7	AGS	PLP	05/15/14	
20		242	NYSY	11.6	AGS	PLP	05/15/14	
20		242	ACRU	11.7	AGS	PLP	05/15/14	
20		242	TADI	14.8	AGS	SAW	05/15/14	
20		242	TADI	15	AGS	SAW	05/15/14	
20		242	PITA	20	AGS	SAW	05/15/14	
20		243	ACRU	6.5	AGS	PLP	05/15/14	
20		243	LIST	9	AGS	PLP	05/15/14	
20		243	FRPE	11.5	AGS	PLP	05/15/14	
20		243	LIST	11.6	AGS	PLP	05/15/14	
20		243	FRPE	13.4	AGS	SAW	05/15/14	
20		243	TADI	14.9	AGS	SAW	05/15/14	
20		243	TADI	16.1	AGS	SAW	05/15/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
20		243	TADI	16.4	AGS	SAW	05/15/14	
20		243	TADI	18	AGS	SAW	05/15/14	
20		243	TADI	19	AGS	SAW	05/15/14	
20		244	ACRU	7.8	AGS	PLP	05/15/14	
20		244	LIST	10.4	AGS	PLP	05/15/14	
20		244	ACRU	10.7	AGS	PLP	05/15/14	
20		244	LIST	11.1	AGS	PLP	05/15/14	
20		244	TADI	12.9	AGS	PLP	05/15/14	
20		244	LIST	13.4	AGS	SAW	05/15/14	
20		244	LIST	13.8	AGS	SAW	05/15/14	
20		244	TADI	16.9	AGS	SAW	05/15/14	
19		248	ACRU	7.3	AGS	PLP	04/30/14	
19		248	LIST	8.3	AGS	PLP	04/30/14	
19		248	ACRU	8.7	AGS	PLP	04/30/14	
19		248	LIST	8.7	AGS	PLP	04/30/14	
19		248	LIST	8.9	AGS	PLP	04/30/14	
19		248	LIST	9.3	AGS	PLP	04/30/14	
19		248	TADI	10	AGS	PLP	04/30/14	
19		248	LIST	10.7	AGS	PLP	04/30/14	
19		248	LIST	11.6	AGS	PLP	04/30/14	
19		248	ACRU	14.4	AGS	SAW	04/30/14	
19		248	TADI	16.5	AGS	SAW	04/30/14	
19		249	ACRU	9.5	AGS	PLP	04/30/14	
19		249	ACRU	10.4	AGS	PLP	04/30/14	
19		249	ACRU	11.5	AGS	PLP	04/30/14	
19		249	ACRU	14.8	AGS	SAW	04/30/14	
19		249	ACRU	16.6	AGS	SAW	04/30/14	
19		249	ACRU	17.2	AGS	SAW	04/30/14	
19		249	ACRU	17.5	AGS	SAW	04/30/14	
19		249	PITA	19.8	AGS	SAW	04/30/14	
14		250	LIST	12.3	AGS	PLP	05/07/14	
14		250	TADI	12.8	AGS	PLP	05/07/14	
14		250	ACRU	17.5	AGS	SAW	05/07/14	
14		250	PITA	18.4	AGS	SAW	05/07/14	
14		250	PITA	18.4	AGS	SAW	05/07/14	
14		250	LIST	19.8	AGS	SAW	05/07/14	
14		250	PITA	22	AGS	SAW	05/07/14	
14		250	LIST	23.9	AGS	SAW	05/07/14	
14		251	ACRU	9.5	AGS	PLP	05/07/14	
14		251	ACRU	10.7	AGS	PLP	05/07/14	
14		251	ACRU	11.6	AGS	PLP	05/07/14	
14		251	ACRU	14.2	AGS	SAW	05/07/14	
14		251	ACRU	14.4	AGS	SAW	05/07/14	
14		251	LIST	17	AGS	SAW	05/07/14	
14		251	PITA	17	AGS	SAW	05/07/14	
14		251	LIST	18.5	AGS	SAW	05/07/14	
14		251	LIST	19	AGS	SAW	05/07/14	
14		251	PITA	19.7	AGS	SAW	05/07/14	
14		251	LIST	20.6	AGS	SAW	05/07/14	
14		251	PITA	22.5	AGS	SAW	05/07/14	
14		251	LIST	22.9	AGS	SAW	05/07/14	
14		251	PITA	24.5	AGS	SAW	05/07/14	
14		252	NYSY	13.1	AGS	SAW	05/07/14	
14		252	LIST	13.3	AGS	SAW	05/07/14	
14		252	PITA	14.8	AGS	SAW	05/07/14	
14		252	LIST	14.9	AGS	SAW	05/07/14	
14		252	LIST	15.9	AGS	SAW	05/07/14	
14		252	LIST	18	AGS	SAW	05/07/14	
14		252	PITA	18	AGS	SAW	05/07/14	
14		252	LIST	19	AGS	SAW	05/07/14	
9		254	PITA	8.2	AGS	PLP	05/05/14	
9		254	PITA	8.4	AGS	PLP	05/05/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
9		254	PITA	10.5	AGS	CNS	05/05/14	
9		254	PITA	12.4	AGS	CNS	05/05/14	
9		254	PITA	13.7	AGS	SAW	05/05/14	
9		254	PITA	13.9	AGS	SAW	05/05/14	
9		254	PITA	14.6	AGS	SAW	05/05/14	
9		254	PITA	14.7	AGS	SAW	05/05/14	
9		254	PITA	15.6	AGS	SAW	05/05/14	
9		254	PITA	16.2	AGS	SAW	05/05/14	
9		254	PITA	23.1	AGS	SAW	05/05/14	
9		255	LIST	9.5	AGS	PLP	05/05/14	
9		255	LIST	10.3	AGS	PLP	05/05/14	
9		255	LIST	10.9	AGS	PLP	05/05/14	
9		255	LIST	11.7	AGS	PLP	05/05/14	
9		255	LIST	13	AGS	SAW	05/05/14	
9		255	LIST	13.6	AGS	SAW	05/05/14	
9		255	LIST	16	AGS	SAW	05/05/14	
9		255	LIST	17.7	AGS	SAW	05/05/14	
6		257	NYSY	7.6	AGS	PLP	05/06/14	
6		257	LIST	9.7	AGS	PLP	05/06/14	
6		257	LIST	10.7	AGS	PLP	05/06/14	
6		257	PITA	11.8	AGS	CNS	05/06/14	
6		257	PITA	12.6	AGS	CNS	05/06/14	
6		257	PITA	14.1	AGS	SAW	05/06/14	
6		257	PITA	14.8	AGS	SAW	05/06/14	
6		258	LIST	6.7	AGS	PLP	05/06/14	10baf
6		258	LIST	6.9	AGS	PLP	05/06/14	10baf
6		258	LIST	8.4	AGS	PLP	05/06/14	10baf
6		258	LIST	9.1	AGS	PLP	05/06/14	10baf
6		258	PITA	9.3	AGS	CNS	05/06/14	10baf
6		258	QUPH	9.4	AGS	PLP	05/06/14	10baf
6		258	PITA	15	AGS	SAW	05/06/14	10baf
4		259	ACRU	7.6	AGS	PLP	05/12/14	
4		259	LIST	9.4	AGS	PLP	05/12/14	
4		259	LIST	10.1	AGS	PLP	05/12/14	
4		259	PITA	11.2	AGS	CNS	05/12/14	
4		259	LIST	12.2	AGS	PLP	05/12/14	
4		259	ACRU	13.8	AGS	SAW	05/12/14	
4		260	PITA	8.4	AGS	PLP	05/12/14	
4		260	PITA	10.1	AGS	CNS	05/12/14	
4		260	ACRU	10.5	AGS	PLP	05/12/14	
4		260	PITA	10.7	AGS	CNS	05/12/14	
4		260	PITA	12.2	AGS	CNS	05/12/14	
4		260	LIST	12.4	AGS	PLP	05/12/14	
25		261	ACRU	9.5	AGS	PLP	04/29/14	
25		261	LIST	12	AGS	PLP	04/29/14	
25		261	LIST	12.3	AGS	PLP	04/29/14	
25		261	LIST	13.5	AGS	SAW	04/29/14	
25		261	PITA	14.1	AGS	SAW	04/29/14	
25		261	LIST	16.2	AGS	SAW	04/29/14	
25		261	PITA	19	AGS	SAW	04/29/14	
25		262	ACRU	8.2	AGS	PLP	04/29/14	
25		262	LIST	10.8	AGS	PLP	04/29/14	
25		262	PITA	12.4	AGS	CNS	04/29/14	
25		262	PITA	16.9	AGS	SAW	04/29/14	
25		262	PITA	17	AGS	SAW	04/29/14	
25		262	PITA	17.1	AGS	SAW	04/29/14	
25		262	ACRU	22.7	AGS	SAW	04/29/14	
21		263	ACRU	7.2	AGS	PLP	05/15/14	10BAF
21		263	ACRU	7.8	AGS	PLP	05/15/14	10BAF
21		263	ACRU	8.8	AGS	PLP	05/15/14	10BAF
21		263	ACRU	9.2	AGS	PLP	05/15/14	10BAF
21		263	LIST	9.4	AGS	PLP	05/15/14	10BAF

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
21		263	ACRU	10.2	AGS	PLP	05/15/14	10BAF
21		263	ACRU	10.9	AGS	PLP	05/15/14	10BAF
21		263	LIST	11.2	AGS	PLP	05/15/14	10BAF
21		264	LIST	7.8	AGS	PLP	05/15/14	10BAF
21		264	ACRU	8.1	AGS	PLP	05/15/14	10BAF
21		264	ACRU	8.4	AGS	PLP	05/15/14	10BAF
21		264	ACRU	9.5	AGS	PLP	05/15/14	10BAF
21		264	LIST	9.8	AGS	PLP	05/15/14	10BAF
21		264	LIST	10	AGS	PLP	05/15/14	10BAF
19		269	TADI	8	AGS	PLP	04/30/14	
19		269	ACRU	10.5	AGS	PLP	04/30/14	
19		269	TADI	11.5	AGS	PLP	04/30/14	
19		269	LIST	12.5	AGS	PLP	04/30/14	
19		269	TADI	12.8	AGS	PLP	04/30/14	
19		269	TADI	15.1	AGS	SAW	04/30/14	
19		269	TADI	17.4	AGS	SAW	04/30/14	
19		269	PITA	19	AGS	SAW	04/30/14	
14		270	ACRU	8	AGS	PLP	05/07/14	
14		270	NYSY	9.6	AGS	PLP	05/07/14	
14		270	LIST	15.4	AGS	SAW	05/07/14	
14		270	PITA	18.2	AGS	SAW	05/07/14	
14		270	PITA	20.8	AGS	SAW	05/07/14	
14		270	PITA	22	AGS	SAW	05/07/14	
15		271	LIST	12.8	AGS	PLP	05/07/14	
15		271	PITA	14.8	AGS	SAW	05/07/14	
15		271	PITA	15.2	AGS	SAW	05/07/14	
15		271	PITA	15.9	AGS	SAW	05/07/14	
15		271	PITA	17	AGS	SAW	05/07/14	
15		271	PITA	18.1	AGS	SAW	05/07/14	
15		271	PITA	18.9	AGS	SAW	05/07/14	
15		271	PITA	20.2	AGS	SAW	05/07/14	
15		271	PITA	20.8	AGS	SAW	05/07/14	
15		272	ACRU	10.3	AGS	PLP	05/07/14	
15		272	PITA	13.8	AGS	SAW	05/07/14	
15		272	PITA	15.4	AGS	SAW	05/07/14	
15		272	PITA	15.7	AGS	SAW	05/07/14	
15		272	PITA	19.3	AGS	SAW	05/07/14	
15		272	PITA	19.6	AGS	SAW	05/07/14	
15		272	PITA	20.5	AGS	SAW	05/07/14	
15		272	PITA	23.3	AGS	SAW	05/07/14	
15		272	PITA	24.5	AGS	SAW	05/07/14	
15		273	PITA	13.1	AGS	SAW	05/07/14	
15		273	PITA	13.8	AGS	SAW	05/07/14	
15		273	QUPH	14.2	AGS	SAW	05/07/14	
15		273	PITA	15.3	AGS	SAW	05/07/14	
15		273	PITA	16.1	AGS	SAW	05/07/14	
15		273	PITA	17.1	AGS	SAW	05/07/14	
15		273	PITA	17.3	AGS	SAW	05/07/14	
15		273	PITA	17.3	AGS	SAW	05/07/14	
15		273	PITA	19.4	AGS	SAW	05/07/14	
14		274	NYSY	6.6	AGS	PLP	05/07/14	
14		274	NYSY	7.1	AGS	PLP	05/07/14	
14		274	NYSY	8.1	AGS	PLP	05/07/14	
14		274	NYSY	9.8	AGS	PLP	05/07/14	
14		274	NYSY	10.8	AGS	PLP	05/07/14	
14		274	NYSY	11.1	AGS	PLP	05/07/14	
14		274	NYSY	11.1	AGS	PLP	05/07/14	
14		274	ACRU	13.7	UGS	SAW	05/07/14	rotten
8		275	NYSY	7.1	AGS	PLP	05/05/14	
8		275	LIST	8.2	AGS	PLP	05/05/14	
8		275	LIST	9.7	AGS	PLP	05/05/14	
8		275	PITA	10	AGS	CNS	05/05/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
8		275	PITA	12.4	AGS	CNS	05/05/14	
8		275	LIST	12.6	AGS	PLP	05/05/14	
8		275	PITA	13.2	AGS	SAW	05/05/14	
8		275	PITA	14.8	AGS	SAW	05/05/14	
8		276	QURU	8	AGS	PLP	05/05/14	
8		276	PITA	9.7	AGS	CNS	05/05/14	
8		276	PITA	10.6	AGS	CNS	05/05/14	
8		276	PITA	12.6	AGS	CNS	05/05/14	
8		276	PITA	13.8	AGS	SAW	05/05/14	
8		276	PITA	13.8	AGS	SAW	05/05/14	
8		276	PITA	14.4	AGS	SAW	05/05/14	
8		276	PITA	14.6	AGS	SAW	05/05/14	
8		276	QUPH	17.5	AGS	SAW	05/05/14	
8		276	PITA	18.8	AGS	SAW	05/05/14	
8		277	NYSY	7.7	AGS	PLP	05/05/14	
8		277	LIST	12.2	AGS	PLP	05/05/14	
8		277	LIST	12.5	AGS	PLP	05/05/14	
8		277	PITA	15.2	AGS	SAW	05/05/14	
8		277	PITA	19.5	AGS	SAW	05/05/14	
8		277	PITA	24.9	AGS	SAW	05/05/14	
21		281	ACRU	6.5	AGS	PLP	04/30/14	10baf
21		281	ACRU	7.4	AGS	PLP	04/30/14	10baf
21		281	ACRU	8	AGS	PLP	04/30/14	10baf
21		281	ACRU	8.4	AGS	PLP	04/30/14	10baf
21		281	ACRU	8.9	AGS	PLP	04/30/14	10baf
21		282	ACRU	7.6	AGS	PLP	04/30/14	10baf
21		282	ACRU	8.5	AGS	PLP	04/30/14	10baf
21		282	LIST	9.1	AGS	PLP	04/30/14	10baf
21		282	LIST	10.1	AGS	PLP	04/30/14	10baf
21		282	ACRU	10.3	AGS	PLP	04/30/14	10baf
21		282	ACRU	10.6	AGS	PLP	04/30/14	10baf
21		282	ACRU	11	AGS	PLP	04/30/14	10baf
21		282	ACRU	15.2	AGS	SAW	04/30/14	10baf
21		283	ACRU	6.1	AGS	PLP	04/30/14	10baf
21		283	LIST	6.3	AGS	PLP	04/30/14	10baf
21		283	ACRU	6.7	AGS	PLP	04/30/14	10baf
21		283	ACRU	7	AGS	PLP	04/30/14	10baf
21		283	ACRU	7.6	AGS	PLP	04/30/14	10baf
21		283	ACRU	8.1	AGS	PLP	04/30/14	10baf
21		283	ACRU	9	AGS	PLP	04/30/14	10baf
21		283	ACRU	9.9	AGS	PLP	04/30/14	10baf
21		284	LIST	7.1	AGS	PLP	04/30/14	10baf
21		284	LIST	7.6	AGS	PLP	04/30/14	10baf
21		284	LIST	9.1	AGS	PLP	04/30/14	10baf
21		284	LIST	10.3	AGS	PLP	04/30/14	10baf
15		289	PITA	10	AGS	CNS	05/07/14	
15		289	PITA	10.1	AGS	CNS	05/07/14	
15		289	PITA	10.5	AGS	CNS	05/07/14	
15		289	PITA	11.9	AGS	CNS	05/07/14	
15		289	PITA	13	AGS	SAW	05/07/14	
15		289	PITA	13.1	AGS	SAW	05/07/14	
15		289	ACRU	13.2	AGS	SAW	05/07/14	
15		289	PITA	17.1	AGS	SAW	05/07/14	
14		290	ACRU	9.2	AGS	PLP	05/07/14	
14		290	ACRU	10.3	AGS	PLP	05/07/14	
14		290	PITA	14.9	AGS	SAW	05/07/14	
14		290	PITA	15.5	AGS	SAW	05/07/14	
14		290	PITA	17	AGS	SAW	05/07/14	
14		290	PITA	17.4	AGS	SAW	05/07/14	
12		291	ACRU	8.5	AGS	PLP	05/05/14	
12		291	ACRU	9.2	AGS	PLP	05/05/14	
12		291	LIST	13.5	AGS	SAW	05/05/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
12		291	PITA	18.6	AGS	SAW	05/05/14	
12		291	LIST	21	AGS	SAW	05/05/14	
12		292	ACRU	13.4	AGS	SAW	05/05/14	
12		292	ACRU	16.2	AGS	SAW	05/05/14	
12		292	LIST	18.4	AGS	SAW	05/05/14	
12		292	PITA	23.8	AGS	SAW	05/05/14	
8		294	PITA	9.1	AGS	CNS	05/05/14	
8		294	PITA	9.4	AGS	CNS	05/05/14	
8		294	PITA	10.8	AGS	CNS	05/05/14	
8		294	PITA	11	AGS	CNS	05/05/14	
8		294	PITA	11.2	AGS	CNS	05/05/14	
8		294	PITA	11.5	AGS	CNS	05/05/14	
8		294	PITA	12	AGS	CNS	05/05/14	
8		295	NYSY	6.8	AGS	PLP	05/05/14	
8		295	NYSY	7.6	AGS	PLP	05/05/14	
8		295	PITA	17.8	AGS	SAW	05/05/14	
25		296	LIST	11.2	AGS	PLP	04/29/14	
25		296	ACRU	12.4	AGS	PLP	04/29/14	
25		296	PITA	13.9	AGS	SAW	04/29/14	
25		296	LIST	15.9	AGS	SAW	04/29/14	
25		296	PITA	15.9	AGS	SAW	04/29/14	
25		296	PITA	19.2	AGS	SAW	04/29/14	
25		296	PITA	24.6	AGS	SAW	04/29/14	
16		297	ACRU	6.3	AGS	PLP	05/05/14	
16		297	ACRU	8.3	AGS	PLP	05/05/14	
16		297	PITA	8.9	AGS	PLP	05/05/14	
16		297	LIST	11.1	AGS	PLP	05/05/14	
16		297	PITA	12.8	AGS	CNS	05/05/14	
16		297	PITA	13.8	AGS	SAW	05/05/14	
16		297	PITA	15.1	AGS	SAW	05/05/14	
16		297	PITA	16	AGS	SAW	05/05/14	
16		298	ACRU	9.2	AGS	PLP	05/05/14	
16		298	LIST	10	AGS	PLP	05/05/14	
16		298	ACRU	10.5	AGS	PLP	05/05/14	
16		298	ACRU	11.1	AGS	PLP	05/05/14	
16		298	ACRU	11.5	AGS	PLP	05/05/14	
16		298	ACRU	12.6	AGS	PLP	05/05/14	
16		298	PITA	16	AGS	SAW	05/05/14	
16		299	ACRU	7.2	AGS	PLP	05/05/14	
16		299	LIST	7.6	AGS	PLP	05/05/14	
16		299	ACRU	9.2	AGS	PLP	05/05/14	
16		299	ACRU	12.7	AGS	PLP	05/05/14	
16		299	ACRU	13.3	AGS	SAW	05/05/14	
16		299	PITA	16.8	AGS	SAW	05/05/14	
16		299	PITA	17.5	AGS	SAW	05/05/14	
16		299	PITA	19.8	AGS	SAW	05/05/14	
16		300	ACRU	7.6	AGS	PLP	05/05/14	
16		300	ACRU	11.5	AGS	PLP	05/05/14	
16		300	PITA	15.6	AGS	SAW	05/05/14	
16		300	ACRU	16.3	AGS	SAW	05/05/14	
16		300	PITA	17.2	AGS	SAW	05/05/14	
16		300	PITA	17.9	AGS	SAW	05/05/14	
16		300	QUPH	28.5	AGS	SAW	05/05/14	
12		301	PITA	8.4	AGS	PLP	05/05/14	
12		301	PITA	9.2	AGS	CNS	05/05/14	
12		301	PITA	9.4	AGS	CNS	05/05/14	
12		301	PITA	10.1	AGS	CNS	05/05/14	
12		301	PITA	10.4	AGS	CNS	05/05/14	
12		301	PITA	10.6	AGS	CNS	05/05/14	
12		301	PITA	11	AGS	CNS	05/05/14	
12		301	PITA	11.2	AGS	CNS	05/05/14	
12		301	PITA	14.3	AGS	SAW	05/05/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
22		304	ACRU	10.4	AGS	PLP	05/15/14	
22		304	PITA	11.7	AGS	CNS	05/15/14	
22		304	ACRU	13.2	AGS	SAW	05/15/14	
22		304	PITA	14.5	AGS	SAW	05/15/14	
22		304	PITA	15.4	AGS	SAW	05/15/14	
22		304	PITA	18.5	AGS	SAW	05/15/14	
22		304	PITA	22	AGS	SAW	05/15/14	
17		305	ACRU	7.2	AGS	PLP	05/05/14	
17		305	ACRU	10	AGS	PLP	05/05/14	
17		305	PITA	13.3	AGS	SAW	05/05/14	
17		305	PITA	17.8	AGS	SAW	05/05/14	
17		305	PITA	18.5	AGS	SAW	05/05/14	
17		305	ACRU	19	AGS	SAW	05/05/14	
17		306	ACRU	8.2	AGS	PLP	05/05/14	
17		306	ACRU	8.3	AGS	PLP	05/05/14	
17		306	ACRU	9.5	AGS	PLP	05/05/14	
17		306	ACRU	10.2	AGS	PLP	05/05/14	
17		306	ACRU	10.4	AGS	PLP	05/05/14	
17		306	PITA	15.2	AGS	SAW	05/05/14	
17		306	PITA	15.6	AGS	SAW	05/05/14	
17		309	ACRU	8.2	AGS	PLP	05/05/14	
17		309	ACRU	9	AGS	PLP	05/05/14	
17		309	ACRU	9.1	AGS	PLP	05/05/14	
17		309	ACRU	9.7	AGS	PLP	05/05/14	
17		309	LIST	9.9	AGS	PLP	05/05/14	
17		309	ACRU	12.1	AGS	PLP	05/05/14	
16		310	ACRU	9.6	AGS	PLP	05/05/14	10baf
16		310	ACRU	10.2	AGS	PLP	05/05/14	10baf
16		310	ACRU	10.8	AGS	PLP	05/05/14	10baf
16		310	LIST	12.6	AGS	PLP	05/05/14	10baf
16		310	LIST	13.5	AGS	SAW	05/05/14	10baf
12		311	PITA	7.7	AGS	PLP	05/05/14	
12		311	PITA	8	AGS	PLP	05/05/14	
12		311	PITA	8	AGS	PLP	05/05/14	
12		311	PITA	8.5	AGS	PLP	05/05/14	
12		311	PITA	9.1	AGS	CNS	05/05/14	
12		311	PITA	10	AGS	CNS	05/05/14	
12		311	PITA	10.7	AGS	CNS	05/05/14	
12		311	PITA	11	AGS	CNS	05/05/14	
12		311	PITA	12	AGS	CNS	05/05/14	
12		311	PITA	13.4	AGS	SAW	05/05/14	
12		311	PITA	14.4	AGS	SAW	05/05/14	
31		313	ACRU	7.3	AGS	PLP	04/23/14	
31		313	PITA	9.6	AGS	CNS	04/23/14	
31		313	PITA	10.9	AGS	CNS	04/23/14	
31		313	PITA	11.4	AGS	CNS	04/23/14	
31		313	PITA	12.3	AGS	CNS	04/23/14	
31		313	PITA	12.4	AGS	CNS	04/23/14	
31		313	PITA	14	AGS	SAW	04/23/14	
31		313	PITA	14.8	AGS	SAW	04/23/14	
31		313	PITA	15.8	AGS	SAW	04/23/14	
31		314	PITA	6.3	AGS	PLP	04/28/14	
31		314	PITA	6.4	AGS	PLP	04/28/14	
31		314	LIST	6.6	AGS	PLP	04/28/14	
31		314	LIST	6.7	AGS	PLP	04/28/14	
31		314	LIST	8	AGS	PLP	04/28/14	
31		314	PITA	8.9	AGS	PLP	04/28/14	
31		314	PITA	9.6	AGS	CNS	04/28/14	
31		314	PITA	9.9	AGS	CNS	04/28/14	
31		314	PITA	10.1	AGS	CNS	04/28/14	
31		314	PITA	10.8	AGS	CNS	04/28/14	
31		314	PITA	11.1	AGS	CNS	04/28/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
31		315	PITA	7.3	AGS	PLP	04/28/14	10BAF
31		315	PITA	7.6	AGS	PLP	04/28/14	10BAF
31		315	PITA	7.8	AGS	PLP	04/28/14	10BAF
31		315	PITA	8.2	AGS	PLP	04/28/14	10BAF
31		315	PITA	9.4	AGS	CNS	04/28/14	10BAF
31		315	PITA	9.6	AGS	CNS	04/28/14	10BAF
31		315	PITA	9.9	AGS	CNS	04/28/14	10BAF
31		315	PITA	9.9	AGS	CNS	04/28/14	10BAF
31		315	PITA	10	AGS	CNS	04/28/14	10BAF
31		315	PITA	10	AGS	CNS	04/28/14	10BAF
31		315	PITA	10.9	AGS	CNS	04/28/14	10BAF
29		316	ACRU	9.3	AGS	PLP	04/23/14	
29		316	ACRU	10.7	AGS	PLP	04/23/14	
29		316	ACRU	11	AGS	PLP	04/23/14	
29		316	ACRU	11.4	AGS	PLP	04/23/14	
29		316	ACRU	13.2	AGS	SAW	04/23/14	
29		316	ACRU	13.8	AGS	SAW	04/23/14	
29		316	LIST	18.5	AGS	SAW	04/23/14	
29		316	PITA	22.4	AGS	SAW	04/23/14	
29		316	PITA	25.5	AGS	SAW	04/23/14	
29		317	ACRU	6.2	AGS	PLP	04/23/14	
29		317	ACRU	8.1	AGS	PLP	04/23/14	
29		317	ACRU	9.2	AGS	PLP	04/23/14	
29		317	ACRU	10.6	AGS	PLP	04/23/14	
29		317	ACRU	14.7	AGS	SAW	04/23/14	
29		317	PITA	16.7	AGS	SAW	04/23/14	
29		317	PITA	20.7	AGS	SAW	04/23/14	
29		318	PITA	14.6	AGS	SAW	04/23/14	
29		318	PITA	15.1	AGS	SAW	04/23/14	
29		318	PITA	15.6	AGS	SAW	04/23/14	
29		318	PITA	16	AGS	SAW	04/23/14	
29		318	PITA	16.2	AGS	SAW	04/23/14	
29		318	PITA	19	AGS	SAW	04/23/14	
29		318	PITA	20.8	AGS	SAW	04/23/14	
29		318	PITA	22	AGS	SAW	04/23/14	
29		318	PITA	25.7	AGS	SAW	04/23/14	
22		319	ACRU	9.4	AGS	PLP	05/15/14	
22		319	PITA	11.4	AGS	CNS	05/15/14	
22		319	PITA	13.8	AGS	SAW	05/15/14	
22		319	PITA	15.7	AGS	SAW	05/15/14	
22		319	PITA	18.4	AGS	SAW	05/15/14	
22		320	PITA	12	AGS	CNS	05/15/14	
22		320	PITA	14.8	AGS	SAW	05/15/14	
22		320	PITA	16.3	AGS	SAW	05/15/14	
22		320	PITA	18	AGS	SAW	05/15/14	
31		322	LIST	6.5	AGS	PLP	04/28/14	
31		322	PITA	8.5	AGS	PLP	04/28/14	
31		322	PITA	9.1	AGS	CNS	04/28/14	
31		322	PITA	9.2	AGS	CNS	04/28/14	
31		322	PITA	9.3	AGS	CNS	04/28/14	
31		322	LIST	9.5	AGS	PLP	04/28/14	
31		322	PITA	9.9	AGS	CNS	04/28/14	
31		322	PITA	9.9	AGS	CNS	04/28/14	
31		322	PITA	10.5	AGS	CNS	04/28/14	
31		322	PITA	11.3	AGS	CNS	04/28/14	
29		324	ACRU	7	AGS	PLP	04/23/14	
29		324	PITA	10.1	AGS	CNS	04/23/14	
29		324	PITA	13.6	AGS	SAW	04/23/14	
29		324	PITA	13.8	AGS	SAW	04/23/14	
29		324	PITA	15.1	AGS	SAW	04/23/14	
29		324	PITA	15.8	AGS	SAW	04/23/14	
29		324	PITA	19.1	AGS	SAW	04/23/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
29		325	LIST	8.1	AGS	PLP	04/23/14	
29		325	ACRU	8.5	AGS	PLP	04/23/14	
29		325	LIST	10.5	AGS	PLP	04/23/14	
29		325	LIST	12.3	AGS	PLP	04/23/14	
29		325	PITA	14	AGS	SAW	04/23/14	
29		325	LIST	15.9	AGS	SAW	04/23/14	
29		325	PITA	16.6	AGS	SAW	04/23/14	
29		325	PITA	18.7	AGS	SAW	04/23/14	
29		325	PITA	19.2	AGS	SAW	04/23/14	
29		326	ACRU	6.1	AGS	PLP	04/23/14	
29		326	ACRU	9.2	AGS	PLP	04/23/14	
29		326	ACRU	10	AGS	PLP	04/23/14	
29		326	PITA	15.5	AGS	SAW	04/23/14	
29		326	PITA	18.4	AGS	SAW	04/23/14	
29		326	PITA	18.5	AGS	SAW	04/23/14	
29		326	PITA	21.5	AGS	SAW	04/23/14	
31		329	PITA	7.8	AGS	PLP	04/23/14	
31		329	PITA	8.5	AGS	PLP	04/23/14	
31		329	PITA	9.1	AGS	CNS	04/23/14	
31		329	PITA	9.9	AGS	CNS	04/23/14	
31		329	PITA	10.8	AGS	CNS	04/23/14	
31		329	PITA	11.3	AGS	CNS	04/23/14	
31		329	PITA	14.5	AGS	SAW	04/23/14	
31		329	PITA	16	AGS	SAW	04/23/14	
31		329	PITA	16.9	AGS	SAW	04/23/14	
31		329	PITA	17.6	AGS	SAW	04/23/14	
31		329	PITA	18	AGS	SAW	04/23/14	
29		332	PITA	8.8	AGS	PLP	04/23/14	
29		332	PITA	10.6	AGS	CNS	04/23/14	
29		332	PITA	10.7	AGS	CNS	04/23/14	
29		332	PITA	11.2	AGS	CNS	04/23/14	
29		332	PITA	12	AGS	CNS	04/23/14	
29		332	PITA	12	AGS	CNS	04/23/14	
29		332	PITA	13.6	AGS	SAW	04/23/14	
29		332	PITA	14.5	AGS	SAW	04/23/14	
29		332	PITA	17.8	AGS	SAW	04/23/14	
29		333	PITA	8.3	AGS	PLP	04/23/14	
29		333	LIST	8.6	AGS	PLP	04/23/14	
29		333	PITA	11.1	AGS	CNS	04/23/14	
29		333	PITA	11.8	AGS	CNS	04/23/14	
29		333	PITA	12.6	AGS	CNS	04/23/14	
29		333	PITA	13	AGS	SAW	04/23/14	
29		333	PITA	13.4	AGS	SAW	04/23/14	
29		333	PITA	13.4	AGS	SAW	04/23/14	
29		333	PITA	14	AGS	SAW	04/23/14	
29		333	PITA	14.3	AGS	SAW	04/23/14	
29		333	PITA	14.9	AGS	SAW	04/23/14	
29		333	PITA	15	AGS	SAW	04/23/14	
29		333	PITA	17.2	AGS	SAW	04/23/14	
29		334	ACRU	10.1	AGS	PLP	04/23/14	
29		334	PITA	10.7	AGS	CNS	04/23/14	
29		334	ACRU	11.7	AGS	PLP	04/23/14	
29		334	PITA	11.7	AGS	CNS	04/23/14	
29		334	PITA	12.4	AGS	CNS	04/23/14	
29		334	PITA	13.3	AGS	SAW	04/23/14	
29		334	PITA	15.5	AGS	SAW	04/23/14	
29		334	PITA	18	AGS	SAW	04/23/14	
29		334	PITA	18.3	AGS	SAW	04/23/14	
29		334	PITA	21.5	AGS	SAW	04/23/14	
27		335	TADI	6.7	AGS	PLP	04/28/14	
27		335	ACRU	9.5	AGS	PLP	04/28/14	
27		335	ACRU	10.6	AGS	PLP	04/28/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
27		335	ACRU	11.6	AGS	PLP	04/28/14	
27		335	ACRU	13	AGS	SAW	04/28/14	
27		335	ACRU	15.2	AGS	SAW	04/28/14	
27		335	LIST	18.8	AGS	SAW	04/28/14	
27		336	ACRU	7.2	AGS	PLP	04/28/14	
27		336	ACRU	7.8	AGS	PLP	04/28/14	
27		336	ACRU	8.5	AGS	PLP	04/28/14	
27		336	ACRU	9.4	AGS	PLP	04/28/14	
27		336	ACRU	12.4	AGS	PLP	04/28/14	
27		336	ACRU	13.2	AGS	SAW	04/28/14	
27		336	PITA	15.2	AGS	SAW	04/28/14	
27		336	PITA	16.6	AGS	SAW	04/28/14	
27		337	TADI	8.7	AGS	PLP	04/28/14	
27		337	ACRU	10	AGS	PLP	04/28/14	
27		337	ACRU	11.4	AGS	PLP	04/28/14	
27		337	NYSY	11.9	AGS	PLP	04/28/14	
27		337	TADI	12	AGS	PLP	04/28/14	
27		337	TADI	12.3	AGS	PLP	04/28/14	
27		337	TADI	12.9	AGS	PLP	04/28/14	
27		337	TADI	12.9	AGS	PLP	04/28/14	
27		337	TADI	15.9	AGS	SAW	04/28/14	
27		337	TADI	16.1	AGS	SAW	04/28/14	
27		337	TADI	18.1	AGS	SAW	04/28/14	
27		337	NYSY	20	AGS	SAW	04/28/14	
27		338	TADI	7.2	AGS	PLP	04/28/14	
27		338	TADI	8.7	AGS	PLP	04/28/14	
27		338	TADI	9.2	AGS	PLP	04/28/14	
27		338	ACRU	11.4	AGS	PLP	04/28/14	
27		338	ACRU	12.6	AGS	PLP	04/28/14	
27		338	LIST	17.1	AGS	SAW	04/28/14	
27		338	ACRU	17.2	AGS	SAW	04/28/14	
27		339	TADI	10.6	AGS	PLP	04/28/14	
27		339	ACRU	10.8	AGS	PLP	04/28/14	
27		339	ACRU	11.2	AGS	PLP	04/28/14	
27		339	ACRU	12.4	AGS	PLP	04/28/14	
27		339	TADI	15.6	AGS	SAW	04/28/14	
27		339	TADI	16.6	AGS	SAW	04/28/14	
31		344	PITA	8.2	AGS	PLP	04/23/14	
31		344	PITA	8.5	AGS	PLP	04/23/14	
31		344	PITA	8.9	AGS	PLP	04/23/14	
31		344	PITA	9.1	AGS	CNS	04/23/14	
31		344	PITA	9.9	AGS	CNS	04/23/14	
31		344	PITA	10.7	AGS	CNS	04/23/14	
31		344	PITA	11	AGS	CNS	04/23/14	
31		344	PITA	13	AGS	SAW	04/23/14	
31		344	PITA	13.3	AGS	SAW	04/23/14	
31		344	PITA	14.3	AGS	SAW	04/23/14	
31		344	PITA	15.2	AGS	SAW	04/23/14	
30		345	LIST	6.9	AGS	PLP	04/28/14	
30		345	PITA	9.6	AGS	CNS	04/28/14	
30		345	PITA	14	AGS	SAW	04/28/14	
30		345	PITA	15.5	AGS	SAW	04/28/14	
30		345	PITA	16.1	AGS	SAW	04/28/14	
30		346	PITA	12.7	AGS	CNS	04/28/14	
30		346	PITA	15	AGS	SAW	04/28/14	
30		346	PITA	15.9	AGS	SAW	04/28/14	
30		346	PITA	16.9	AGS	SAW	04/28/14	
30		346	PITA	17.6	AGS	SAW	04/28/14	
30		346	PITA	18.9	AGS	SAW	04/28/14	
30		347	PITA	8	AGS	PLP	04/28/14	
30		347	PITA	10.5	AGS	CNS	04/28/14	
30		347	LIST	12.1	AGS	PLP	04/28/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
30		347	PITA	12.4	AGS	CNS	04/28/14	
30		347	PITA	12.6	AGS	CNS	04/28/14	
30		347	PITA	12.9	AGS	CNS	04/28/14	
30		347	PITA	13.5	AGS	SAW	04/28/14	
30		347	PITA	15.1	AGS	SAW	04/28/14	
30		347	PITA	15.3	AGS	SAW	04/28/14	
27		350	ACRU	10.5	AGS	PLP	04/28/14	
27		350	LIST	11.6	AGS	PLP	04/28/14	
27		350	PITA	11.9	AGS	CNS	04/28/14	
27		350	ACRU	12.6	AGS	PLP	04/28/14	
27		350	ACRU	15.1	AGS	SAW	04/28/14	
27		350	PITA	16	AGS	SAW	04/28/14	
27		351	ACRU	11.2	AGS	PLP	04/28/14	
27		351	ACRU	13.3	UGS	SAW	04/28/14	lean
27		351	PITA	13.9	AGS	SAW	04/28/14	
27		351	PITA	18.8	AGS	SAW	04/28/14	
27		352	ACRU	7.5	AGS	PLP	04/28/14	
27		352	ACRU	7.5	AGS	PLP	04/28/14	
27		352	ACRU	7.5	AGS	PLP	04/28/14	
27		352	ACRU	7.9	AGS	PLP	04/28/14	
27		352	ACRU	9.5	AGS	PLP	04/28/14	
27		352	ACRU	10.3	AGS	PLP	04/28/14	
27		352	TADI	10.5	AGS	PLP	04/28/14	
31		353	PITA	10	AGS	CNS	04/23/14	
31		353	PITA	10.7	AGS	CNS	04/23/14	
31		353	PITA	11.8	AGS	CNS	04/23/14	
31		353	ACRU	13.3	AGS	SAW	04/23/14	
31		353	PITA	13.5	AGS	SAW	04/23/14	
31		353	PITA	14.6	AGS	SAW	04/23/14	
31		353	PITA	14.6	AGS	SAW	04/23/14	
31		353	PITA	16.4	AGS	SAW	04/23/14	
31		353	PITA	16.5	AGS	SAW	04/23/14	
31		353	PITA	18.2	AGS	SAW	04/23/14	
30		355	PITA	9	AGS	CNS	04/28/14	
30		355	PITA	9.5	AGS	CNS	04/28/14	
30		355	LIST	11.2	AGS	PLP	04/28/14	
30		355	PITA	12.4	AGS	CNS	04/28/14	
30		355	PITA	15	AGS	SAW	04/28/14	
30		355	PITA	15.8	AGS	SAW	04/28/14	
30		355	PITA	17.1	AGS	SAW	04/28/14	
30		356	PITA	10.7	AGS	CNS	04/28/14	
30		356	PITA	11.9	AGS	CNS	04/28/14	
30		356	PITA	12.3	AGS	CNS	04/28/14	
30		356	PITA	14.5	AGS	SAW	04/28/14	
30		356	PITA	15.2	AGS	SAW	04/28/14	
30		356	PITA	16	AGS	SAW	04/28/14	
30		356	PITA	16.1	AGS	SAW	04/28/14	
28		358	PITA	10.2	AGS	CNS	04/28/14	
28		358	PITA	14.9	AGS	SAW	04/28/14	
28		358	PITA	18	AGS	SAW	04/28/14	
28		358	PITA	19.3	AGS	SAW	04/28/14	
32		359	LIST	6.9	AGS	PLP	04/23/14	
32		359	PITA	11	AGS	CNS	04/23/14	
32		359	PITA	11.4	AGS	CNS	04/23/14	
32		359	PITA	12	AGS	CNS	04/23/14	
32		359	PITA	12.5	AGS	CNS	04/23/14	
32		359	PITA	13.2	AGS	SAW	04/23/14	
32		359	PITA	13.4	AGS	SAW	04/23/14	
32		359	PITA	14	AGS	SAW	04/23/14	
32		359	PITA	15.9	AGS	SAW	04/23/14	
32		359	PITA	16.5	AGS	SAW	04/23/14	
32		359	LIST	18.5	AGS	SAW	04/23/14	

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
32		360	PITA	13.5	AGS	SAW	04/23/14	
32		360	PITA	14	AGS	SAW	04/23/14	
32		360	PITA	15.3	AGS	SAW	04/23/14	
32		360	PITA	15.8	AGS	SAW	04/23/14	
32		360	PITA	17	AGS	SAW	04/23/14	
32		360	PITA	17.6	AGS	SAW	04/23/14	
32		360	PITA	19.2	AGS	SAW	04/23/14	
30		361	PITA	13	AGS	SAW	04/23/14	
30		361	PITA	13.9	AGS	SAW	04/23/14	
30		361	PITA	14	AGS	SAW	04/23/14	
30		361	PITA	14.4	AGS	SAW	04/23/14	
30		361	PITA	15	AGS	SAW	04/23/14	
30		361	PITA	17	AGS	SAW	04/23/14	
30		361	PITA	18	AGS	SAW	04/23/14	
32		362	PITA	7	AGS	PLP	04/23/14	
32		362	PITA	9.6	AGS	CNS	04/23/14	
32		362	PITA	9.8	AGS	CNS	04/23/14	
32		362	PITA	11.5	AGS	CNS	04/23/14	
32		362	PITA	14.6	AGS	SAW	04/23/14	
32		362	PITA	14.9	AGS	SAW	04/23/14	
32		362	PITA	15.2	AGS	SAW	04/23/14	
32		362	PITA	15.4	AGS	SAW	04/23/14	
32		362	PITA	16.7	AGS	SAW	04/23/14	
32		362	PITA	17.7	AGS	SAW	04/23/14	
28		366	PITA	8.8	AGS	PLP	04/28/14	
28		366	PITA	9.9	AGS	CNS	04/28/14	
28		366	PITA	10	AGS	CNS	04/28/14	
28		366	PITA	10.9	AGS	CNS	04/28/14	
28		366	PITA	11.2	AGS	CNS	04/28/14	
28		366	PITA	11.4	AGS	CNS	04/28/14	
28		366	PITA	15	AGS	SAW	04/28/14	
28		367	PITA	10.1	AGS	CNS	04/28/14	
28		367	PITA	10.3	AGS	CNS	04/28/14	
28		367	PITA	10.5	AGS	CNS	04/28/14	
28		367	PITA	10.6	AGS	CNS	04/28/14	
28		367	PITA	11.4	AGS	CNS	04/28/14	
28		367	PITA	11.7	AGS	CNS	04/28/14	
28		368	PITA	9.4	AGS	CNS	04/28/14	
28		368	PITA	9.6	AGS	CNS	04/28/14	
28		368	PITA	9.9	AGS	CNS	04/28/14	
28		368	PITA	10.2	AGS	CNS	04/28/14	
28		368	PITA	11.6	AGS	CNS	04/28/14	
28		368	PITA	13	AGS	SAW	04/28/14	
32		369	PITA	15.3	AGS	SAW	04/23/14	
32		369	LIST	15.8	AGS	SAW	04/23/14	
32		369	PITA	16.7	AGS	SAW	04/23/14	
32		369	PITA	19.2	AGS	SAW	04/23/14	
32		370	PITA	7.9	AGS	PLP	04/23/14	
32		370	PITA	10.7	AGS	CNS	04/23/14	
32		370	PITA	10.9	AGS	CNS	04/23/14	
32		370	PITA	11.1	AGS	CNS	04/23/14	
32		370	PITA	11.3	AGS	CNS	04/23/14	
32		370	PITA	11.3	AGS	CNS	04/23/14	
32		370	PITA	12	AGS	CNS	04/23/14	
32		370	PITA	12.4	AGS	CNS	04/23/14	
32		370	PITA	12.6	AGS	CNS	04/23/14	
32		370	PITA	13	AGS	SAW	04/23/14	
32		370	PITA	13.9	AGS	SAW	04/23/14	
32		370	PITA	16.5	AGS	SAW	04/23/14	
32		371	PITA	7.8	AGS	PLP	04/23/14	10baf
32		371	PITA	9	AGS	CNS	04/23/14	10baf
32		371	PITA	9.4	AGS	CNS	04/23/14	10baf

DNA Raw Timber Inventory Data
 Count/Species/DBH (Less-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Date	Notes
32		371	PITA	9.4	AGS	CNS	04/23/14	10baf
32		371	PITA	10.3	AGS	CNS	04/23/14	10baf
32		371	PITA	10.5	AGS	CNS	04/23/14	10baf
32		371	PITA	10.7	AGS	CNS	04/23/14	10baf
32		371	PITA	11	AGS	CNS	04/23/14	10baf
32		371	PITA	12	AGS	CNS	04/23/14	10baf
32		371	PITA	13	AGS	SAW	04/23/14	10baf
32		372	PITA	7.1	AGS	PLP	04/23/14	10baf
32		372	PITA	7.5	AGS	PLP	04/23/14	10baf
32		372	PITA	7.7	AGS	PLP	04/23/14	10baf
32		372	PITA	8.2	AGS	PLP	04/23/14	10baf
32		372	PITA	8.3	AGS	PLP	04/23/14	10baf
32		372	PITA	8.7	AGS	PLP	04/23/14	10baf
32		372	PITA	9.4	AGS	CNS	04/23/14	10baf
32		372	PITA	10.5	AGS	CNS	04/23/14	10baf
32		372	PITA	10.5	AGS	CNS	04/23/14	10baf
32		372	PITA	11	AGS	CNS	04/23/14	10baf
32		372	PITA	11	AGS	CNS	04/23/14	10baf
32		375	PITA	7.5	AGS	PLP	04/23/14	10baf
32		375	PITA	7.6	AGS	PLP	04/23/14	10baf
32		375	PITA	8.1	AGS	PLP	04/23/14	10baf
32		375	PITA	9.5	AGS	CNS	04/23/14	10baf
32		375	PITA	9.8	AGS	CNS	04/23/14	10baf
32		375	PITA	10	AGS	CNS	04/23/14	10baf
32		375	PITA	10.1	AGS	CNS	04/23/14	10baf
32		375	PITA	10.3	AGS	CNS	04/23/14	10baf
32		375	PITA	10.3	AGS	CNS	04/23/14	10baf
32		375	PITA	10.6	AGS	CNS	04/23/14	10baf
32		375	LIST	12.1	AGS	PLP	04/23/14	10baf
32		375	PITA	15.7	AGS	SAW	04/23/14	10baf
32		375	PITA	17.7	AGS	SAW	04/23/14	10baf
32		376	ACRU	7.3	AGS	PLP	04/23/14	10baf
32		376	PITA	7.8	AGS	PLP	04/23/14	10baf
32		376	PITA	8	AGS	PLP	04/23/14	10baf
32		376	PITA	8.1	AGS	PLP	04/23/14	10baf
32		376	PITA	8.3	AGS	PLP	04/23/14	10baf
32		376	PITA	8.3	AGS	PLP	04/23/14	10baf
32		376	PITA	8.6	AGS	PLP	04/23/14	10baf
32		376	PITA	9.3	AGS	CNS	04/23/14	10baf
32		376	PITA	9.4	AGS	CNS	04/23/14	10baf
32		376	PITA	9.6	AGS	CNS	04/23/14	10baf
32		376	PITA	9.7	AGS	CNS	04/23/14	10baf
32		376	PITA	9.7	AGS	CNS	04/23/14	10baf
32		376	PITA	11	AGS	CNS	04/23/14	10baf
32		376	PITA	11	AGS	CNS	04/23/14	10baf
32		376	PITA	13.2	AGS	SAW	04/23/14	10baf
32		376	PITA	20.2	AGS	SAW	04/23/14	10baf
32		377	PITA	7.3	AGS	PLP	04/23/14	10baf
32		377	PITA	7.5	AGS	PLP	04/23/14	10baf
32		377	PITA	7.5	AGS	PLP	04/23/14	10baf
32		377	PITA	7.7	AGS	PLP	04/23/14	10baf
32		377	PITA	8	AGS	PLP	04/23/14	10baf
32		377	PITA	8.4	AGS	PLP	04/23/14	10baf
32		377	PITA	9.2	AGS	CNS	04/23/14	10baf
29		378	ACRU	8.1	AGS	PLP	04/23/14	
29		378	ACRU	10.2	AGS	PLP	04/23/14	
29		378	LIST	10.9	AGS	PLP	04/23/14	
29		378	PITA	12.4	AGS	CNS	04/23/14	
29		378	PITA	14.8	AGS	SAW	04/23/14	
29		378	PITA	15.5	AGS	SAW	04/23/14	
29		378	PITA	16.1	AGS	SAW	04/23/14	
29		378	PITA	17.3	AGS	SAW	04/23/14	

Appendix D-2: DNA More-intensive plot data tables: These tables represent the merchantable height and site index data collected at a subset of plots in the point, double sampling for timber attributes protocol employed. Each record (row) corresponds to a single sampled tree stem. Data collected includes:

Stand #	The stand number in which the plot was located. Existing stand numbers used where available; sequential numbers beginning higher than existing stands assigned to new stands.
Type	Forest type-size class code for stand from prior inventory. At DNA, there was no prior comprehensive forest inventory, so this field was left blank. If data were available, it would have been taken into the field by the field crew to assist in refining and updating stand boundaries. Type code, concatenated with a dash to the size class code, yields the combined forest type-size class code. See Table E-1 for definition of type codes and Table E-2 for definition of size class code.
Plot #	Unique (to installation) plot identification number.
Species	Species code to uniquely identify the species of tree. See Table E-3 for definition of codes.
DBH	Diameter at breast height (dbh) measured to the nearest tenth of an inch.
Vigor cls	The vigor class of the tree. See Table E-4 for definition of codes. Typically not populated in this table, as the trees sampled in this table are also represented in the less-intensive tables to avoid double-counting basal area in the point, double sampling scheme employed.
Grade	The diameter-based product grade of the tree. See Table E-5 for definition of codes. Typically not populated in this table, as the trees sampled in this table are also represented in the less-intensive tables to avoid double-counting basal area in the point, double sampling scheme employed.
Ht. 4in.	Height from the ground to a point on the main stem where the diameter outside bark (dob) is 4", or the point just below where the tree breaks into branches each smaller than 4" dob. Populated only if the tree was a pulpwood class tree.
Ht. 6in.	Height from the ground to a point on the main stem where the diameter outside bark (dob) is 6", or the point just below where the tree breaks into branches each smaller than 6" dob. Populated only if the tree was a chip-n-saw class tree.
Ht. 8in.	Height from the ground to a point on the main stem where the diameter outside bark (dob) is 8", or the point just below where the tree breaks into branches each smaller than 8" dob. Populated only if the tree was a sawtimber class tree.
Total Ht.	Total height of the tree from ground to tip. Populated only if tree sampled for total height.
Site tree age	Age of the tree as determined from an increment core. Populated only if the tree was sampled for age to calculate site index.
Notes	Miscellaneous notes about the tree represented by record (row) in the table. The most common note, "10BAF", indicates that the plot (and thus tree) was sampled using 10BAF, instead of the default 20BAF, as requested in the scope of work.

DNA Raw Timber Inventory Data
 Count/Species/DBH/Merchantable Height/Site Index (More-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Ht. 4in.	Ht. 6in.	Ht. 8in.	Total Ht.	Site tree age	Notes
3		26	ACRU	16.5					26	54		no site tree/all hardwood
3		26	ACRU	12.1					34	60		
3		26	LIST	23.4					48	74		
3		26	LIST	16.8					60	84		
3		26	LIST	16.2					40	68		
3		26	LIST	6.9			22			50		
3		26	LIST	8.5			32			58		
3		26	LIST	13.1					42	78		
3		26	LIST	12.3					40	66		
3		30	ACRU	8.7			32			58		
3		30	LIST	16.4					54	80		
3		30	LIST	16.4					46	80		
3		30	LIST	14.7					54	84		
3		30	LIST	14					54	80		
3		30	LIST	16.3					50	86		
3		30	PITA	15.5					60	88	64	
3		30	PITA	21.8					66	94		
2		49	ACRU	12.1					26	54		
2		49	LIST	19.7					52	96		
2		49	LIST	18.5					68	91		
2		49	LIST	11.7				45		92		
2		49	LIST	13.9					60	90		
2		49	LIST	8.4			36			50		
2		49	LIST	13.5					62	102		
2		49	PITA	20.5					80	112	60	
18		56	PITA						74	100	72	offsite
18		56	QULA	15.7					50	72		
18		56	QURU	27.2					52	86		
18		56	QURU	12.9					40	62		
18		56	QURU	23.2					56	82		
18		56	QURU	14.3					40	68		
1		70	LIST	17					74	110		
1		70	LIST	23.4					66	102		
1		70	LIST	31					64	94		
1		70	PITA	24.5					76	112	66	
3		91	ACRU	15.2					44	64		
3		91	ACRU	14.7					32	62		
3		91	ACRU	19					40	66		
3		91	ACRU	13.1					34	56		
3		91	LIST	15.1					48	78		
3		91	LIST	19					54	90		
3		91	NYSY	15.3					42	72		
3		91	NYSY	12.3					32	68		
3		91	PITA						62	88	96	offsite
7		116	LIST	8.2			32			50		
7		116	LIST	7.9			20			50		
7		116	PITA	17.3					70	98	70	
7		116	PITA	18.2					70	100		
7		116	PITA	12.2					52	78		
7		116	PITA	17.6					68	102		
7		116	PITA	16.5					68	98		
7		116	PITA	18					76	102		
7		116	PITA	21					72	98		
7		116	PITA	16.7					70	98		
11		179	ACRU	11					20	52		
11		179	ACRU	12.5					30	60		
11		179	PITA	17.6					60	82	52	
11		179	PITA	20.7					62	84		
11		179	PITA	19.7					60	80		
11		179	PITA	14.6					46	78		
11		179	PITA	15.6					50	82		
9		219	ACRU	17.4				26	46	72		

DNA Raw Timber Inventory Data
 Count/Species/DBH/Merchantable Height/Site Index (More-intensive) plots

Stand #	Type	Plot #	Species	DBH	Vigor cls	Grade	Ht. 4in.	Ht. 6in.	Ht. 8in.	Total Ht.	Site tree age	Notes
9		219	LIST	9.8			28			44		
9		219	LIST	12.4					56	86		
9		219	PITA	17.6					62	92	60	
9		219	PITA	16.7					66	94		
9		219	PITA	20.4					60	90		
9		219	PITA	21.1					66	94		
9		219	PITA	15.9					54	86		
9		219	PITA	17.8	ugs				52	82		rotten
9		219	PITA	18.4					54	76		
9		219	PITA	18.9					66	94		
6		222	ACRU	10.8				22		50		
6		222	PITA	14					48	68	32	
6		222	PITA	12.7					44	66		
6		222	PITA	14.8					46	70		
25		236	LIST	19.5					52	74		
25		236	LIST	20					50	75		
25		236	PITA	22.3					70	102	76	
25		236	PITA	15					62	80		
25		236	QURU	26.4					46	80		
25		236	QURU	31.6					52	72		
25		236	QURU	22.9					50	68		
15		271	LIST	12.8					28	66		
15		271	PITA	20.2					70	98	66	
15		271	PITA	14.8					60	90		
15		271	PITA	18.1					68	100		
15		271	PITA	15.2					60	90		
15		271	PITA	20.8					68	100		
15		271	PITA	17					62	88		
15		271	PITA	18.9					66	98		
15		271	PITA	15.9					64	88		
12		301	PITA	11				32		54		
12		301	PITA	10.6				30		54		
12		301	PITA	8.4			24			50		
12		301	PITA	9.2			26			50		
12		301	PITA	10.1				18		44		
12		301	PITA	9.4			26			50		
12		301	PITA	11.2				24		56		
12		301	PITA	10.4				22		52		
12		301	PITA	14.3					40	60	32	
29		325	ACRU	8.5			32			48		
29		325	LIST	10.5				40		60		
29		325	LIST	15.9					30	60		
29		325	LIST	8.1			20			50		
29		325	LIST	12.3					28	58		
29		325	PITA	18.7					52	72	42	
29		325	PITA	16.6					42	64		
29		325	PITA	14					42	66		
29		325	PITA	19.2					48	70		
28		367	PITA	10.5						32	16	offsite
32		369	LIST	15.8					30	58		
32		369	PITA	16.7					42	64	42	
32		369	PITA	15.3					32	50		
32		369	PITA	19.2					42	66		

Appendix D-3: DNA Fuels transect activity fuels data tables: These tables represent the data summarizing activity fuels (duff, litter, 1-, 10-, and 100-hour fuels) collected from the fuel transects, performed at the same subset of plots as the more-intensive timber inventory data in the point, double sampling for timber attributes protocol employed. The class values (1-, 10-, and 100-hours) represent the length of time it takes for fuels in each class to lose 66% of their moisture. Each record (row) corresponds to a single transect; two transects were sampled at each more-intensive plot. Data collected includes:

Stand #	The stand number in which the transect was located. Existing stand numbers used where available; sequential numbers beginning higher than existing stands assigned to new stands. This field was not be populated since there were effectively no stands delineated by a prior inventory. Plot can be cross-referenced against new stands using Appendix D.
Type	Forest type-size class code for stand from prior inventory. At DNA, there was no prior comprehensive forest inventory, so this field was left blank. If data were available, it would have been taken into the field by the field crew to assist in refining and updating stand boundaries. Type code, concatenated with a dash to the size class code, yields the combined forest type-size class code. See Table E-1 for definition of type codes and Table E-2 for definition of size class code.
Plot #	Unique (to installation) plot identification number.
Tx ID	Fuels transect ID, corresponding to the azimuth of the transect.
1-H	Number of 1-hour fuels (0-0.64 cm diameter) encountered from 0-2m along transect.
10-H	Number of 10-hour fuels (0.64-2.54 cm diameter) encountered from 0-3m along transect.
100-H	Number of 100-hour fuels (2.54-7.62 cm diameter) encountered from 0-11.3m along transect.
3m D	Duff depth (cm) at 3m distance from beginning of transect.
3m L	Litter depth (cm) at 3m distance from beginning of transect.
3m F	Fuel depth (cm) at 3m distance from beginning of transect.
10m D	Duff depth (cm) at 10m distance from beginning of transect.
10m L	Litter depth (cm) at 10m distance from beginning of transect.
10m F	Fuel depth (cm) at 10m distance from beginning of transect.

Appendix D-3 (continued): DNA Fuels transect 1000-hour fuels data tables: These tables represent the data collected from the fuel transects, performed at the same subset of plots as the more-intensive timber inventory data in the point, double sampling for timber attributes protocol employed. Each record (row) corresponds to a single piece of 1000-hour fuel (>7.62 cm diameter). Two transects were sampled at each more-intensive plot. No row is present for a plot or transect if no fuels were encountered. Data collected includes:

Plot #	Unique (to installation) plot identification number.
Tx ID	Fuels transect ID, corresponding to the azimuth of the transect
Species	Species, identified to hardwood (HW) or softwood (SW) of the 1000-fuel encountered.
Rotten	If the fuel encountered is rotten/falling apart/in advanced decomposition, then its diameter is indicated in this column. Null values indicate no fuels in this category were encountered along transect.
Sound	If the fuel encountered is solid/holds form/etc., then its diameter is indicated in this column. Null values indicate no fuels in this category were encountered along transect.

DNA Raw Fuel Loading Transect Data
 Measured at more-intensive plots

Stand #	Type	Plot #	Tx ID	1-H	10-H	100-H	3m D	3m L	3m F	10m D	10m L	10m F
		369	290	4	2	0	2	2	2	1	2	4
		369	140	6	2	2	7	4	9	5	4	8
		325	60	4	0	2	0	2	2	1	2	2
		325	280	3	1	0	2	1	5	0	3	3
		367	350	8	1	0	2	4	4	2	4	12
		367	160	6	2	0	1	3	3	1	4	4
		236	30	4	1	1	1	4	7	1	3	3
		236	270	0	1	0	1	4	5	1	4	8
		56	90	4	0	0	2	3	3	2	4	5
		56	260	8	4	1	1	3	5	1	2	2
		301	50	4	1	3	2	4	5	1	3	5
		301	190	9	3	0	3	4	6	4	6	6
		219	10	3	2	2	3	2	3	2	5	5
		219	120	5	1	0	2	4	5	3	4	4
		116	20	5	0	0	3	4	4	2	3	3
		116	230	3	0	0	6	6	19	2	2	5
		222	70	11	3	0	2	3	8	3	5	5
		222	310	16	6	1	3	2	4	5	4	4
		271	180	3	2	0	3	4	4	2	3	3
		271	340	2	1	1	4	6	10	3	4	8
		179	130	6	0	0	1	3	15	3	4	5
		179	280	12	4	0	5	6	16	1	2	2
		91	50	2	3	1	1	3	8	1	3	3
		91	190	3	1	1	1	3	3	1	2	2
		26	250	8	1	0	1	3	3	1	2	8
		26	80	6	0	2	1	3	13	1	3	5
		30	90	5	3	0	1	3	3	2	4	4
		30	230	1	3	2	3	5	6	2	6	6
		49	0	1	2	0	1	3	3	1	5	5
		49	220	1	2	2	1	2	3	1	2	2
		70	290	3	0	0	1	2	2	0	3	3
		70	70	1	1	0	1	2	2	0	3	3

1000 Hour Fuels				
Plot #	Tx ID	Species	Rotten	Sound
369	140	SW	13	
56	260	HW	10	
56	260	HW	11	
56	260	HW		11
301	190	SW	10	
219	10	SW	16	
219	120	SW	8	
116	20	SW	13	
116	230	SW		19
271	180	SW		16
271	180	SW	15	
271	340	SW	12	
271	340	SW	10	
179	130	SW		15
179	130	SW		16
179	280	SW	15	
179	280	SW		11
49	220	HW	15	

Appendix D-4: Cross-walk for DNA old stand number & type, new stand number & type, and type of plot from the 2014 inventory: These tables contain a cross-walk showing, for each plot in the 2014 forest inventory at DNA, the stand data (full designation, number, and type) from the prior forest inventory and the 2014 forest inventory. Sorted by new stand number. Data displayed includes:

Plot ID	Unique (to installation) plot identification number.
Plot Type	Type of plot. "BA" indicates a less-intensive plot where basal area (BA) was measured, and each tree in the plot was measured for species, vigor class, dbh, and grade. "HEIGHT" indicates a more-intensive plot, where total height, merchantable height, and age may have been measured based on the grade (pulp, chip-n-saw, or sawtimber) of the tree. "FUELS" indicates that fuels transects were also established at the plot.
Old Stand Code	Stand code (Compartment - Stand Number/Type - Size Class) of the stand from the prior inventory in which the plot was located. Note that no prior forest inventory was present for this installation but polygons were present in the "forest_stand_area" feature class in the DNA installation; so no codes could be displayed here, thus "—" is the sole value displayed for this column.
New Stand Code	Stand code (Compartment - Stand Number/Type - Size Class) of the stand from the 2014 inventory in which the plot was located. See Table E-1 for definition of type codes and Table E-2 for definition of size class code.
Old Stand Number	Stand OID of the stand from the prior data in which the plot was located. "—" indicates the plot was located in an area not delineated as a stand or with no associated information from the prior inventory. Note that no prior forest inventory was present for this installation but polygons were present in the "forest_stand_area" feature class in the DNA installation; so for sake of comparison the OID from that data is displayed here.
New Stand Number	Stand number/ID of the stand from the 2014 inventory in which the plot was located. Sorted by new stand number.
Old Stand Type	Stand type of the stand from the prior GIS data in which the plot was located. "—" indicates the plot was located in an area not delineated as a stand or with no associated information from the prior inventory. Note that no prior forest inventory was present for this installation but polygons were present in the "forest_stand_area" feature class in the DNA installation; so for sake of comparison the type from that data is displayed here. Note that it may not conform to the standards in Table E-1 defining type codes.
New Stand Type	Stand type of the stand from the 2014 inventory in which the plot was located. See Table E-1 for definition of type codes.

DNA cross-walk of old and new stand types and plot types

Cross-walk for old stand number type, new stand number type, and plot number plot type from the 2014 inventory. Sorted by new stand number.

Plot ID	Plot Type	Old Stand Code	New Stand Code	Old Stand Number (OID)	New Stand Number	Old Stand Type	New Stand Type
50	BA	—	1/HP-4	—	1	—	HP
51	BA	—	1/HP-4	—	1	—	HP
70	BA/HEIGHT/FUELS	—	1/HP-4	—	1	—	HP
71	BA	—	1/HP-4	—	1	—	HP
72	BA	—	1/HP-4	—	1	—	HP
97	BA	—	1/HP-4	—	1	—	HP
98	BA	—	1/HP-4	—	1	—	HP
132	BA	—	1/HP-4	—	1	—	HP
33	BA	—	2/H-4	—	2	—	H
34	BA	—	2/H-4	—	2	—	H
48	BA	—	2/H-4	—	2	—	H
49	BA/HEIGHT/FUELS	—	2/H-4	—	2	—	H
67	BA	—	2/H-4	—	2	—	H
68	BA	—	2/H-4	—	2	—	H
94	BA	—	2/H-4	—	2	—	H
95	BA	—	2/H-4	—	2	—	H
129	BA	—	2/H-4	—	2	—	H
130	BA	—	2/H-4	—	2	—	H
164	BA	—	2/H-4	—	2	—	H
196	BA	—	2/H-4	—	2	—	H
197	BA	—	2/H-4	—	2	—	H
3	BA	—	3/H-4	—	3	—	H
4	BA	—	3/H-4	—	3	—	H
8	BA	—	3/H-4	—	3	—	H
9	BA	—	3/H-4	—	3	—	H
11	BA	—	3/H-4	—	3	—	H
12	BA	—	3/H-4	—	3	—	H
15	BA	—	3/H-4	—	3	—	H
16	BA	—	3/H-4	—	3	—	H
18	BA	—	3/H-4	—	3	—	H
19	BA	—	3/H-4	—	3	—	H
25	BA	—	3/H-4	—	3	—	H
26	BA/HEIGHT/FUELS	—	3/H-4	—	3	—	H
28	BA	—	3/H-4	—	3	—	H
29	BA	—	3/H-4	—	3	—	H
30	BA/HEIGHT/FUELS	—	3/H-4	—	3	—	H
31	BA	—	3/H-4	—	3	—	H
41	BA	—	3/H-4	—	3	—	H
42	BA	—	3/H-4	—	3	—	H
43	BA	—	3/H-4	—	3	—	H
44	BA	—	3/H-4	—	3	—	H
45	BA	—	3/H-4	—	3	—	H
46	BA	—	3/H-4	—	3	—	H
61	BA	—	3/H-4	—	3	—	H
62	BA	—	3/H-4	—	3	—	H
63	BA	—	3/H-4	—	3	—	H
64	BA	—	3/H-4	—	3	—	H
65	BA	—	3/H-4	—	3	—	H
90	BA	—	3/H-4	—	3	—	H
91	BA/HEIGHT/FUELS	—	3/H-4	—	3	—	H
92	BA	—	3/H-4	—	3	—	H
125	BA	—	3/H-4	—	3	—	H
126	BA	—	3/H-4	—	3	—	H
159	BA	—	3/H-4	—	3	—	H
160	BA	—	3/H-4	—	3	—	H
161	BA	—	3/H-4	—	3	—	H

DNA cross-walk of old and new stand types and plot types

Cross-walk for old stand number type, new stand number type, and plot number plot type from the 2014 inventory. Sorted by new stand number.

Plot ID	Plot Type	Old Stand Code	New Stand Code	Old Stand Number (OID)	New Stand Number	Old Stand Type	New Stand Type
193	BA	—	3/H-4	—	3	—	H
194	BA	—	3/H-4	—	3	—	H
195	BA	—	4/PH-3	—	4	—	PH
227	BA	—	4/PH-3	—	4	—	PH
228	BA	—	4/PH-3	—	4	—	PH
230	BA	—	4/PH-3	—	4	—	PH
231	BA	—	4/PH-3	—	4	—	PH
259	BA	—	4/PH-3	—	4	—	PH
260	BA	—	4/PH-3	—	4	—	PH
40	BA	—	5/HP-4	—	5	—	HP
60	BA	—	5/HP-4	—	5	—	HP
89	BA	—	5/HP-4	—	5	—	HP
187	BA	—	5/HP-4	—	5	—	HP
188	BA	—	5/HP-4	—	5	—	HP
189	BA	—	5/HP-4	—	5	—	HP
190	BA	—	5/HP-4	—	5	—	HP
191	BA	—	5/HP-4	—	5	—	HP
192	BA	—	5/HP-4	—	5	—	HP
225	BA	—	5/HP-4	—	5	—	HP
184	BA	—	6/HP-4	297	6	Pine/Hardwood	HP
185	BA	—	6/HP-4	678	6	Hardwood/Pine	HP
186	BA	—	6/HP-4	678	6	Hardwood/Pine	HP
222	BA/HEIGHT/FUELS	—	6/HP-4	297	6	Pine/Hardwood	HP
223	BA	—	6/HP-4	—	6	—	HP
224	BA	—	6/HP-4	—	6	—	HP
257	BA	—	6/HP-4	297	6	Pine/Hardwood	HP
258	BA	—	6/HP-4	297	6	Pine/Hardwood	HP
83	BA	—	7/HP-4	300	7	Pine/Hardwood	HP
84	BA	—	7/HP-4	679	7	Hardwood	HP
85	BA	—	7/HP-4	299	7	Pine	HP
86	BA	—	7/HP-4	299	7	Pine	HP
115	BA	—	7/HP-4	300	7	Pine/Hardwood	HP
116	BA/HEIGHT/FUELS	—	7/HP-4	300	7	Pine/Hardwood	HP
117	BA	—	7/HP-4	679	7	Hardwood	HP
118	BA	—	7/HP-4	679	7	Hardwood	HP
119	BA	—	7/HP-4	679	7	Hardwood	HP
120	BA	—	7/HP-4	298	7	Pine/Hardwood	HP
148	BA	—	7/HP-4	300	7	Pine/Hardwood	HP
149	BA	—	7/HP-4	300	7	Pine/Hardwood	HP
150	BA	—	7/HP-4	300	7	Pine/Hardwood	HP
151	BA	—	7/HP-4	679	7	Hardwood	HP
152	BA	—	7/HP-4	679	7	Hardwood	HP
153	BA	—	7/HP-4	298	7	Pine/Hardwood	HP
275	BA	—	8/PH-4	295	8	Pine/Hardwood	PH
276	BA	—	8/PH-4	295	8	Pine/Hardwood	PH
277	BA	—	8/PH-4	295	8	Pine/Hardwood	PH
294	BA	—	8/PH-4	295	8	Pine/Hardwood	PH
295	BA	—	8/PH-4	295	8	Pine/Hardwood	PH
183	BA	—	9/PH-4	680	9	Pine	PH
219	BA/HEIGHT/FUELS	—	9/PH-4	680	9	Pine	PH
220	BA	—	9/PH-4	680	9	Pine	PH
221	BA	—	9/PH-4	395	9	Hardwood	PH
254	BA	—	9/PH-4	680	9	Pine	PH
255	BA	—	9/PH-4	680	9	Pine	PH
80	BA	—	10/HP-4	—	10	—	HP
81	BA	—	10/HP-4	—	10	—	HP

DNA cross-walk of old and new stand types and plot types

Cross-walk for old stand number type, new stand number type, and plot number plot type from the 2014 inventory. Sorted by new stand number.

Plot ID	Plot Type	Old Stand Code	New Stand Code	Old Stand Number (OID)	New Stand Number	Old Stand Type	New Stand Type
82	BA	—	10/HP-4	300	10	Pine/Hardwood	HP
145	BA	—	10/HP-4	301	10	Pine	HP
146	BA	—	10/HP-4	301	10	Pine	HP
147	BA	—	10/HP-4	300	10	Pine/Hardwood	HP
181	BA	—	10/HP-4	301	10	Pine	HP
182	BA	—	10/HP-4	—	10	—	HP
107	BA	—	11/PH-4	369	11	Hardwood	PH
108	BA	—	11/PH-4	711	11	Pine/Hardwood	PH
109	BA	—	11/PH-4	711	11	Pine/Hardwood	PH
139	BA	—	11/PH-4	364	11	Pine	PH
140	BA	—	11/PH-4	—	11	—	PH
141	BA	—	11/PH-4	369	11	Hardwood	PH
142	BA	—	11/PH-4	—	11	—	PH
143	BA	—	11/PH-4	—	11	—	PH
175	BA	—	11/PH-4	—	11	—	PH
176	BA	—	11/PH-4	—	11	—	PH
177	BA	—	11/PH-4	366	11	Pine/Hardwood	PH
178	BA	—	11/PH-4	366	11	Pine/Hardwood	PH
179	BA/HEIGHT/FUELS	—	11/PH-4	366	11	Pine/Hardwood	PH
291	BA	—	12/P-3	363	12	Pine/Hardwood	P
292	BA	—	12/P-3	363	12	Pine/Hardwood	P
301	BA/HEIGHT/FUELS	—	12/P-3	363	12	Pine/Hardwood	P
311	BA	—	12/P-3	363	12	Pine/Hardwood	P
216	BA	—	13/H-2	367	13	Pine/Hardwood	H
217	BA	—	13/H-2	367	13	Pine/Hardwood	H
250	BA	—	14/HP-4	715	14	Hardwood/Pine	HP
251	BA	—	14/HP-4	715	14	Hardwood/Pine	HP
252	BA	—	14/HP-4	715	14	Hardwood/Pine	HP
270	BA	—	14/HP-4	715	14	Hardwood/Pine	HP
274	BA	—	14/HP-4	368	14	Hardwood	HP
290	BA	—	14/HP-4	710	14	Pine	HP
271	BA/HEIGHT/FUELS	—	15/P-4	710	15	Pine	P
272	BA	—	15/P-4	710	15	Pine	P
273	BA	—	15/P-4	710	15	Pine	P
289	BA	—	15/P-4	710	15	Pine	P
297	BA	—	16/HP-2	372	16	Pine/Hardwood	HP
298	BA	—	16/HP-2	372	16	Pine/Hardwood	HP
299	BA	—	16/HP-2	370	16	Hardwood	HP
300	BA	—	16/HP-2	370	16	Hardwood	HP
310	BA	—	16/HP-2	370	16	Hardwood	HP
305	BA	—	17/HP-2	371	17	Pine/Hardwood	HP
306	BA	—	17/HP-2	371	17	Pine/Hardwood	HP
309	BA	—	17/HP-2	714	17	Pine/Hardwood	HP
22	BA	—	18/H-4	718	18	Hardwood/Pine	H
35	BA	—	18/H-4	380	18	Pine	H
38	BA	—	18/H-4	719	18	Pine/Hardwood	H
39	BA	—	18/H-4	719	18	Pine/Hardwood	H
52	BA	—	18/H-4	718	18	Hardwood/Pine	H
56	BA/HEIGHT/FUELS	—	18/H-4	379	18	Hardwood/Pine	H
57	BA	—	18/H-4	719	18	Pine/Hardwood	H
73	BA	—	18/H-4	718	18	Hardwood/Pine	H
77	BA	—	18/H-4	719	18	Pine/Hardwood	H
78	BA	—	18/H-4	719	18	Pine/Hardwood	H
79	BA	—	18/H-4	719	18	Pine/Hardwood	H
99	BA	—	18/H-4	—	18	—	H
100	BA	—	18/H-4	377	18	Hardwood	H

DNA cross-walk of old and new stand types and plot types

Cross-walk for old stand number type, new stand number type, and plot number plot type from the 2014 inventory. Sorted by new stand number.

Plot ID	Plot Type	Old Stand Code	New Stand Code	Old Stand Number (OID)	New Stand Number	Old Stand Type	New Stand Type
104	BA	—	18/H-4	379	18	Hardwood/Pine	H
105	BA	—	18/H-4	379	18	Hardwood/Pine	H
106	BA	—	18/H-4	719	18	Pine/Hardwood	H
136	BA	—	18/H-4	378	18	Pine	H
138	BA	—	18/H-4	378	18	Pine	H
215	BA	—	19/H-2	—	19	—	H
248	BA	—	19/H-2	376	19	Hardwood	H
249	BA	—	19/H-2	376	19	Hardwood	H
269	BA	—	19/H-2	376	19	Hardwood	H
174	BA	—	20/H-2	376	20	Hardwood	H
209	BA	—	20/H-2	—	20	—	H
210	BA	—	20/H-2	376	20	Hardwood	H
211	BA	—	20/H-2	376	20	Hardwood	H
242	BA	—	20/H-2	—	20	—	H
243	BA	—	20/H-2	376	20	Hardwood	H
244	BA	—	20/H-2	376	20	Hardwood	H
263	BA	—	21/H-2	376	21	Hardwood	H
264	BA	—	21/H-2	376	21	Hardwood	H
281	BA	—	21/H-2	—	21	—	H
282	BA	—	21/H-2	—	21	—	H
283	BA	—	21/H-2	376	21	Hardwood	H
284	BA	—	21/H-2	376	21	Hardwood	H
304	BA	—	22/P-4	375	22	Pine/Hardwood	P
319	BA	—	22/P-4	375	22	Pine/Hardwood	P
320	BA	—	22/P-4	375	22	Pine/Hardwood	P
134	BA	—	23/H-4	393	23	Hardwood	H
205	BA	—	23/H-4	393	23	Hardwood	H
206	BA	—	23/H-4	393	23	Hardwood	H
240	BA	—	23/H-4	393	23	Hardwood	H
169	BA	—	24/H-4	391	24	Hardwood	H
170	BA	—	24/H-4	391	24	Hardwood	H
201	BA	—	24/H-4	—	24	—	H
204	BA	—	24/H-4	391	24	Hardwood	H
238	BA	—	24/H-4	391	24	Hardwood	H
239	BA	—	24/H-4	—	24	—	H
199	BA	—	25/HP-4	725	25	Pine/Hardwood	HP
200	BA	—	25/HP-4	725	25	Pine/Hardwood	HP
202	BA	—	25/HP-4	725	25	Pine/Hardwood	HP
236	BA/HEIGHT/FUELS	—	25/HP-4	725	25	Pine/Hardwood	HP
237	BA	—	25/HP-4	725	25	Pine/Hardwood	HP
261	BA	—	25/HP-4	725	25	Pine/Hardwood	HP
262	BA	—	25/HP-4	725	25	Pine/Hardwood	HP
296	BA	—	25/HP-4	725	25	Pine/Hardwood	HP
165	BA	—	26/H-2	391	26	Hardwood	H
166	BA	—	26/H-2	391	26	Hardwood	H
167	BA	—	26/H-2	391	26	Hardwood	H
198	BA	—	26/H-2	391	26	Hardwood	H
235	BA	—	26/H-2	391	26	Hardwood	H
335	BA	—	27/H-2	388	27	Hardwood/Pine	H
336	BA	—	27/H-2	388	27	Hardwood/Pine	H
337	BA	—	27/H-2	388	27	Hardwood/Pine	H
338	BA	—	27/H-2	388	27	Hardwood/Pine	H
339	BA	—	27/H-2	388	27	Hardwood/Pine	H
350	BA	—	27/H-2	—	27	—	H
351	BA	—	27/H-2	388	27	Hardwood/Pine	H
352	BA	—	27/H-2	—	27	—	H

DNA cross-walk of old and new stand types and plot types

Cross-walk for old stand number type, new stand number type, and plot number plot type from the 2014 inventory. Sorted by new stand number.

Plot ID	Plot Type	Old Stand Code	New Stand Code	Old Stand Number (OID)	New Stand Number	Old Stand Type	New Stand Type
358	BA	—	28/P-3	722	28	Hardwood/Pine	P
366	BA	—	28/P-3	—	28	—	P
367	BA/HEIGHT/FUELS	—	28/P-3	723	28	Beach/Dune	P
368	BA	—	28/P-3	723	28	Beach/Dune	P
316	BA	—	29/PH-4	386	29	Pine	PH
317	BA	—	29/PH-4	386	29	Pine	PH
318	BA	—	29/PH-4	387	29	Hardwood	PH
324	BA	—	29/PH-4	386	29	Pine	PH
325	BA/HEIGHT/FUELS	—	29/PH-4	387	29	Hardwood	PH
326	BA	—	29/PH-4	386	29	Pine	PH
332	BA	—	29/PH-4	386	29	Pine	PH
333	BA	—	29/PH-4	386	29	Pine	PH
334	BA	—	29/PH-4	386	29	Pine	PH
378	BA	—	29/PH-4	386	29	Pine	PH
345	BA	—	30/P-4	726	30	Landfill/IR Site	P
346	BA	—	30/P-4	726	30	Landfill/IR Site	P
347	BA	—	30/P-4	384	30	Pine	P
355	BA	—	30/P-4	726	30	Landfill/IR Site	P
356	BA	—	30/P-4	384	30	Pine	P
361	BA	—	30/P-4	383	30	Pine	P
313	BA	—	31/P-3	381	31	Pine	P
314	BA	—	31/P-3	—	31	—	P
315	BA	—	31/P-3	720	31	Pine/Hardwood	P
322	BA	—	31/P-3	720	31	Pine/Hardwood	P
329	BA	—	31/P-3	381	31	Pine	P
344	BA	—	31/P-3	381	31	Pine	P
353	BA	—	31/P-3	—	31	—	P
359	BA	—	32/P-3	383	32	Pine	P
360	BA	—	32/P-3	383	32	Pine	P
362	BA	—	32/P-3	383	32	Pine	P
369	BA/HEIGHT/FUELS	—	32/P-3	383	32	Pine	P
370	BA	—	32/P-3	383	32	Pine	P
371	BA	—	32/P-3	383	32	Pine	P
372	BA	—	32/P-3	383	32	Pine	P
375	BA	—	32/P-3	383	32	Pine	P
376	BA	—	32/P-3	383	32	Pine	P
377	BA	—	32/P-3	723	32	Beach/Dune	P

Appendix E
Definitions of Codes and Variables Used in
Tables

Summary of timber attribute variables and their locations within the report and accompanying data

PDF: PDF/Printed tables in Appendix H-J.

XL: Supplementary Microsoft Excel spreadsheet

Variable name/Breakdown	Variable Type	Product/Sp	Per acre/Total	STOCK TABLES						SUMMARY TABLES							
				Installation		Compartment		Type		Installation		Compartment		Type		Stand	
				PDF	XL	PDF	XL	PDF	XL	PDF	XL	PDF	XL	PDF	XL	PDF	XL	GIS
Area (acres)	AREA	—	—			X	X	X	X	X	X	X	X	X	X	X	X
Site index species	SITE	—	—												X	X	X
Site index	SITE	—	—												X	X	X
Growth (%)	SITE	—	—												X	X	X
Forest type	SITE	—	—												X	X	X
Age	CONDITION	—	—												X	X	X
Size class	CONDITION	—	—												X	X	X
Quadratic mean diameter (QMD)	CONDITION	ALL	—												X	X	X
Average height	CONDITION	ALL	—												X	X	X
Trees/acre by 2" dbh class & species/product grp	TREE COUNT	ALL	PER-ACRE	X	X	X	X	X	X	X	X						
Trees/acre	TREE COUNT	ALL	PER-ACRE			X	X	X	X			X	X	X	X	X	X
Total number of trees, 2" dbh class & species/product grp	TREE COUNT	ALL	TOTAL	X	X	X	X	X	X	X	X						
Total trees	TREE COUNT	ALL	TOTAL			X	X	X	X			X	X	X	X	X	X
Basal area/acre by 2" dbh class & species/product grp	BASAL AREA	ALL	PER-ACRE	X	X	X	X	X	X	X	X						
Sawtimber volume (board-feet)/acre, 2" dbh class & species	VOLUME	SPECIES	PER-ACRE	X	X	X	X	X	X	X	X						
Chip-n-saw volume (board-feet)/acre, 2" dbh class	VOLUME	C-N-S	PER-ACRE	X	X	X	X	X	X	X	X						
Pulp volume (cords)/acre, 2" dbh class & hardwood/software	VOLUME	H/S WOOD	PER-ACRE	X	X	X	X	X	X	X	X						
Sawtimber weight (tons)/acre, 2" dbh class & species	WEIGHT	SPECIES	PER-ACRE	X	X	X	X	X	X	X	X						
Chip-n-saw weight (tons)/acre, 2" dbh class	WEIGHT	C-N-S	PER-ACRE	X	X	X	X	X	X	X	X						
\$/acre, 2" dbh class & species/product group	VALUE	ALL	PER-ACRE	X	X	X	X	X	X	X	X						
Pulp weight (tons)/acre, 2" dbh class & hardwood/software	WEIGHT	H/S WOOD	PER-ACRE	X	X	X	X	X	X	X	X						
Total sawtimber volume (board-feet), 2" dbh class & species	VOLUME	SPECIES	TOTAL	X	X	X	X	X	X	X	X						
Total chip-n-saw volume (board-feet), 2" dbh class	VOLUME	C-N-S	TOTAL	X	X	X	X	X	X	X	X						
Total pulp volume (cords), 2" dbh class & hardwood/software	VOLUME	H/S WOOD	TOTAL	X	X	X	X	X	X	X	X						
Total sawtimber weight (tons), 2" dbh class & species	WEIGHT	SPECIES	TOTAL	X	X	X	X	X	X	X	X						
Total chip-n-saw weight (tons), 2" dbh class	WEIGHT	C-N-S	TOTAL	X	X	X	X	X	X	X	X						
Total pulp weight (tons), 2" dbh class & hardwood/software	WEIGHT	H/S WOOD	TOTAL	X	X	X	X	X	X	X	X						
Total \$, 2" dbh class & species/product grp	VALUE	ALL	TOTAL	X	X	X	X	X	X	X	X						
Basal area/acre	BASAL AREA	ALL	PER-ACRE			X	X	X	X			X	X	X	X	X	X
Hardwood basal area/acre	BASAL AREA	H/S WOOD	PER-ACRE									X	X	X	X	X	X
Softwood basal area/acre	BASAL AREA	H/S WOOD	PER-ACRE									X	X	X	X	X	X
Sawtimber basal area/acre	BASAL AREA	SAW	PER-ACRE									X	X	X	X	X	X
Hardwood sawtimber basal area/acre	BASAL AREA	H/S WOOD	PER-ACRE									X	X	X	X	X	X
Softwood sawtimber basal area/acre	BASAL AREA	H/S WOOD	PER-ACRE									X	X	X	X	X	X
Sawtimber volume (board-feet)/acre	VOLUME	SAW	PER-ACRE									X	X	X	X	X	X
Hardwood sawtimber volume (board-feet)/acre	VOLUME	H/S WOOD	PER-ACRE									X	X	X	X	X	X
Softwood sawtimber volume (board-feet)/acre	VOLUME	H/S WOOD	PER-ACRE									X	X	X	X	X	X
Sawtimber tons/acre	WEIGHT	SAW	PER-ACRE									X	X	X	X	X	X
Hardwood sawtimber tons/acre	WEIGHT	H/S WOOD	PER-ACRE									X	X	X	X	X	X
Softwood sawtimber tons/acre	WEIGHT	H/S WOOD	PER-ACRE									X	X	X	X	X	X
Sawtimber \$/acre	VALUE	SAW	PER-ACRE									X	X	X	X	X	X
Chip-n-saw basal area/acre	BASAL AREA	C-N-S	PER-ACRE	X	X	X	X	X	X	X	X						
Chip-n-saw volume (board-feet)/acre	VOLUME	C-N-S	PER-ACRE	X	X	X	X	X	X	X	X						
Chip-n-saw tons/acre	WEIGHT	C-N-S	PER-ACRE	X	X	X	X	X	X	X	X						
Chip-n-saw \$/acre	VALUE	C-N-S	PER-ACRE	X	X	X	X	X	X	X	X						
Total sawtimber and chip-and-saw volume (board-feet)/acre	VOLUME	SAW, C-N-S	PER-ACRE			X	X	X	X			X	X	X	X	X	X
Pulp basal area/acre	BASAL AREA	PULP	PER-ACRE									X	X	X	X	X	X
Hardwood pulp basal area/acre	BASAL AREA	H/S WOOD	PER-ACRE	X	X	X	X	X	X	X	X						
Softwood pulp basal area/acre	BASAL AREA	H/S WOOD	PER-ACRE	X	X	X	X	X	X	X	X						
Pulp volume (cords) per acre	VOLUME	PULP	PER-ACRE									X	X	X	X	X	X
Hardwood pulp volume (cords)/acre	VOLUME	H/S WOOD	PER-ACRE	X	X	X	X	X	X	X	X						
Softwood pulp volume (cords)/acre	VOLUME	H/S WOOD	PER-ACRE	X	X	X	X	X	X	X	X						
Pulp tons/acre	WEIGHT	PULP	PER-ACRE									X	X	X	X	X	X
Hardwood pulp tons/acre	WEIGHT	H/S WOOD	PER-ACRE	X	X	X	X	X	X	X	X						
Softwood pulp tons/acre	WEIGHT	H/S WOOD	PER-ACRE	X	X	X	X	X	X	X	X						
Total pulp \$/acre	VALUE	PULP	PER-ACRE									X	X	X	X	X	X
Hardwood pulp \$/acre	VALUE	H/S WOOD	PER-ACRE	X	X	X	X	X	X	X	X						
Softwood pulp \$/acre	VALUE	H/S WOOD	PER-ACRE	X	X	X	X	X	X	X	X						
Total tons/acre	WEIGHT	ALL	PER-ACRE			X	X	X	X								
Total \$/acre	VALUE	ALL	PER-ACRE			X	X	X	X			X	X	X	X	X	X
Total sawtimber volume (board-feet)	VOLUME	SAW	TOTAL									X	X	X	X	X	X
Total hardwood sawtimber volume (board-feet)	VOLUME	H/S WOOD	TOTAL									X	X	X	X	X	X
Total softwood sawtimber volume (board-feet)	VOLUME	H/S WOOD	TOTAL									X	X	X	X	X	X
Total sawtimber tons	WEIGHT	WEIGHT	TOTAL									X	X	X	X	X	X
Total hardwood sawtimber tons	WEIGHT	H/S WOOD	TOTAL									X	X	X	X	X	X
Total softwood sawtimber tons	WEIGHT	H/S WOOD	TOTAL									X	X	X	X	X	X
Total sawtimber \$	VALUE	SAW	TOTAL									X	X	X	X	X	X
Total chip-n-saw volume (board-feet)	VOLUME	C-N-S	TOTAL	X	X	X	X	X	X	X	X						
Total chip-n-saw tons	WEIGHT	C-N-S	TOTAL	X	X	X	X	X	X	X	X						
Total chip-n-saw \$	VALUE	C-N-S	TOTAL	X	X	X	X	X	X	X	X						
Total sawtimber and chip-and-saw volume (board-feet)	VOLUME	SAW, C-N-S	TOTAL			X	X	X	X			X	X	X	X	X	X
Total pulp volume (cords)	VOLUME	PULP	TOTAL									X	X	X	X	X	X
Total hardwood pulp volume (cords)	VOLUME	H/S WOOD	TOTAL	X	X	X	X	X	X	X	X						
Total softwood pulp volume (cords)	VOLUME	H/S WOOD	TOTAL	X	X	X	X	X	X	X	X						
Total pulp tons	WEIGHT	PULP	TOTAL									X	X	X	X	X	X
Total hardwood pulp tons	WEIGHT	H/S WOOD	TOTAL	X	X	X	X	X	X	X	X						
Total softwood pulp tons	WEIGHT	H/S WOOD	TOTAL	X	X	X	X	X	X	X	X						
Total pulp \$	VALUE	PULP	TOTAL									X	X	X	X	X	X
Total tons	VOLUME	ALL	TOTAL			X	X	X	X								
Total \$	VALUE	ALL	TOTAL			X	X	X	X			X	X	X	X	X	X

This list is not meant to be all inclusive. These and additional variables may be reported in additional places in the body of the report, appendices, and/or GIS data. Summary of accuracy at the compartment, forest type and installation levels reported in

Table E-1: List and definition of forest type codes used in the summary and data tables; based on prior report.

Forest type code	Code meaning	Stand average basal area criteria
H	hardwood	< 25% softwood basal area
HP	hardwood - pine	≥25% – <50% softwood basal area
PH	pine - hardwood	≥50% – <75% softwood basal area
P	pine	≥75% softwood basal area
Wildlife	—	Pre-merchantable stand

Type code concatenated with size class code, using dash, to arrive at a combined forest type-size class code.

Table E-2: List and definition of size class codes used in the summary and data tables; based on prior report.

Size class code	Code meaning	Stand average basal area criteria
4	sawtimber	majority of basal area in sawtimber size (dbh \geq 13") trees
3	chip-n-saw	majority of basal area in chip-n-saw size (softwoods only: dbh \geq 9 – <13") trees
2	pulpwood	majority of basal area in pulpwood size (softwoods: dbh \geq 6 – <9"; hardwoods: dbh \geq 6 – <13") trees
1 (WL)	seedling/sapling (wildlife)	majority of basal area in trees <6" dbh

Type code concatenated with size class code, using dash, to arrive at a combined forest type-size class code.

Table E-3: List and definition of species codes used in the summary and data tables.

Species code	Common name	Scientific name
ACRU	soft maple	Acer rubrum
FRCA	Carolina ash	Fraxinus caroliniana
FRPE	green ash	Fraxinus pennsylvanica
ILOP	American holly	Ilex opaca
LIST	sweetgum	Liquidambar styraciflua
LITU	tulip-poplar	Liriodendron tulipifera
NYAQ	water tupelo	Nyssa aquatica
NYSY	blackgum	Nyssa sylvatica
PIPA	longleaf pine	Pinus palustris
PITA	loblolly pine	Pinus taeda
QUAL	white oak	Quercus alba
QULA	laurel oak	Quercus laurifolia
QUMI	swamp chestnut oak	Quercus michauxii
QUNI	water oak	Quercus nigra
QUPH	willow oak	Quercus phellos
QURU	red oak	Quercus rubra
TADI	bald cypress	Taxodium distichum
ULAM	American elm	Ulmus americana
UNHW	unidentified hardwood	N/A

Table E-4: List and definition of vigor class codes used in the summary and data tables.

Vigor class code	Code meaning	Product class/grade criteria
AGS	<u>A</u> ceptable <u>G</u> rowing <u>S</u> tock	Tree is of desirable species and quality, and worth retaining through at least one additional thinning/cutting cycle.
UGS	<u>U</u> nacceptable <u>G</u> rowing <u>S</u> tock	Tree is of undesirable species or quality, and is not worth retaining through at least one additional thinning/cutting cycle.

Table E-5: List and definition of grade codes used in the summary and data tables.

Grade code	Code meaning	Product class/grade criteria
ST	sawlog	Tree is sawtimber size (dbh \geq 13")
CS	chip-n-saw	Tree is chip-n-saw size (softwoods only: dbh \geq 9 – <13")
PW	pulpwood	Tree is pulpwood size (softwoods: dbh \geq 6 – <9"; hardwoods: dbh \geq 6 – <13")

Appendix F
Fuel Plot Photo Series



DNA_plot26_E



DNA_plot26_N



DNA_plot26_S



DNA_plot26_W



DNA_plot30_E



DNA_plot30_N



DNA_plot30_S



DNA_plot30_W



DNA_plot49_E



DNA_plot49_N



DNA_plot49_S



DNA_plot49_W



DNA_plot56_E



DNA_plot56_N



DNA_plot56_S



DNA_plot56_W



DNA_plot70_E



DNA_plot70_N



DNA_plot70_S



DNA_plot70_W



DNA_plot91_E



DNA_plot91_N



DNA_plot91_S



DNA_plot91_W



DNA_plot236_E



DNA_plot236_N



DNA_plot236_S



DNA_plot236_W



DNA_plot301_E



DNA_plot301_N



DNA_plot301_S



DNA_plot301_W



DNA_plot325_E



DNA_plot325_N



DNA_plot325_S



DNA_plot325_W



DNA_plot367_E



DNA_plot367_N



DNA_plot367_S



DNA_plot367_W



DNA_plot369_E



DNA_plot369_N



DNA_plot369_S



DNA_plot369_W

Appendix G
RAWS Fuel Moisture Characteristics Assessment

FIGURE G-1
Back Bay Virginia (Station Identification Number 449905): 1-hour average, minimum, and maximum percent fuel moistures.

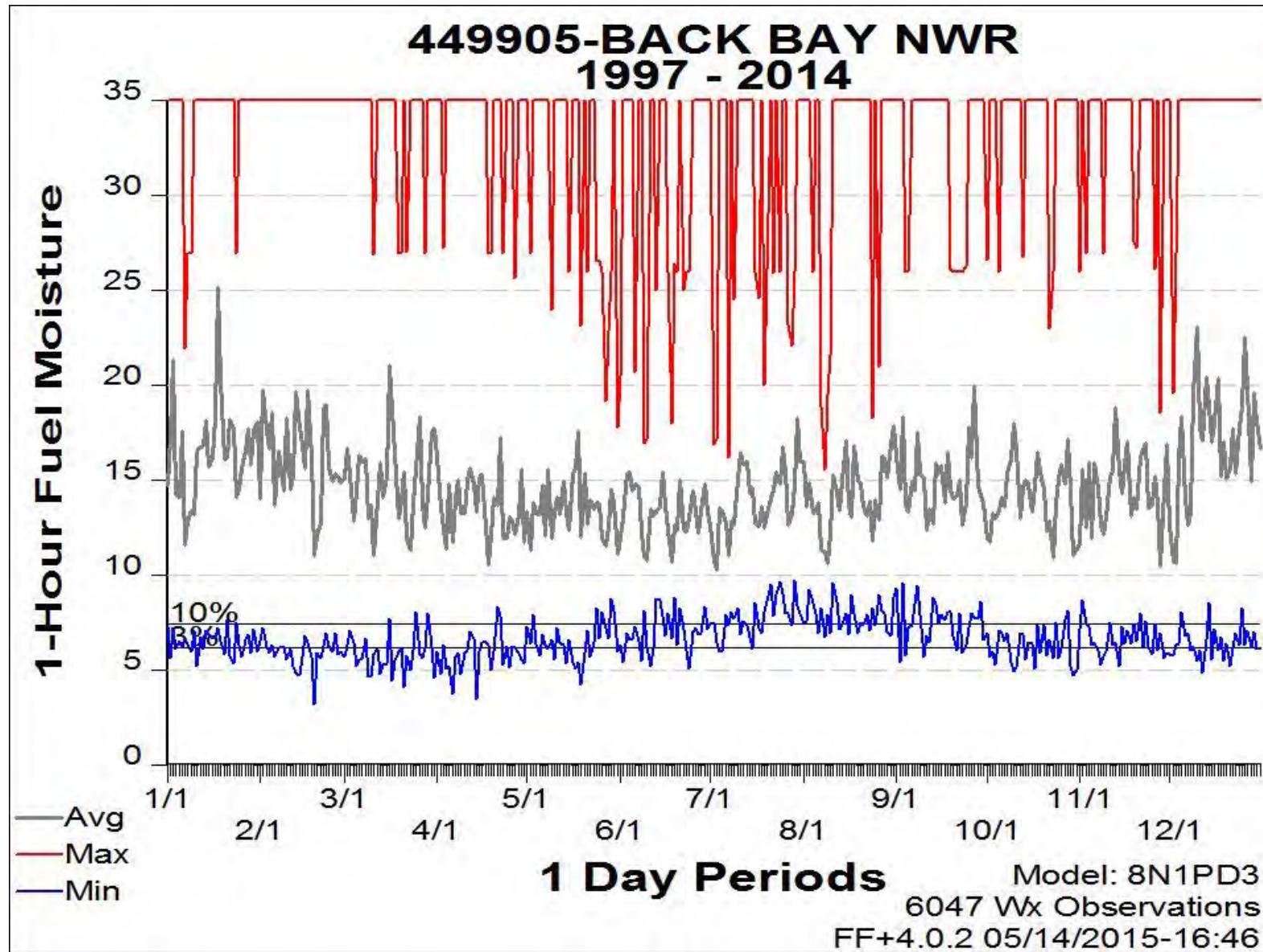


FIGURE G-2
Back Bay Virginia (Station Identification Number 449905): 10-hour average, minimum, and maximum percent fuel moistures.

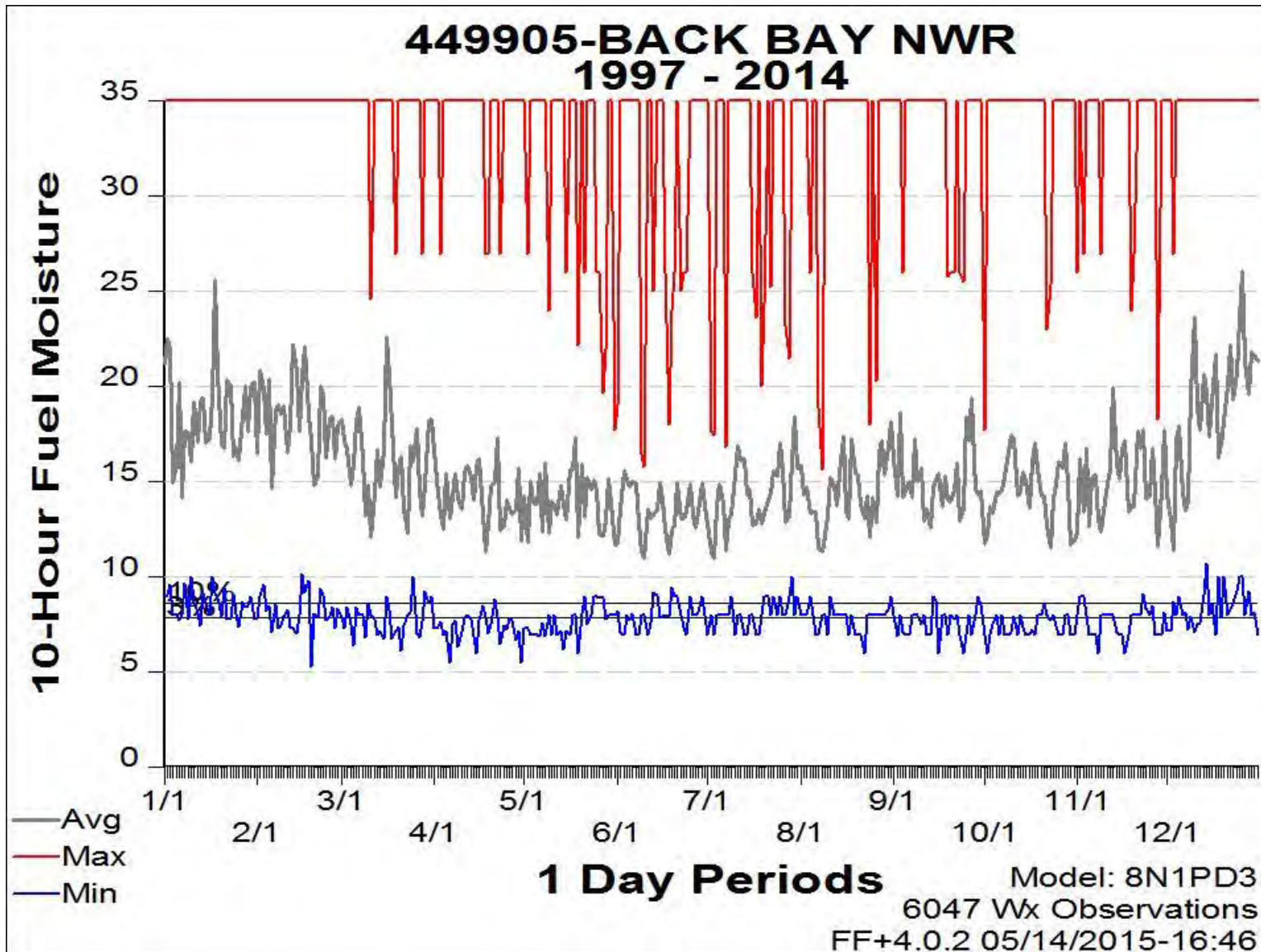


FIGURE G-3
Back Bay Virginia (Station Identification Number 449905): 100-hour average, minimum, and maximum percent fuel moistures.

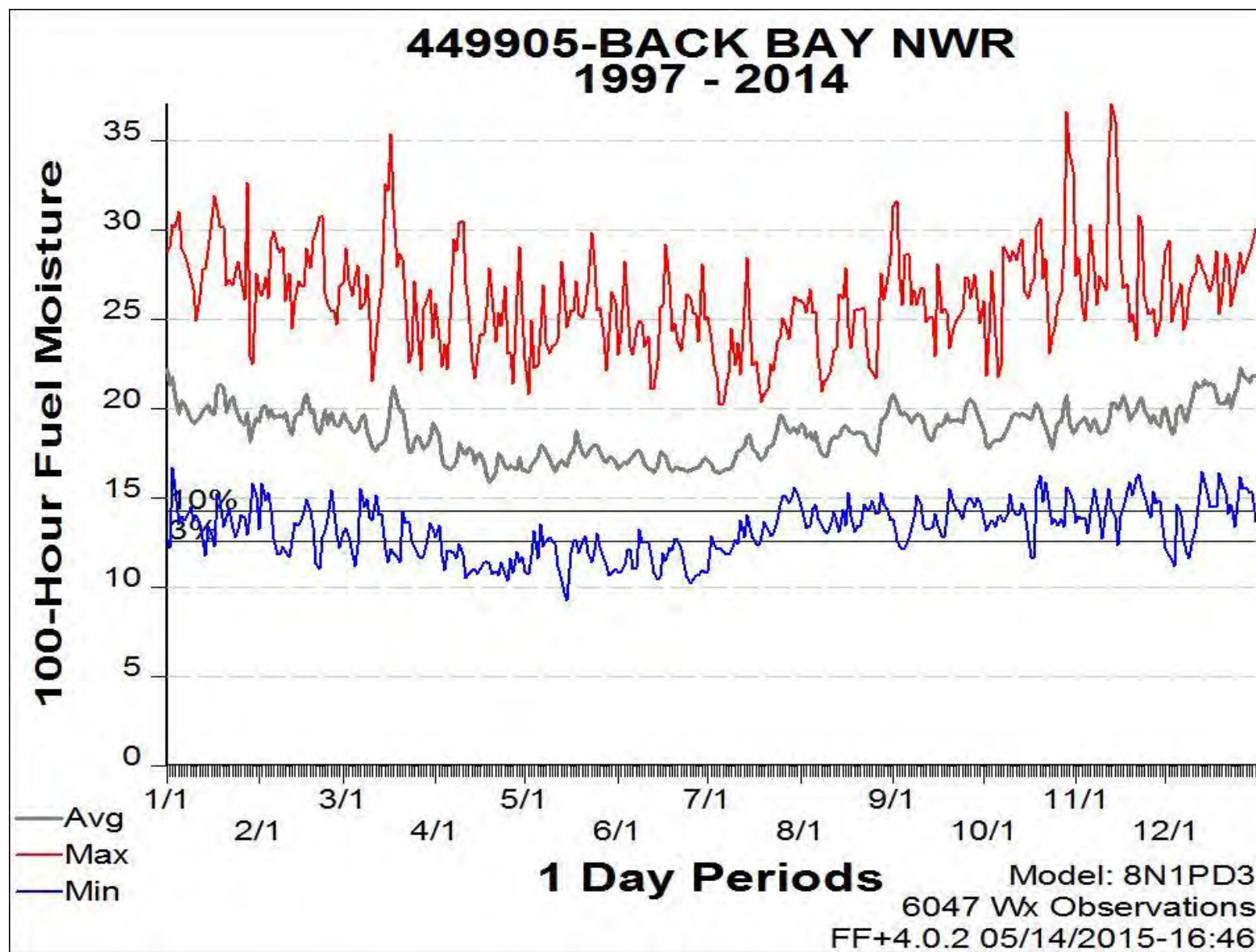


FIGURE G-4
Back Bay Virginia (Station Identification Number 449905): 1000-hour average, minimum, and maximum percent fuel moistures.

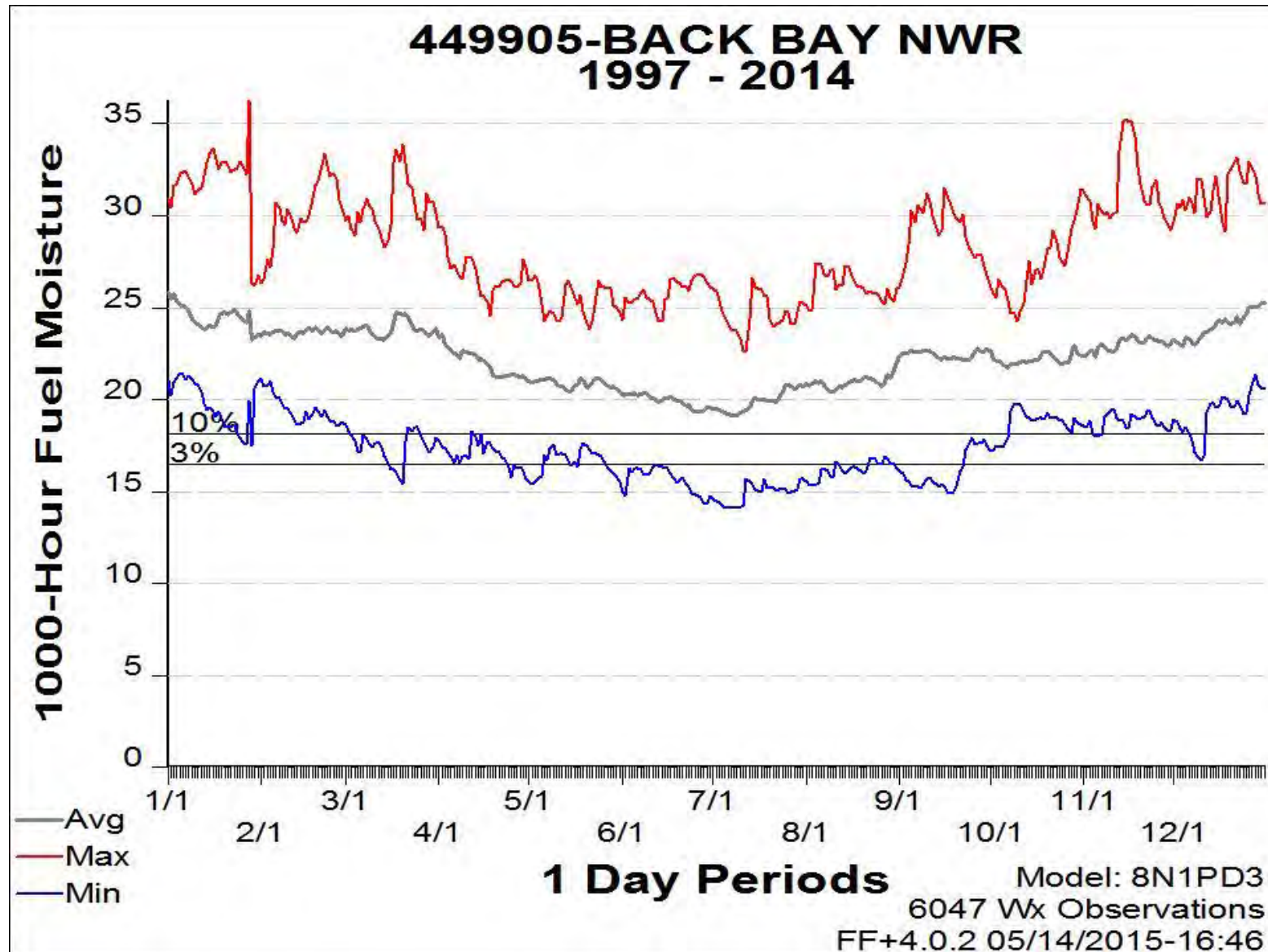


FIGURE G-5
Back Bay Virginia (Station Identification Number 449905): herbaceous average, minimum, and maximum percent fuel moistures.

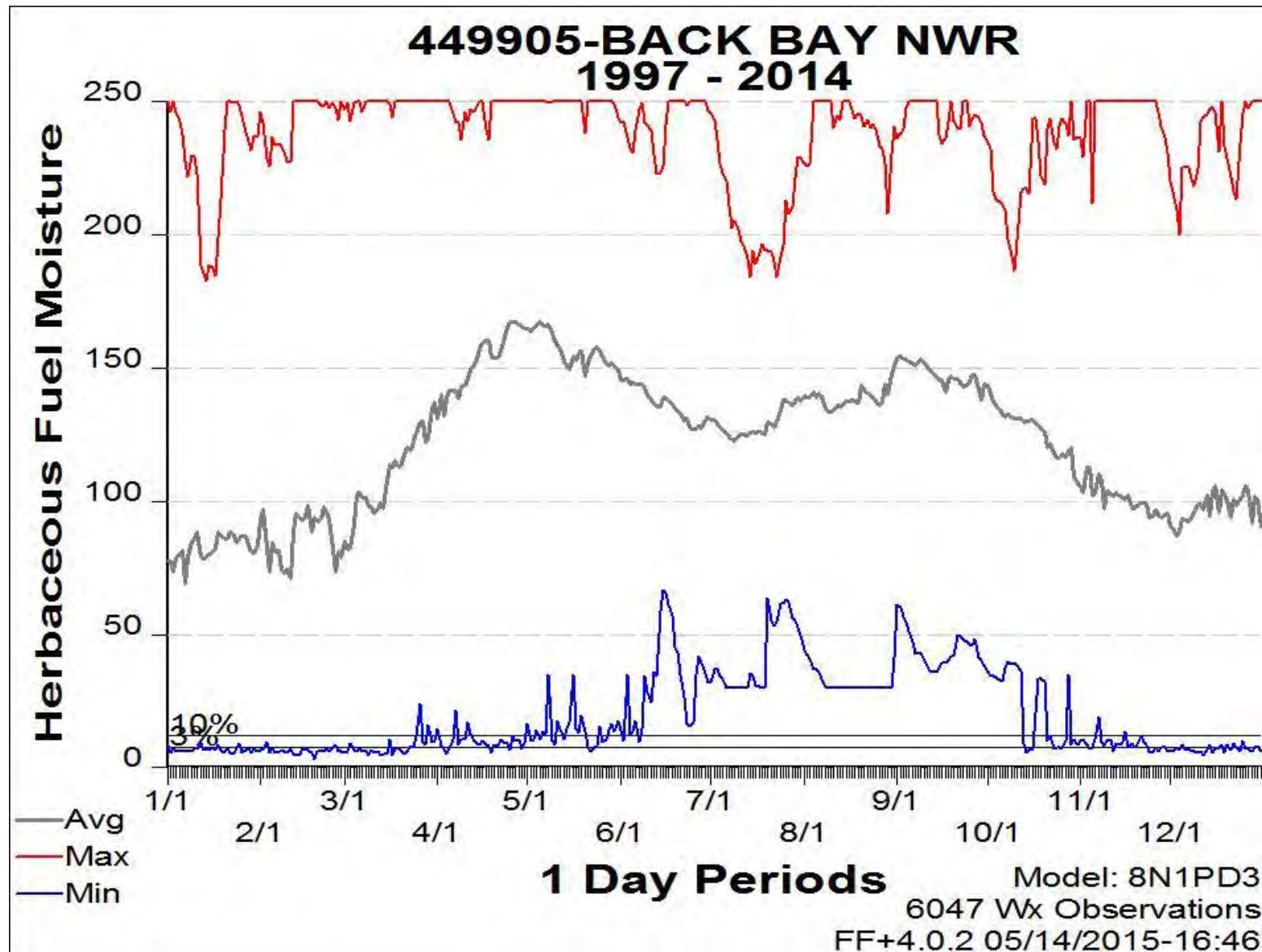


FIGURE G-6
Back Bay Virginia (Station Identification Number 449905): live woody average, minimum, and maximum percent fuel moistures.

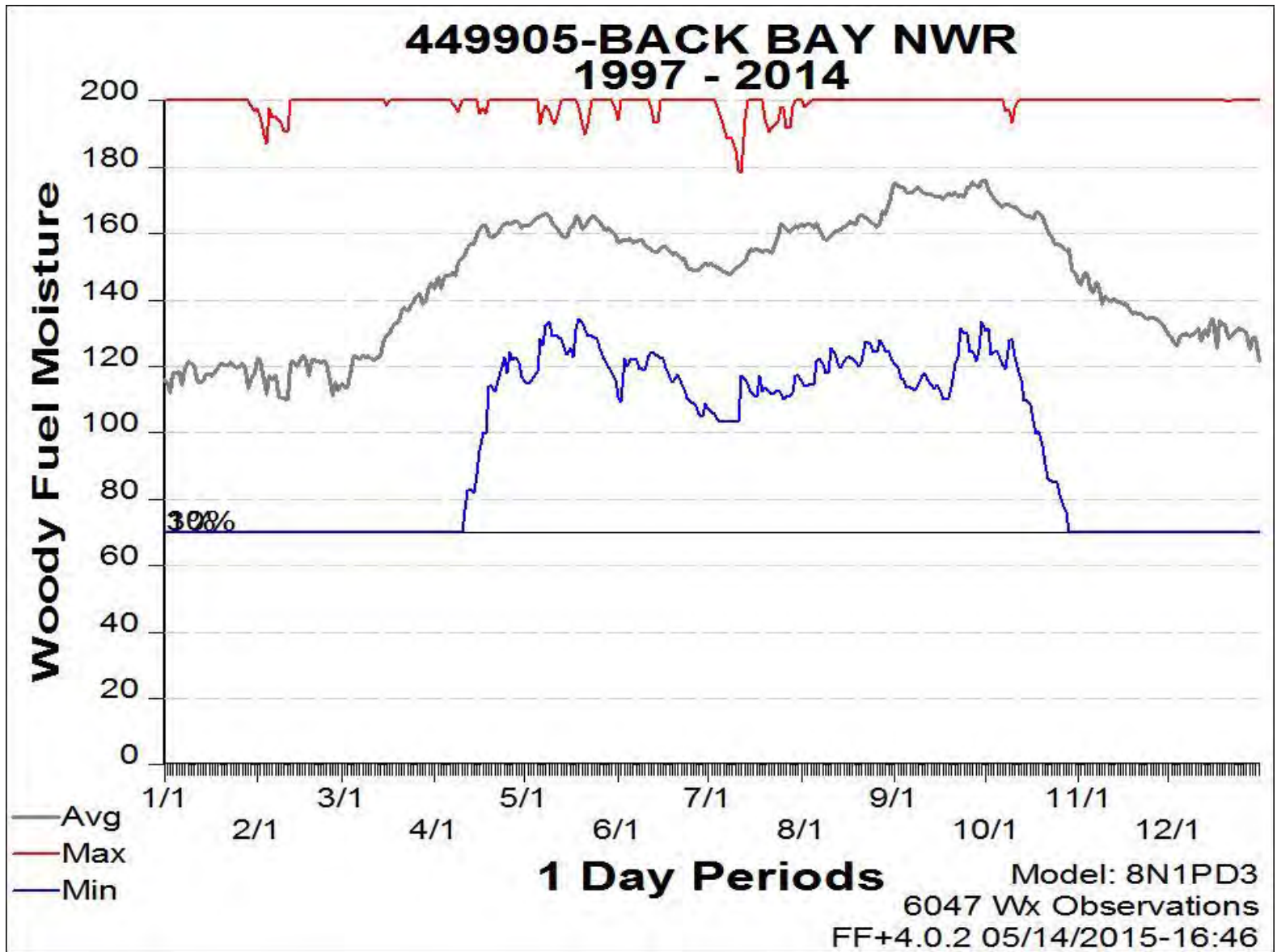


FIGURE G-7
Great Dismal Swamp NWR, (Station Identification Number 449801): 1-hour average, minimum, and maximum percent fuel moistures.

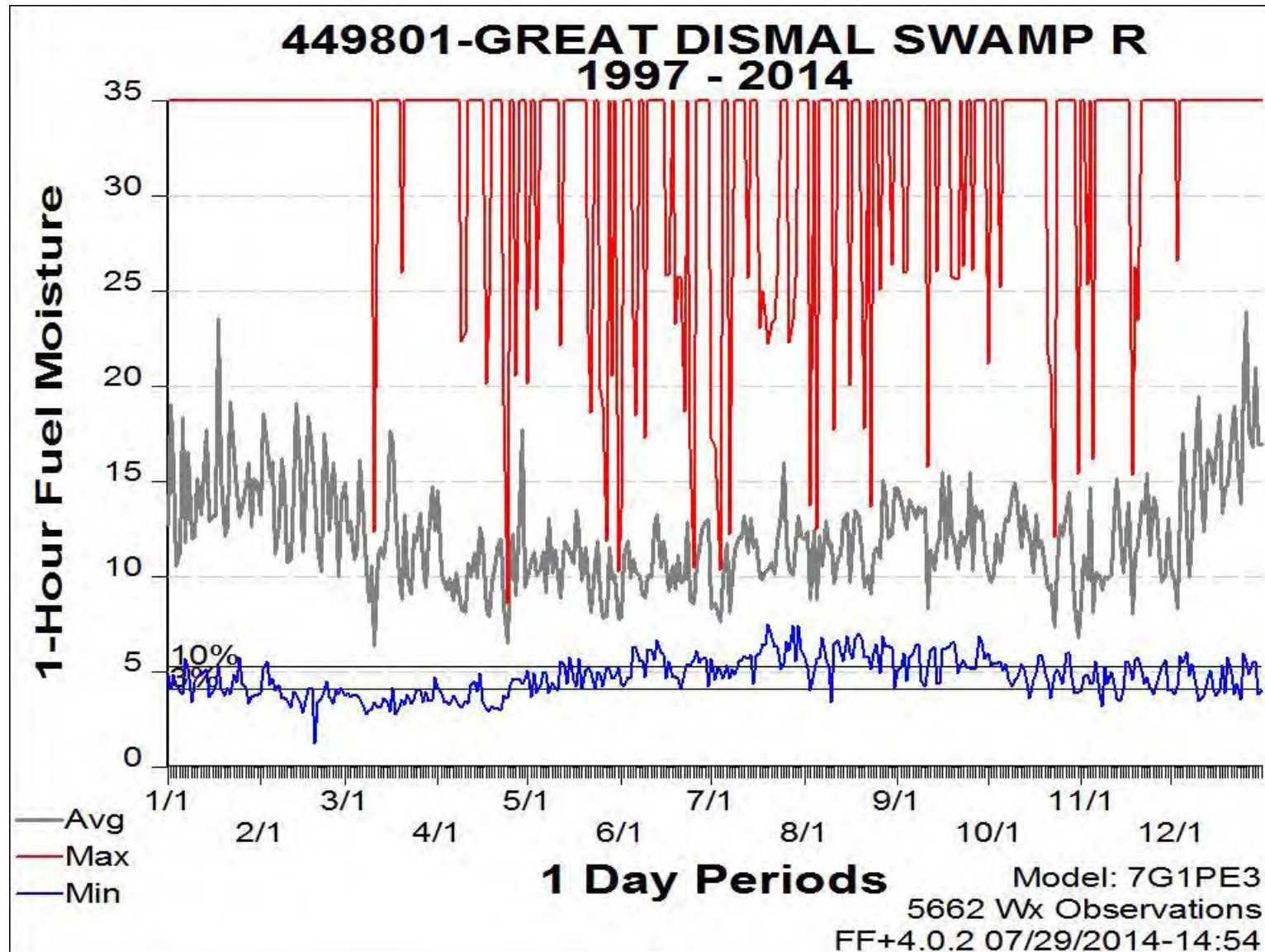


FIGURE G-8
Great Dismal Swamp NWR, (Station Identification Number 449801): 10-hour average, minimum, and maximum percent fuel moistures.

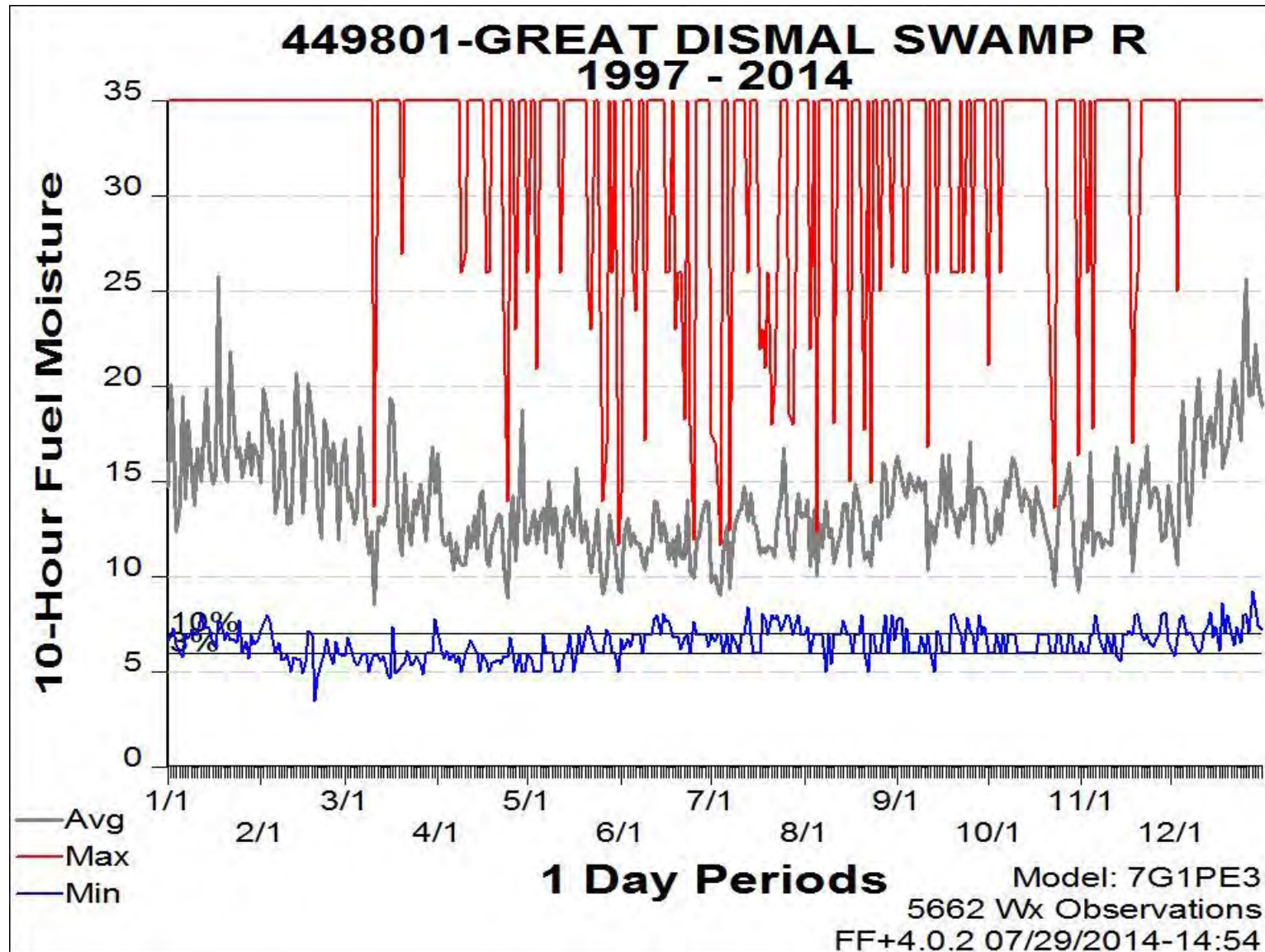


FIGURE G-9
Great Dismal Swamp NWR, (Station Identification Number 449801): 100-hour average, minimum, and maximum percent fuel moistures

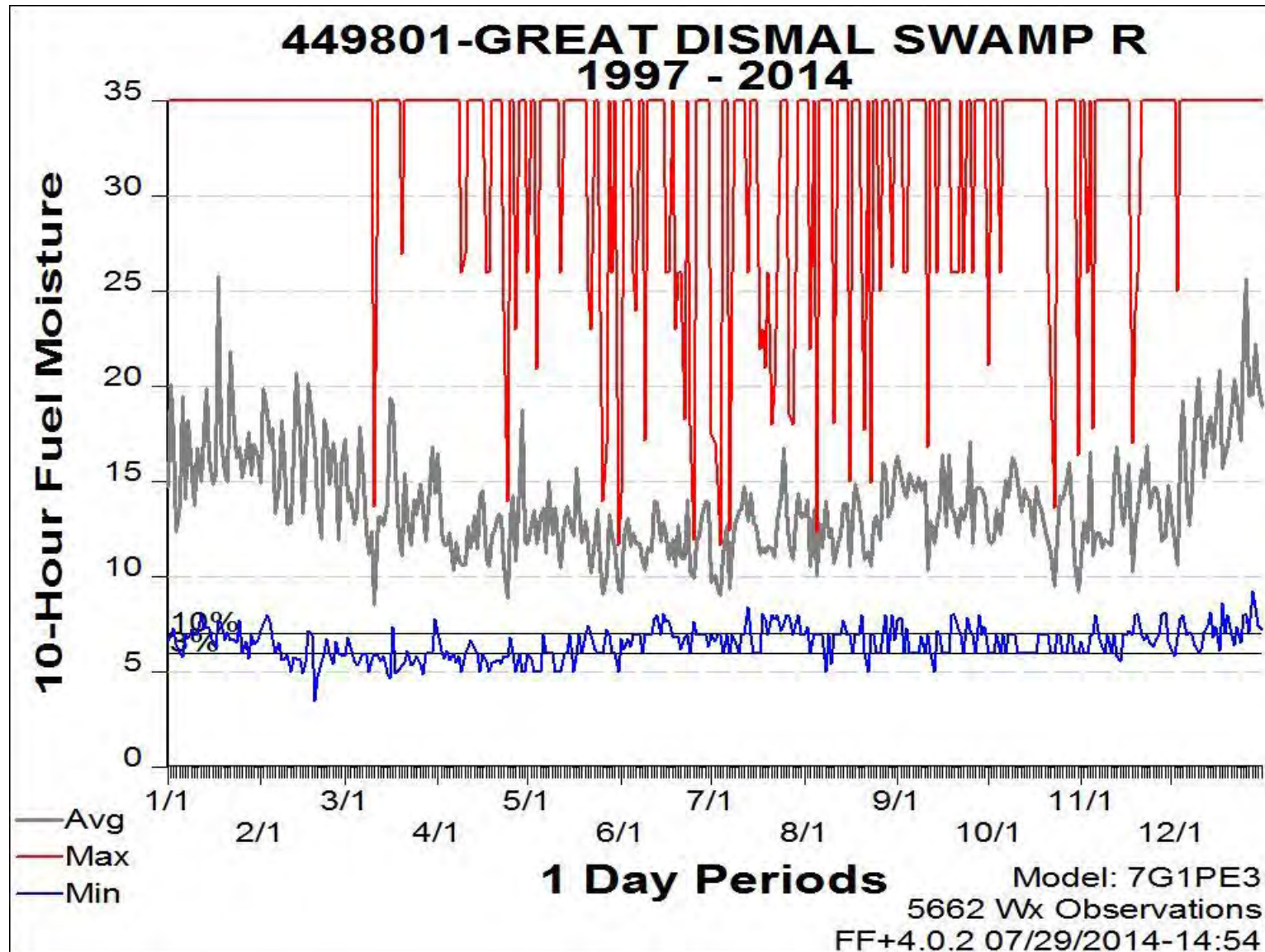


FIGURE G-10
Great Dismal Swamp NWR, (Station Identification Number 449801): 1000-hour average, minimum, and maximum percent fuel moistures.

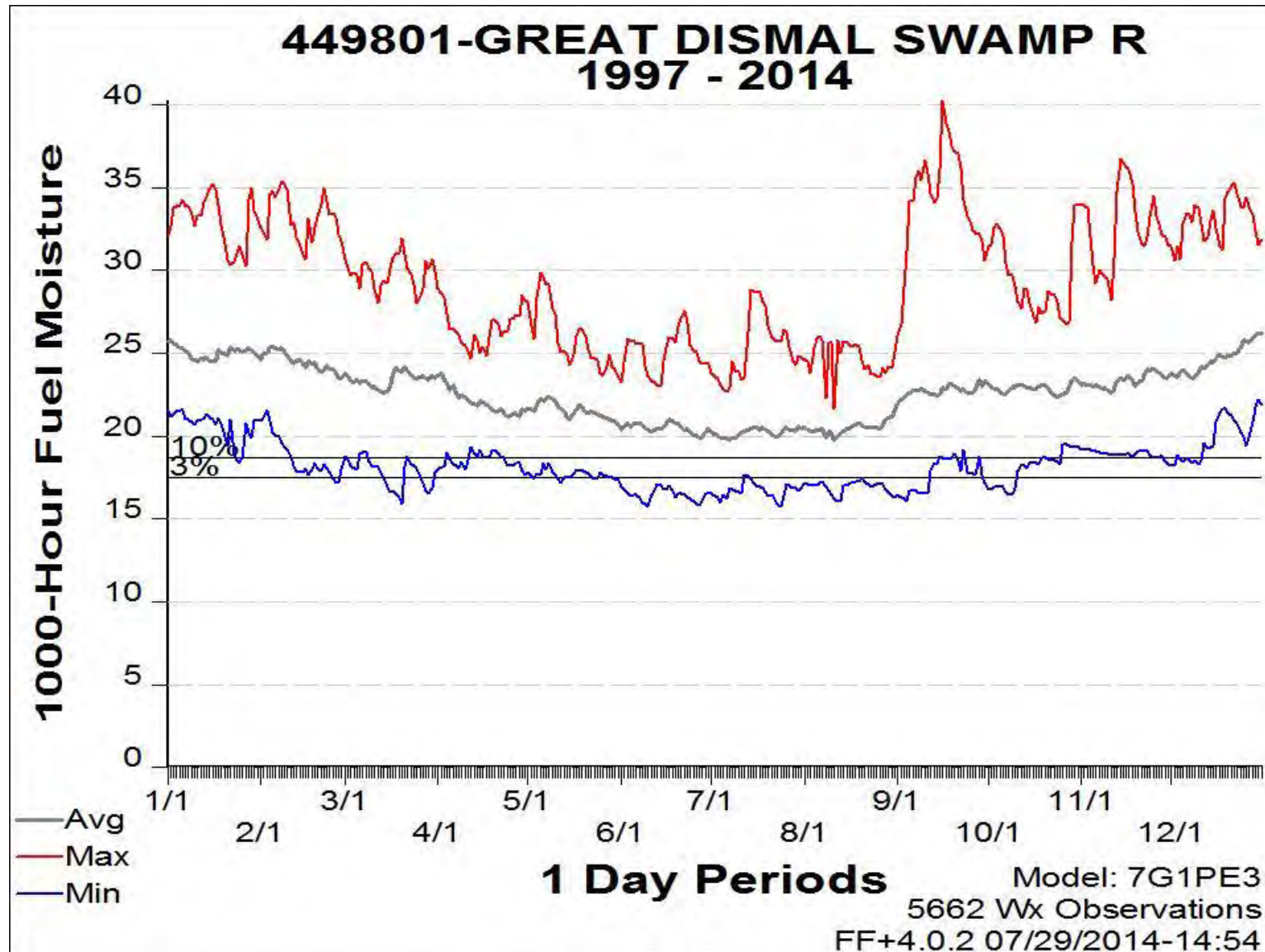


FIGURE G-11
Great Dismal Swamp NWR, (Station Identification Number 449801): herbaceous average, minimum, and maximum percent fuel moistures.

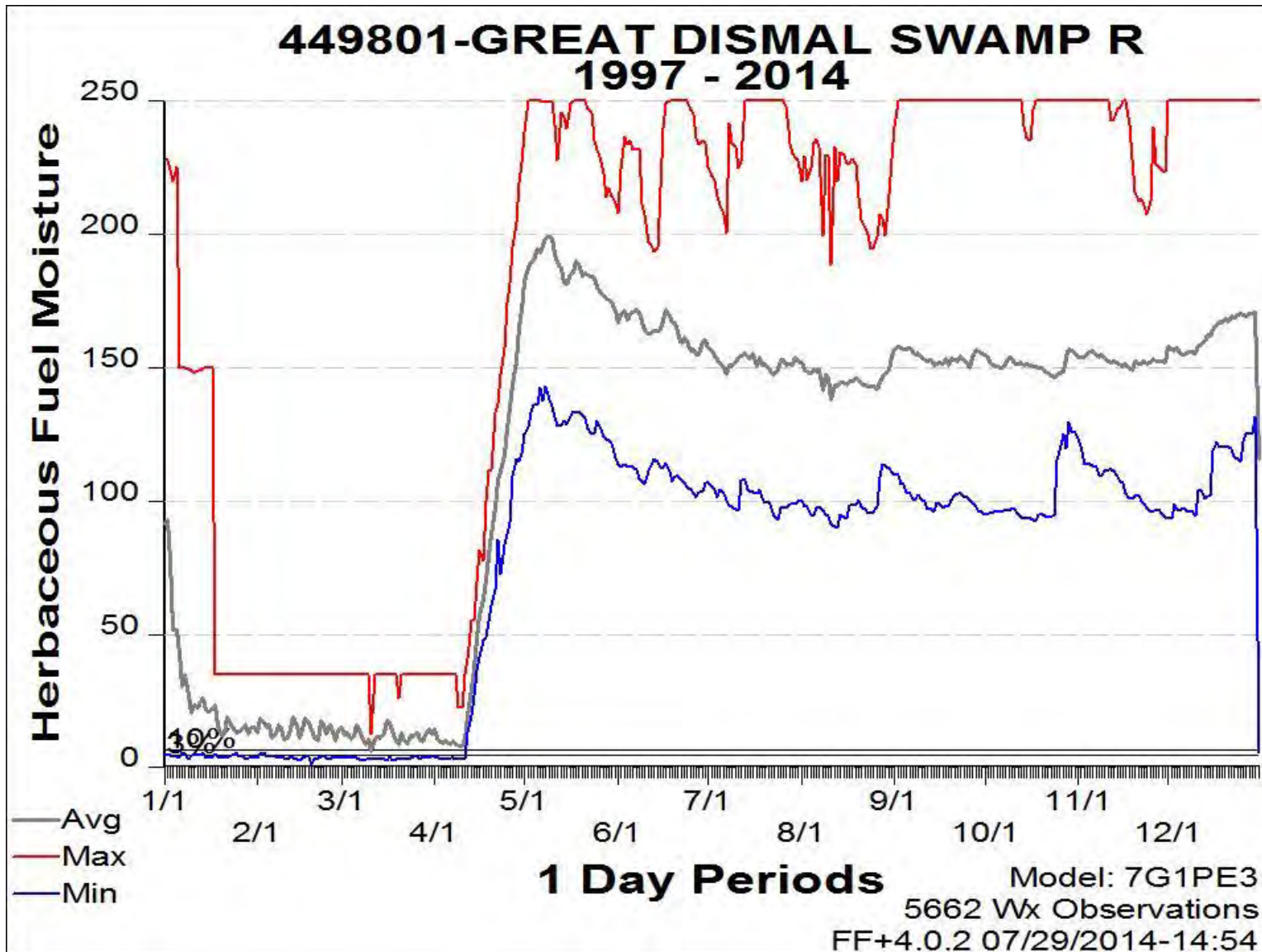


FIGURE G-12
Great Dismal Swamp NWR, (Station Identification Number 449801): live woody average, minimum, and maximum percent fuel moistures.

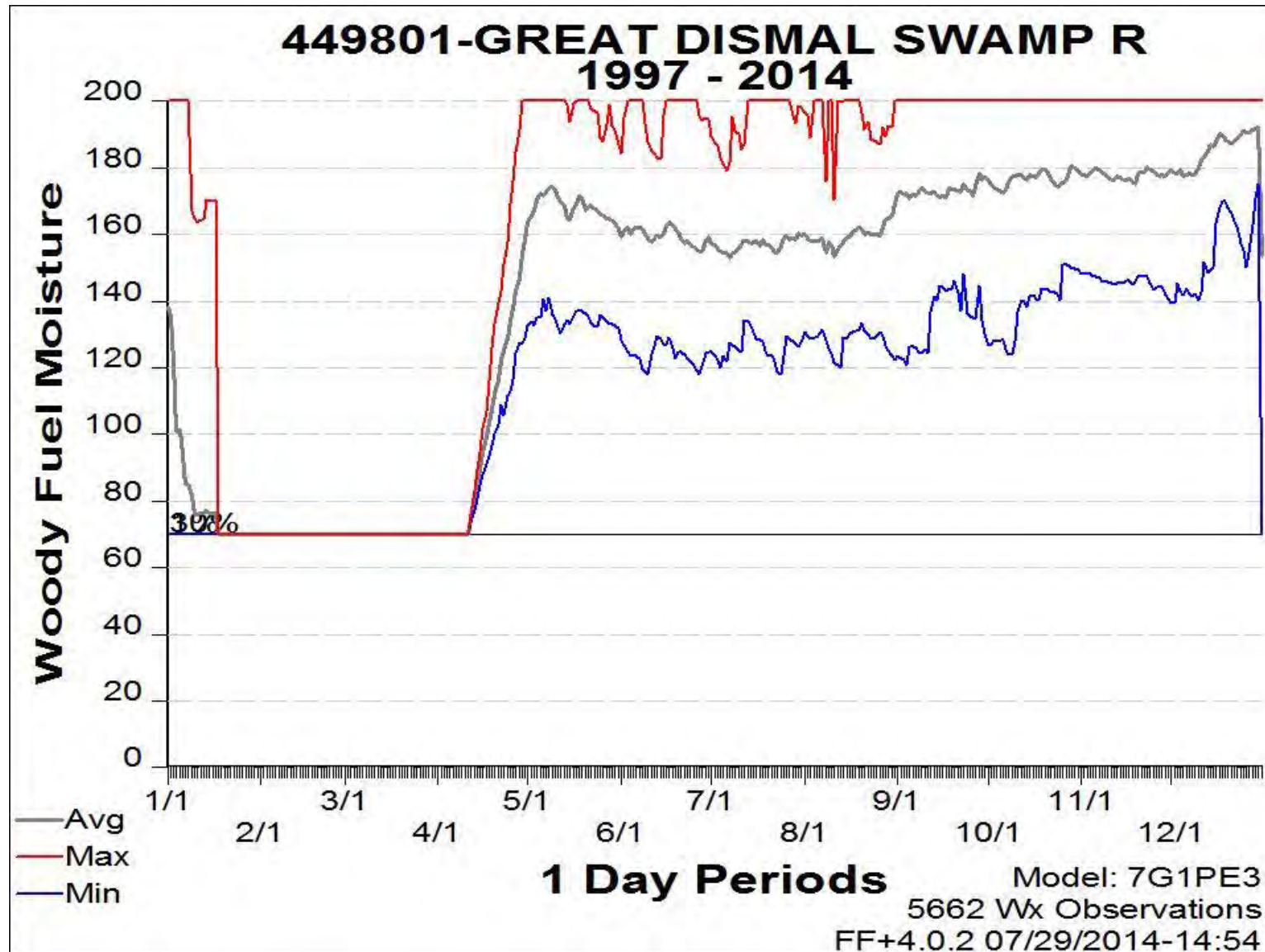


FIGURE G-13
Elizabeth City, (Station Identification Number 311503): 1-hour average, minimum, and maximum percent fuel moistures.

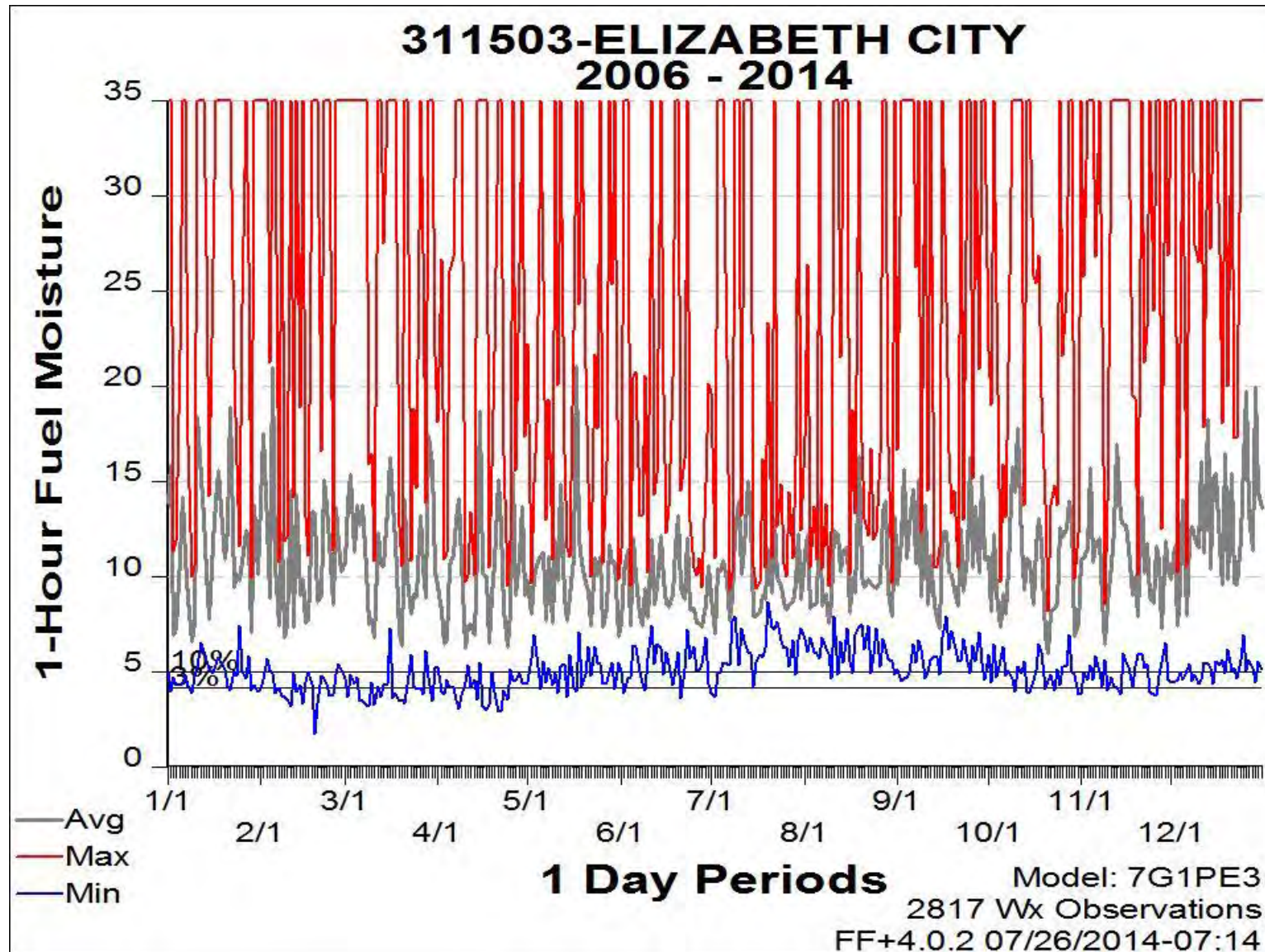


FIGURE G-14
Elizabeth City, (Station Identification Number 311503): 10-hour average, minimum, and maximum percent fuel moistures.

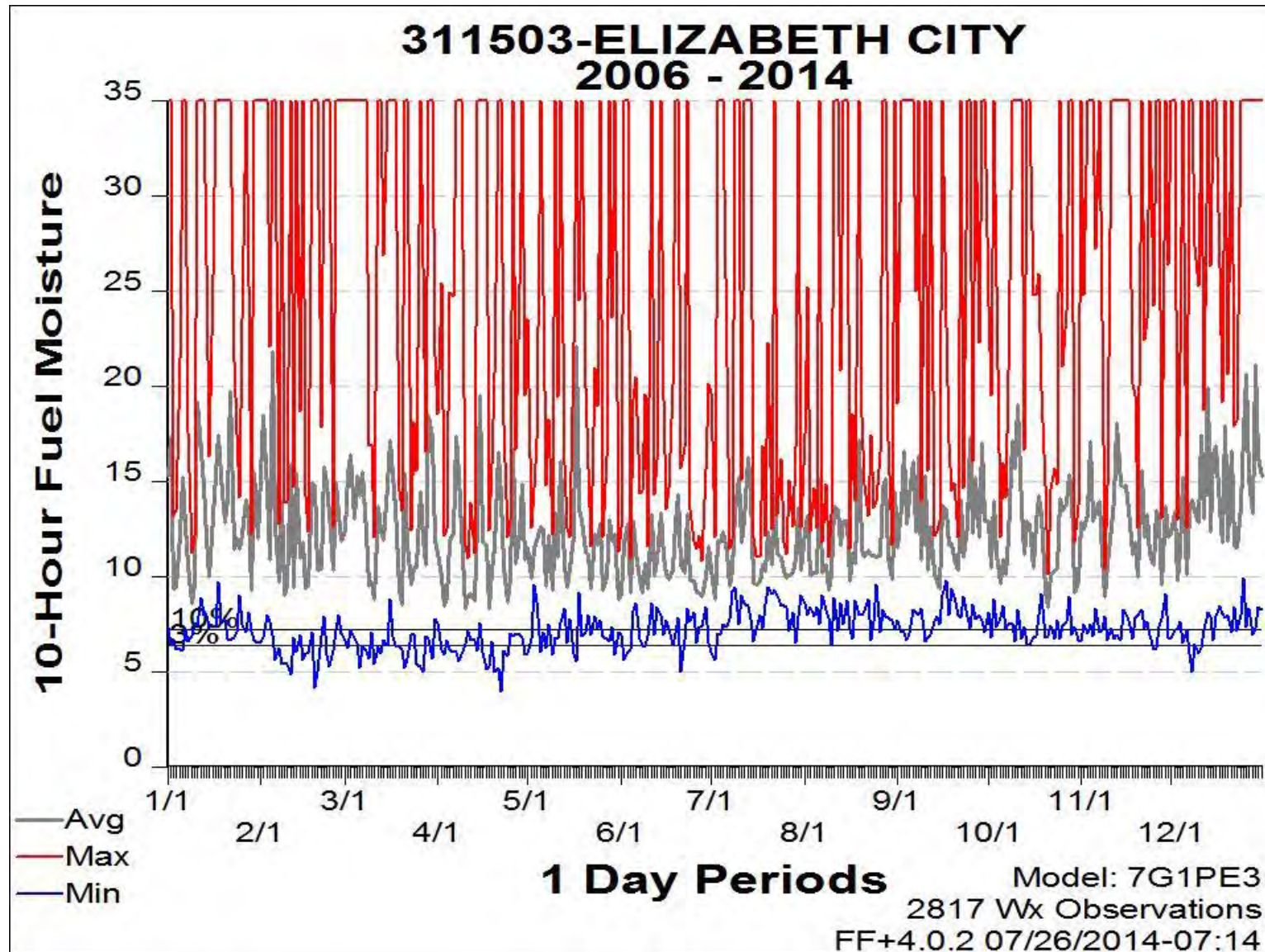


FIGURE G-15
Elizabeth City, (Station Identification Number 311503): 100-hour average, minimum, and maximum percent fuel moistures

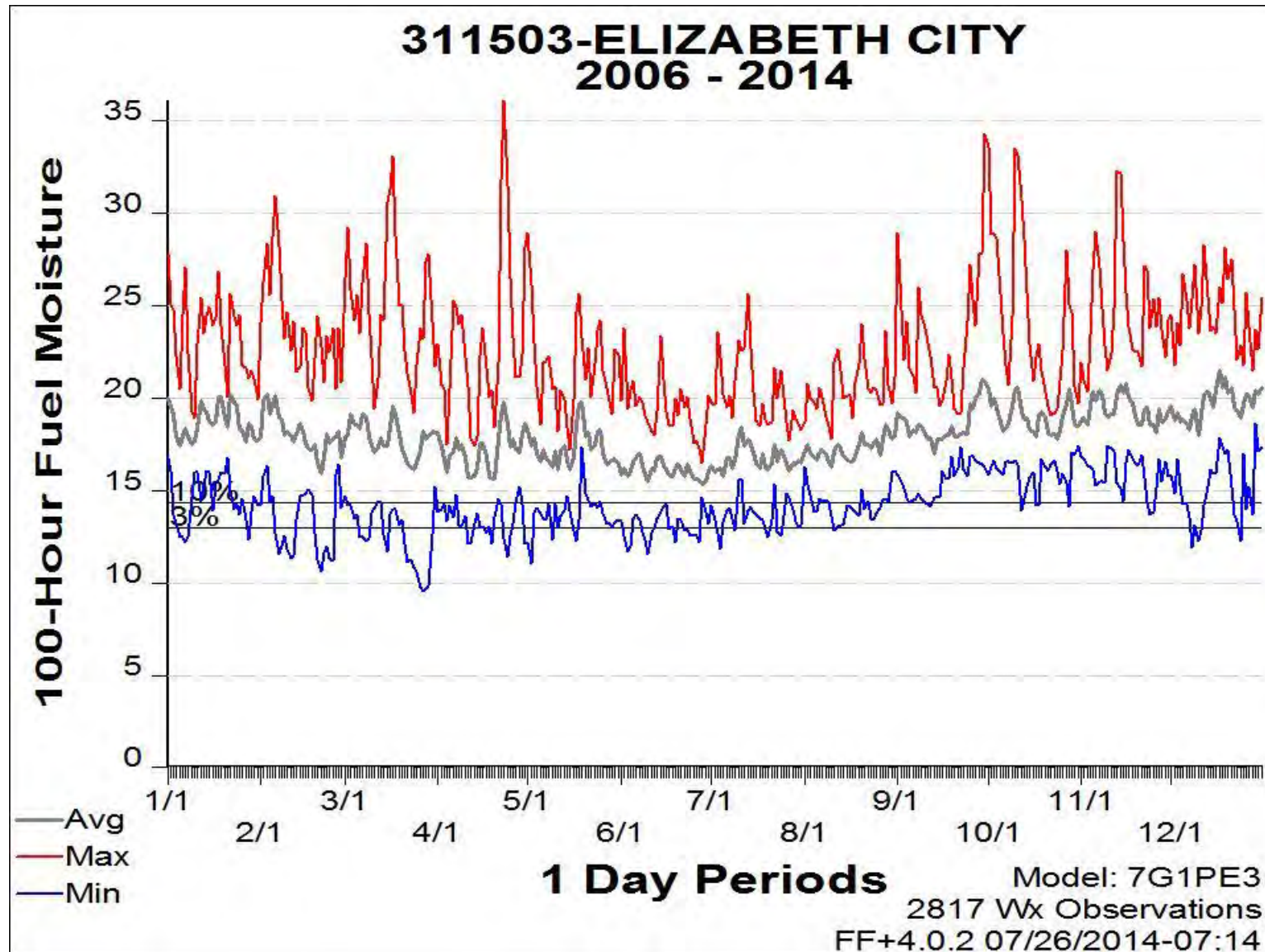


FIGURE G-16
Elizabeth City, (Station Identification Number 311503): 1000-hour average, minimum, and maximum percent fuel moistures.

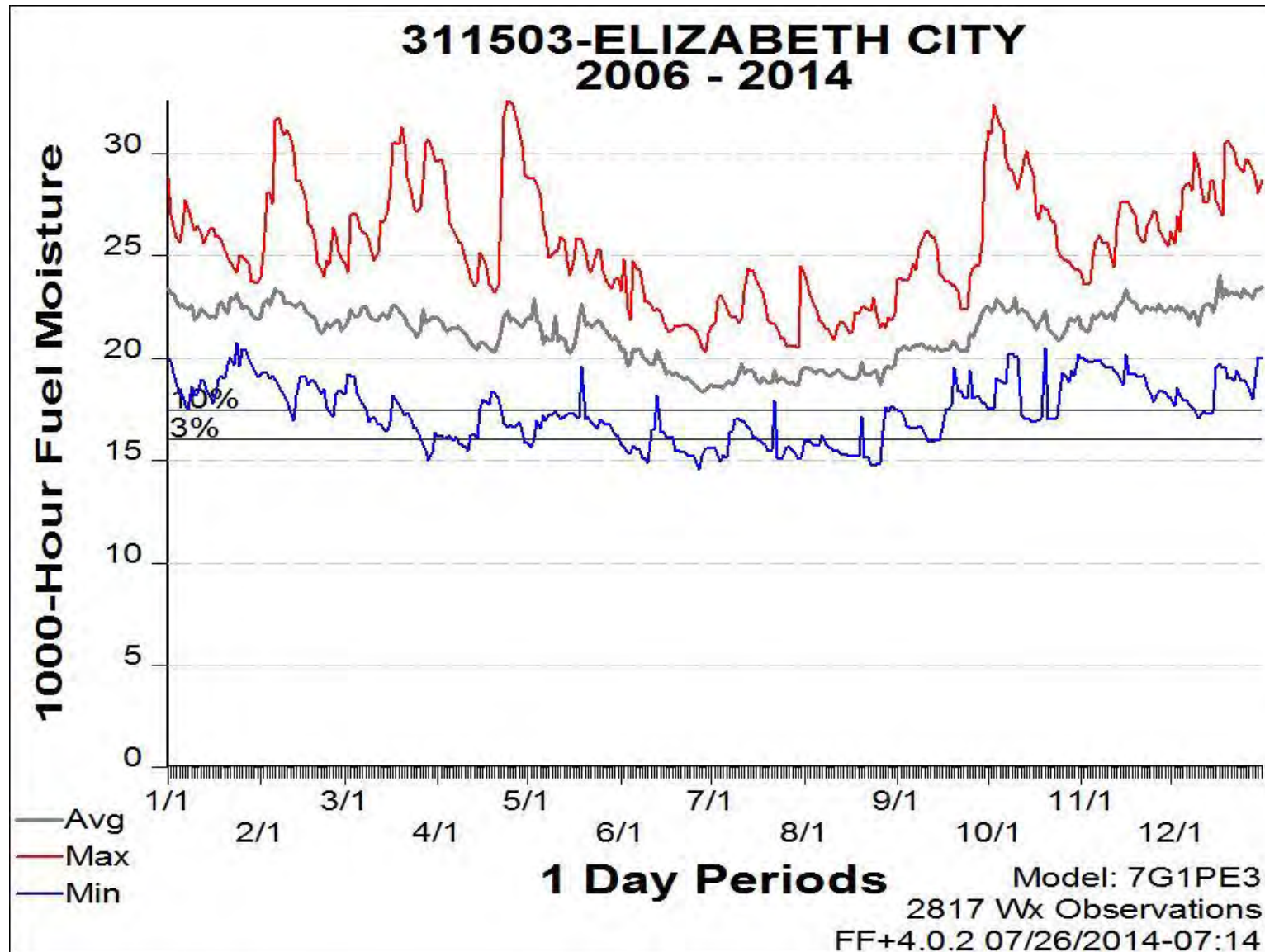


FIGURE G-17
Elizabeth City, (Station Identification Number 311503): herbaceous average, minimum, and maximum percent fuel moistures.

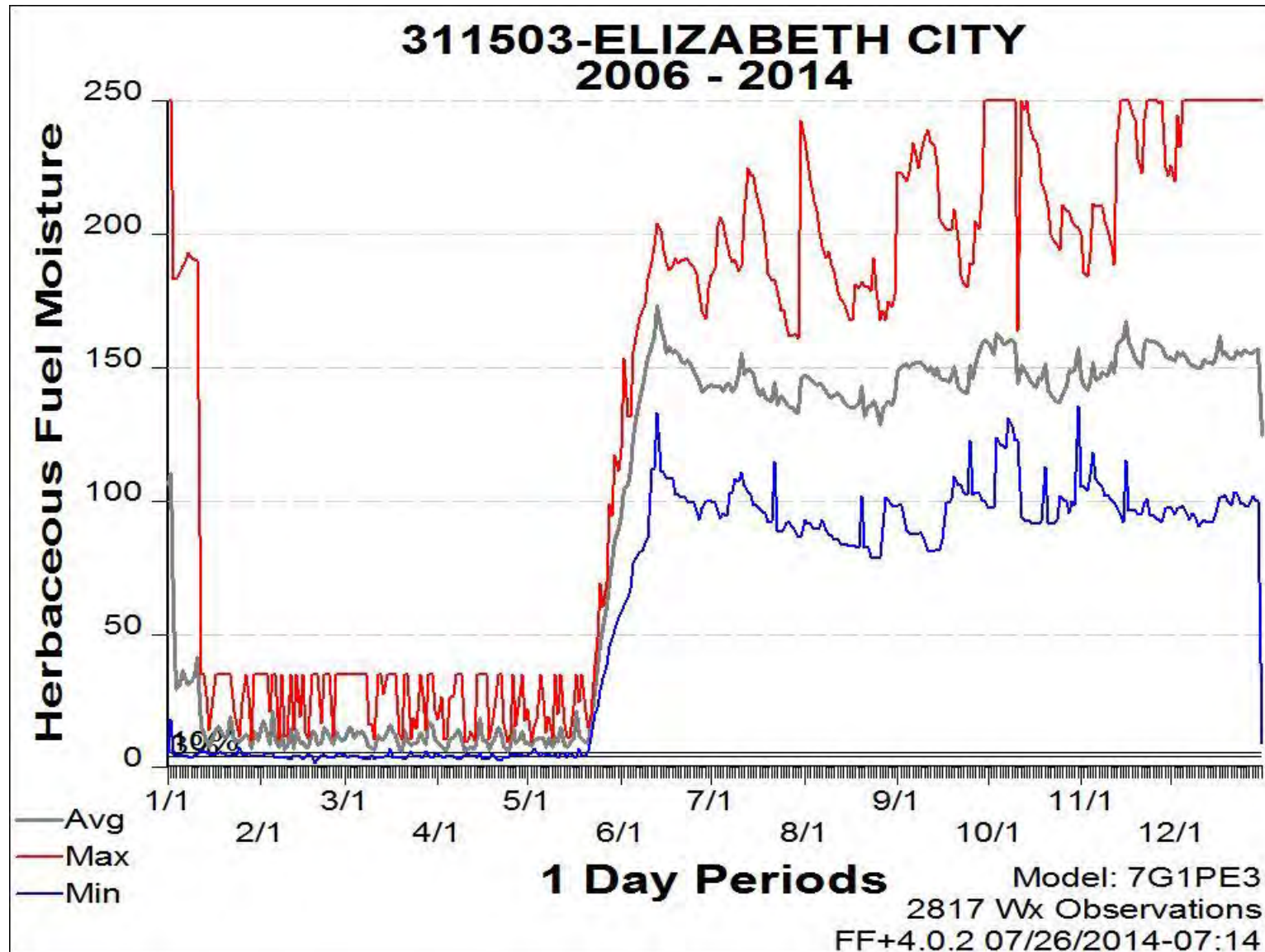
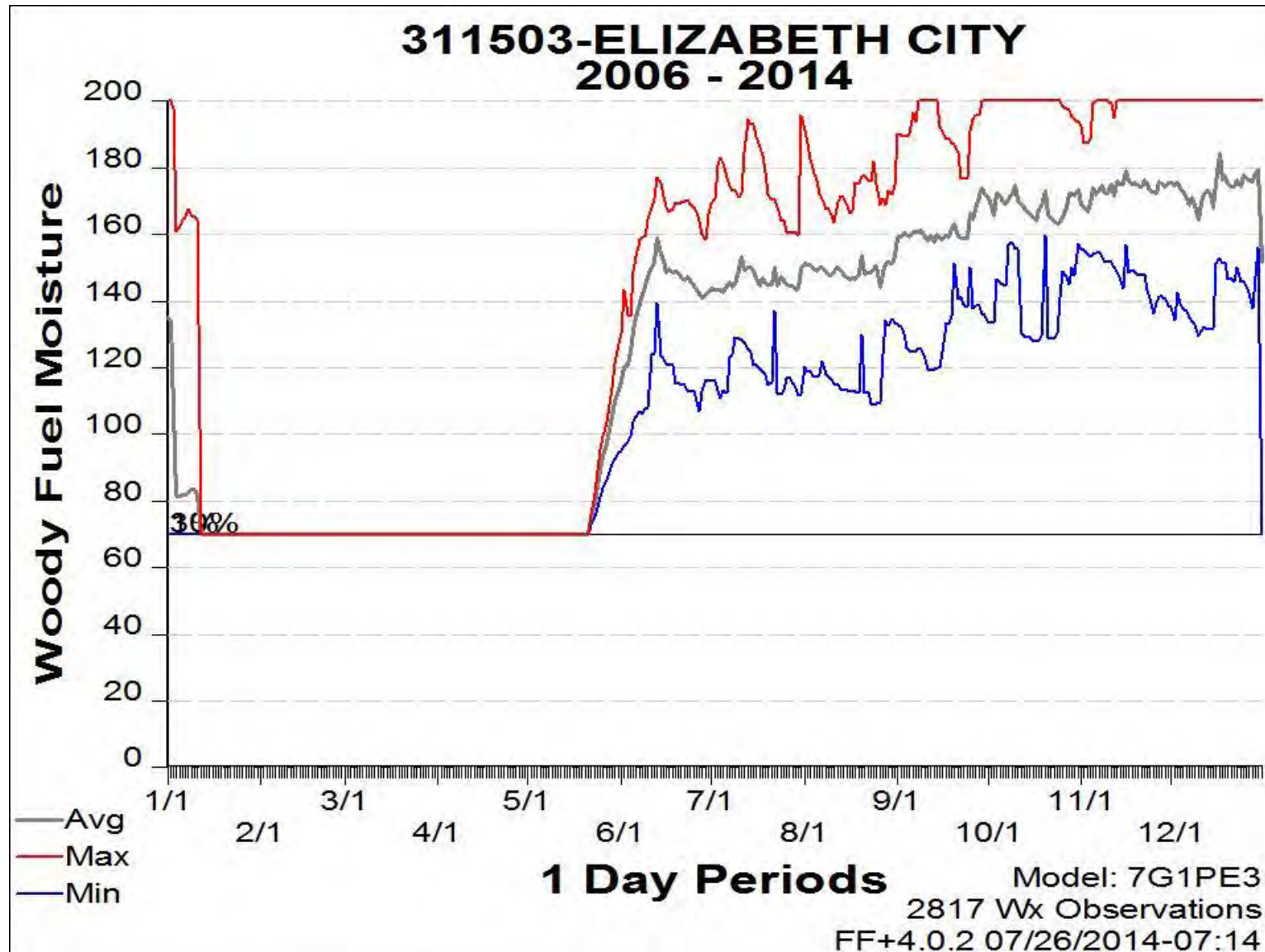


FIGURE G-18
Elizabeth City, (Station Identification Number 311503): live woody average, minimum, and maximum percent fuel moistures.



Appendix H
DNA Forest Stand Summary

Appendix H: DNA Forest Stand Summary Table These tables summarize, at the stand level, basal area, and number of trees, volume, and weight by hardwood/softwood and product category (sawtimber, chip-n-saw, and pulpwood), and value, both per acre and for the entire installation. Additional variables describing the inherent productivity, character, and condition of the stand such as site index species, site index, growth, forest type, age, and size class are reported.

DNA Forest Stand Summary Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
Softwood sawtimber and chip-n-saw: Board-feet, International 1/4 inch log rule (form class 80)
Hardwood and softwood pulpwood: Cords; 80 ft³ of wood and bark in one cord

Weight units are:

Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons.

QMD is quadratic mean diameter, the diameter of the tree of average basal area

Average height is Lorey's mean height (BA-weighted height), the arithmetic average of the trees selected by variable radius point sampling.
Site index values are all reported with base age of 50, and growth is calculated from ΔMean Stand Diameter, a method more robust than counting rings on individual trees.
Type-inventory is assigned on the basis of the majority of basal area; Pine: >=75% softwood BA; Pine-Hardwood: >=50 - <75% softwood BA;
Hardwood-Pine: >=25 - <50% softwood BA; Hardwood: <25% softwood BA.
Size class is assigned on the basis of majority basal area, and can take the values sawtimber, chip-n-saw, or pulpwood.

Stand number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Acres	23.22	45.64	140.59	12.90	22.25	16.72	44.51	14.74	17.87	12.06	37.60	11.03	6.83	14.34	13.69	9.94
Site index spp.	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine
Site index (50)	103	105	80	72	97	78	90	96	86	95	80	68	94	95	90	96
Growth (%)	0.9%	0.9%	0.9%	1.8%	1.0%	1.2%	1.0%	1.4%	0.9%	1.0%	1.0%	1.2%	1.3%	0.9%	0.9%	1.3%
Type - inventory	HP	H	H	PH	HP	HP	HP	PH	PH	HP	PH	P	H	HP	P	HP
Age	66	60	80	41	55	32	70	51	60	57	52	32	48	57	66	52
Size class	sawtimber	sawtimber	sawtimber	chip-n-saw	sawtimber	sawtimber	sawtimber	sawtimber	sawtimber	sawtimber	sawtimber	chip-n-saw	pulpwood	sawtimber	sawtimber	pulpwood
Basal area (BA, sq. ft./acre)	101.3	130.8	154.1	134.3	166.0	118.8	153.8	136.0	206.7	132.5	168.5	145.0	130.0	166.7	175.0	130.0
Hardwood BA/acre	73.8	106.2	126.5	37.1	124.0	61.3	82.5	44.0	83.3	72.5	78.5	35.0	130.0	113.3	20.0	82.0
Softwood BA/acre	27.5	24.6	27.6	97.1	42.0	57.5	71.3	92.0	123.3	60.0	90.0	110.0	0.0	53.3	155.0	48.0
Trees/acre	126	123	199	261	211	165	169	210	259	154	188	230	203	179	145	192
QMD (inches)	12.2	14.0	11.9	9.7	12.0	11.5	12.9	10.9	12.1	12.6	12.8	10.8	10.8	13.1	14.9	11.1
Average height (feet)	71	75	69	59	68	64	73	65	71	71	71	64	61	74	78	64
Sawtimber BA/acre	65.0	98.5	82.2	8.6	84.0	51.3	97.5	48.0	123.3	67.5	110.8	50.0	35.0	113.3	145.0	54.0
Hardwood sawtimber BA/acre	42.5	73.8	61.6	2.9	44.0	22.5	32.5	4.0	23.3	15.0	30.8	25.0	35.0	60.0	10.0	14.0
Softwood sawtimber BA/acre	22.5	24.6	20.5	5.7	40.0	28.8	65.0	44.0	100.0	52.5	80.0	25.0	0.0	53.3	135.0	40.0
Sawtimber volume (board-feet)/acre	7,434	10,762	8,978	1,095	10,224	6,181	12,954	7,214	17,558	9,510	15,325	6,108	3,510	13,844	21,727	7,397
Hardwood sawtimber volume (board-feet)/acre	3,965	6,967	5,811	214	4,057	1,748	2,933	430	2,140	1,416	2,990	2,253	3,510	5,620	912	1,230
Softwood sawtimber volume (board-feet)/acre	3,469	3,795	3,167	881	6,167	4,433	10,022	6,784	15,418	8,095	12,335	3,855	0	8,223	20,815	6,167
Sawtimber tons/acre	43.1	65.5	54.4	5.5	55.7	32.5	66.6	34.3	86.1	47.2	78.0	33.0	23.5	76.1	102.0	37.0
Hardwood sawtimber tons/acre	27.2	48.1	39.9	1.5	27.5	12.2	20.7	3.2	15.5	10.2	21.5	15.3	23.5	38.5	6.7	8.8
Softwood sawtimber tons/acre	15.9	17.4	14.5	4.0	28.2	20.3	45.9	31.1	70.6	37.1	56.5	17.7	0.0	37.7	95.3	28.2
Sawtimber \$/acre	\$1,073.44	\$1,555.24	\$1,295.69	\$170.33	\$1,522.42	\$943.66	\$2,052.65	\$1,181.60	\$2,773.84	\$1,510.88	\$2,477.79	\$915.08	\$452.74	\$2,057.18	\$3,523.52	\$1,184.84
Chip-n-saw BA/acre	5.0	0.0	5.4	74.3	2.0	28.8	6.3	48.0	16.7	5.0	6.2	60.0	0.0	0.0	20.0	4.0
Chip-n-saw volume (board-feet)/acre	294	0	318	4,371	118	1,692	368	2,825	981	294	362	3,531	0	0	1,177	235
Chip-n-saw tons/acre	1.5	0.0	1.7	22.9	0.6	8.9	1.9	14.8	5.1	1.5	1.9	18.5	0.0	0.0	6.2	1.2
Chip-n-saw \$/acre	\$34.42	\$0.00	\$37.22	\$511.45	\$13.77	\$197.94	\$43.03	\$330.47	\$114.75	\$34.42	\$42.37	\$413.09	\$0.00	\$0.00	\$137.70	\$27.54
Pulp BA/acre	31.3	32.3	66.5	51.4	80.0	38.8	50.0	40.0	66.7	60.0	51.5	35.0	95.0	53.3	10.0	72.0
Hardwood pulp BA/acre	31.3	32.3	64.9	34.3	80.0	38.8	50.0	40.0	60.0	57.5	47.7	10.0	95.0	53.3	10.0	68.0
Softwood pulp BA/acre	0.0	0.0	1.6	17.1	0.0	0.0	0.0	0.0	6.7	2.5	3.8	25.0	0.0	0.0	0.0	4.0
Pulp volume (cords) per acre	5.6	5.7	12.2	8.5	14.7	6.9	9.2	8.4	12.2	9.1	4.8	16.5	11.1	1.7	12.0	
Hardwood pulp volume (cords)/acre	5.6	5.7	12.0	6.3	14.7	6.9	9.2	8.4	11.4	10.9	8.6	1.7	16.5	11.1	1.7	11.5
Softwood pulp volume (cords)/acre	0.0	0.0	0.2	2.2	0.0	0.0	0.0	0.0	0.8	0.3	0.5	3.2	0.0	0.0	0.0	0.5
Pulp tons/acre	11.4	11.8	25.4	17.6	30.7	14.3	19.0	18.4	25.5	24.1	19.0	33.2	24.1	3.5	24.6	
Hardwood pulp tons/acre	11.4	11.8	25.0	13.1	30.7	14.3	19.0	18.4	23.7	23.4	18.0	3.4	33.2	24.1	3.5	23.5
Softwood pulp tons/acre	0.0	0.0	0.4	4.5	0.0	0.0	0.0	0.0	1.7	0.7	1.0	6.5	0.0	0.0	0.0	1.0
Pulp \$/acre	\$81.22	\$84.11	\$183.30	\$152.05	\$218.04	\$101.80	\$135.01	\$130.66	\$191.49	\$174.94	\$141.41	\$109.99	\$236.01	\$171.29	\$24.74	\$180.99
Total \$/acre	\$1,189.08	\$1,639.35	\$1,516.21	\$833.83	\$1,754.23	\$1,243.39	\$2,230.69	\$1,642.73	\$3,080.09	\$1,720.25	\$2,661.57	\$1,438.16	\$688.75	\$2,228.47	\$3,685.95	\$1,393.37
Total number of trees	2,915	5,608	28,001	3,370	4,684	2,760	7,541	3,096	4,633	1,858	7,077	2,537	1,386	2,564	1,986	1,911
Total sawtimber volume (board-feet)	172,613	491,181	1,262,283	14,126	227,484	103,350	576,602	106,337	313,769	114,694	576,226	67,367	23,970	198,517	297,440	73,527
Total hardwood sawtimber volume (board-feet)	92,059	317,964	817,033	2,760	90,261	29,234	130,526	6,340	38,244	17,073	112,442	24,851	23,970	80,597	12,486	12,224
Total softwood sawtimber volume (board-feet)	80,553	173,217	445,250	11,366	137,223	74,116	446,076	99,997	275,526	97,621	463,784	42,516	0	117,919	284,954	61,303
Total sawtimber tons	999.7	2,987.4	7,642.2	71.4	1,239.4	543.0	2,938.7	505.8	1,538.7	569.7	3,635.5	160.3	1091.5	1,396.4	3,681.1	
Total hardwood sawtimber tons	630.8	2,194.2	5,603.2	19.4	611.1	203.6	920.0	47.9	277.0	122.7	807.2	168.8	160.3	551.5	91.5	87.4
Total softwood sawtimber tons	368.9	793.2	2,039.0	52.0	628.4	339.4	2,042.7	457.9	1,261.7	447.0	2,123.8	194.7	0.0	540.0	1,304.9	280.7
Total sawtimber \$	\$24,925.27	\$70,981.10	\$182,160.94	\$2,197.28	\$33,873.79	\$15,777.99	\$91,363.48	\$17,416.77	\$49,568.59	\$18,221.25	\$93,164.72	\$10,093.32	\$3,092.19	\$29,500.02	\$48,236.97	\$11,777.35
Total chip-n-saw volume (board-feet)	6,832	0	44,719	56,390	2,619	28,287	16,370	41,634	17,526	3,548	13,616	38,943	0	0	16,112	2,340
Total chip-n-saw tons	35.8	0.0	234.2	295.4	13.7	148.2	85.7	218.1	91.8	18.6	71.3	204.0	0.0	0.0	84.4	12.3
Total chip-n-saw \$	\$799.33	\$0.00	\$5,232.10	\$6,597.64	\$306.38	\$3,309.54	\$1,915.28	\$4,871.16	\$2,050.53	\$415.16	\$1,593.05	\$4,556.39	\$0.00	\$0.00	\$1,885.07	\$273.74
Total pulp volume (cords)	129.7	260.6	1,710.7	109.7	326.2	115.2	408.2	123.2	218.2	135.1	341.2	53.5	112.6	158.9	23.5	119.6
Total hardwood pulp volume (cords)	129.7	260.6	1,681.8	81.7	326.2	115.2	408.2	123.2	203.1	131.3	322.8	18.5	112.6	158.9	23.5	114.5
Total softwood pulp volume (cords)	0.0	0.0	28.9	28.0	0.0	0.0	0.0	0.0	15.1	3.8	18.3	35.0	0.0	0.0	0.0	5.0
Total pulp tons	265.2	539.9	3,574.3	227.1	682.3	239.4	845.2	270.9	455.0	290.1	715.9	109.8	226.7	345.5	47.6	244.3
Total hardwood pulp tons	265.2	539.9	3,515.0	169.5	682.3	239.4	845.2	270.9	424.0	282.2	678.3	38.0	226.7	345.5	47.6	233.9
Total softwood pulp tons	0.0	0.0	59.3	57.5	0.0	0.0	0.0	0.0	31.0	7.8	37.6	71.8	0.0	0.0	0.0	10.3
Total pulp \$	\$1,885.88	\$3,838.98	\$25,770.84	\$1,961.48	\$4,851.40	\$1,702.02	\$6,009.17	\$1,925.96	\$3,422.01	\$2,109.75	\$5,317.17	\$1,213.19	\$1,611.98	\$2,456.26	\$338.65	\$1,799.02
Total stand \$	\$27,610.48	\$74,820.08	\$213,163.89	\$10,756.40	\$39,031.56	\$20,789.55	\$99,287.93	\$24,213.89	\$55,041.13	\$20,746.16	\$100,074.94	\$15,862.90	\$4,704.17	\$31,956.28	\$50,460.69	\$13,850.10

DNA Forest Stand Summary Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
Softwood sawtimber and chip-n-saw: Board-feet, International 1/4 inch log rule (form class 80)
Hardwood and softwood pulpwood: Cords; 80 ft³ of wood and bark in one cord

Weight units are:

Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons.

QMD is quadratic mean diameter, the diameter of the tree of average basal area

Average height is Lorey's mean height (BA-weighted height), the arithmetic average of the trees selected by variable radius point sampling.
Site index values are all reported with base age of 50, and growth is calculated from ΔMean Stand Diameter, a method more robust than counting rings on individual trees.

Type-inventory is assigned on the basis of the majority of basal area; Pine: >=75% softwood BA; Pine-Hardwood: >=50 - <75% softwood BA;

Hardwood-Pine: >=25 - <50% softwood BA; Hardwood: <25% softwood BA.

Size class is assigned on the basis of majority basal area, and can take the values sawtimber, chip-n-saw, or pulpwood.

Stand number	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Acres	9.93	52.33	9.96	24.92	12.17	5.53	12.80	20.87	19.95	6.94	19.21	12.68	14.94	9.55	14.70	19.73
Site index spp.	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine	pine
Site index (50)	96	91	97	97	97	97	97	97	92	97	97	49	74	96	96	66
Growth (%)	1.4%	1.1%	1.1%	1.1%	1.9%	1.5%	1.0%	1.0%	0.9%	1.1%	1.4%	1.6%	1.0%	1.4%	1.6%	1.5%
Type - inventory	HP	H	H	H	H	P	H	H	HP	H	H	P	PH	P	P	P
Age	51	72	55	55	47	55	51	50	76	44	51	16	42	51	45	42
Size class	pulpwood	sawtimber	pulpwood	pulpwood	pulpwood	sawtimber	sawtimber	sawtimber	sawtimber	pulpwood	pulpwood	chip-n-saw	sawtimber	sawtimber	chip-n-saw	chip-n-saw
Basal area (BA, sq. ft./acre)	126.7	160.0	180.0	157.1	65.0	106.7	170.0	180.0	152.5	224.0	142.5	115.0	176.0	136.7	192.9	145.0
Hardwood BA/acre	93.3	126.7	170.0	151.4	65.0	20.0	170.0	180.0	100.0	224.0	127.5	0.0	54.0	10.0	20.0	8.0
Softwood BA/acre	33.3	33.3	10.0	5.7	0.0	86.7	0.0	0.0	52.5	0.0	15.0	115.0	122.0	126.7	172.9	137.0
Trees/acre	209	155	287	230	166	103	171	205	142	317	219	174	221	158	364	222
QMD (inches)	10.5	13.8	10.7	11.2	8.5	13.8	13.5	12.7	14.0	11.4	10.9	11.0	12.1	12.6	9.9	10.9
Average height (feet)	60	72	62	66	50	74	74	73	75	69	62	65	70	72	61	63
Sawtimber BA/acre	40.0	114.4	60.0	77.1	1.7	73.3	115.0	123.3	115.0	108.0	47.5	25.0	102.0	83.3	54.3	57.0
Hardwood sawtimber BA/acre	6.7	81.1	50.0	71.4	1.7	6.7	115.0	123.3	67.5	108.0	35.0	0.0	10.0	0.0	2.9	4.0
Softwood sawtimber BA/acre	33.3	33.3	10.0	5.7	0.0	66.7	0.0	0.0	47.5	0.0	12.5	25.0	92.0	83.3	51.4	53.0
Sawtimber volume (board-feet)/acre	5,639	12,376	5,921	7,681	125	10,778	11,278	12,113	13,956	10,659	5,013	3,855	15,035	12,849	8,143	8,573
Hardwood sawtimber volume (board-feet)/acre	499	7,237	4,379	6,800	125	499	11,278	12,113	6,632	10,659	3,086	0	850	0	214	401
Softwood sawtimber volume (board-feet)/acre	5,139	5,139	1,542	881	0	10,279	0	7,324	0	1,927	3,855	14,185	12,849	7,929	8,172	8,172
Sawtimber tons/acre	27.0	79.8	36.9	49.8	0.9	50.6	75.6	81.2	78.8	72.0	30.2	17.7	70.8	58.8	37.8	40.1
Hardwood sawtimber tons/acre	3.5	56.3	29.9	45.8	0.9	3.5	75.6	81.2	45.2	72.0	21.4	0.0	5.8	0.0	1.5	2.7
Softwood sawtimber tons/acre	23.5	23.5	7.1	4.0	0.0	47.1	0.0	0.0	33.5	0.0	8.8	17.7	65.0	58.8	36.3	37.4
Sawtimber \$/acre	\$896.99	\$1,953.42	\$814.68	\$1,019.90	\$16.10	\$1,729.58	\$1,454.82	\$1,562.61	\$2,092.84	\$1,375.02	\$710.27	\$624.44	\$2,407.65	\$2,081.48	\$1,312.17	\$1,375.56
Chip-n-saw BA/acre	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	5.0	0.0	2.5	85.0	26.0	40.0	90.0	58.0
Chip-n-saw volume (board-feet)/acre	0	0	0	0	0	1,177	0	0	294	0	147	5,002	1,530	2,354	5,296	3,413
Chip-n-saw tons/acre	0.0	0.0	0.0	0.0	0.0	6.2	0.0	0.0	1.5	0.0	0.8	26.2	8.0	12.3	27.7	17.9
Chip-n-saw \$/acre	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$137.70	\$0.00	\$0.00	\$34.42	\$0.00	\$17.21	\$585.21	\$179.01	\$275.39	\$619.64	\$399.32
Pulp BA/acre	86.7	45.6	120.0	80.0	63.3	13.3	55.0	56.7	32.5	116.0	92.5	5.0	48.0	13.3	48.6	30.0
Hardwood pulp BA/acre	86.7	45.6	120.0	80.0	63.3	13.3	55.0	56.7	32.5	116.0	92.5	0.0	44.0	10.0	17.1	4.0
Softwood pulp BA/acre	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	4.0	3.3	31.4	26.0
Pulp volume (cords) per acre	14.6	8.3	20.7	13.9	10.8	2.2	9.5	10.0	5.6	21.0	16.0	0.6	8.0	2.2	7.0	4.0
Hardwood pulp volume (cords)/acre	14.6	8.3	20.7	13.9	10.8	2.2	9.5	10.0	5.6	21.0	16.0	0.0	7.5	1.8	3.0	0.7
Softwood pulp volume (cords)/acre	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.5	0.4	4.0	3.3
Pulp tons/acre	29.9	17.6	41.8	28.4	22.0	4.6	19.2	20.4	11.3	43.0	32.6	1.3	16.3	4.4	14.2	8.2
Hardwood pulp tons/acre	29.9	17.6	41.8	28.4	22.0	4.6	19.2	20.4	11.3	43.0	32.6	0.0	15.2	3.5	6.0	1.4
Softwood pulp tons/acre	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.0	0.9	8.2	6.8
Pulp \$/acre	\$212.74	\$125.19	\$297.29	\$201.82	\$156.14	\$32.68	\$136.17	\$144.98	\$80.45	\$306.06	\$231.86	\$17.10	\$121.98	\$36.36	\$150.12	\$98.84
Total \$/acre	\$1,109.73	\$2,078.61	\$1,111.97	\$1,221.72	\$172.24	\$1,899.96	\$1,590.98	\$1,707.60	\$2,207.71	\$1,681.07	\$959.35	\$1,226.75	\$2,708.64	\$2,393.23	\$2,081.93	\$1,873.72
Total number of trees	2,076	8,095	2,854	5,720	2,025	570	2,193	4,270	2,833	2,200	4,214	2,209	3,308	1,505	5,352	4,381
Total sawtimber volume (board-feet)	55,992	647,653	58,972	191,406	1,519	59,603	144,354	252,804	278,426	73,974	96,299	48,876	224,627	122,704	119,708	169,142
Total hardwood sawtimber volume (board-feet)	4,958	378,706	43,615	169,450	1,519	2,761	144,354	252,804	132,318	73,974	59,276	0	12,705	0	3,145	7,914
Total softwood sawtimber volume (board-feet)	51,035	268,947	15,357	21,956	0	56,842	0	146,108	0	37,023	48,876	211,922	122,704	116,563	161,228	161,228
Total sawtimber tons	268.5	4177.9	368.0	1242.1	10.7	279.7	968.2	1695.2	1571.3	499.9	580.9	1057.6	561.9	555.8	791.2	791.2
Total hardwood sawtimber tons	34.8	2,946.3	297.7	1,141.6	10.7	19.4	968.2	1,695.2	902.2	499.9	411.3	0.0	87.1	0.0	22.1	52.9
Total softwood sawtimber tons	233.7	1,231.6	70.3	100.5	0.0	260.3	0.0	669.1	0.0	169.5	223.8	970.5	561.9	533.8	738.3	738.3
Total sawtimber \$	\$8,907.15	\$102,222.48	\$8,114.17	\$25,415.93	\$195.95	\$9,564.60	\$18,621.66	\$32,611.71	\$41,752.12	\$9,542.61	\$13,644.36	\$7,917.93	\$35,970.36	\$19,878.09	\$19,288.90	\$27,139.80
Total chip-n-saw volume (board-feet)	0	0	0	0	0	6,508	0	0	5,870	0	2,826	63,423	22,858	22,479	77,852	67,338
Total chip-n-saw tons	0.0	0.0	0.0	0.0	0.0	34.1	0.0	0.0	30.7	0.0	14.8	332.2	119.7	117.7	407.8	352.7
Total chip-n-saw \$	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$761.46	\$0.00	\$0.00	\$686.76	\$0.00	\$330.64	\$7,420.48	\$2,674.35	\$2,630.01	\$9,108.64	\$7,878.60
Total pulp volume (cords)	145.0	434.4	206.0	346.2	131.2	12.4	121.1	207.7	111.5	145.9	306.4	8.0	119.1	20.8	102.5	78.8
Total hardwood pulp volume (cords)	145.0	434.4	206.0	346.2	131.2	12.4	121.1	207.7	111.5	145.9	306.4	0.0	111.5	16.8	43.9	13.7
Total softwood pulp volume (cords)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	7.6	4.0	58.6	65.1
Total pulp tons	297.1	921.4	416.5	707.4	267.3	25.4	245.1	425.6	225.7	298.7	626.4	16.5	243.1	41.8	208.4	161.1
Total hardwood pulp tons	297.1	921.4	416.5	707.4	267.3	25.4	245.1	425.6	225.7	298.7	626.4	0.0	227.6	33.5	88.2	27.6
Total softwood pulp tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.5	15.6	8.3	120.2	133.5
Total pulp \$	\$2,112.47	\$6,551.37	\$2,961.05	\$5,029.43	\$1,900.25	\$180.73	\$1,742.92	\$3,025.80	\$1,605.01	\$2,124.02	\$4,454.02	\$216.77	\$1,822.37	\$347.23	\$2,206.80	\$1,950.06
Total stand \$	\$11,019.63	\$108,773.84	\$11,075.22	\$30,445.37	\$2,096.20	\$10,506.80	\$20,364.59	\$35,637.51	\$44,043.89	\$11,666.64	\$18,429.03	\$15,555.19	\$40,467.07	\$22,855.33	\$30,604.33	\$36,968.46

Appendix I
DNA Statistical Summary Table

Appendix I: DNA Timber Inventory Statistical Summary Table: This table provides sampling error for overall quadratic mean diameter, and basal area, volume, and weight for hardwoods, softwoods, and product categories (sawtimber, chip-n-saw, and pulpwood). Sampling error is reported as the 90% confidence limit half-width expressed as a percent of the mean, for each compartment, forest type, and installation. Installation sampling error is stratified based on forest type.

90% confidence limit half-width as percent of the mean for major timber category totals for 2014 forest inventory at DNA. A value of zero indicates no trees of the category were sampled in the stratum.

	Basal area (ft ² /ac)	Hardwood BA/acre	Softwood BA/acre	Trees/ acre	Tree height (ft)	QMD	Hardwood	Softwood	Sawtimber board-feet	Hardwood	Softwood	Sawtimber tons	Chip-n-saw	Chip-n-saw	Hardwood	Softwood	Pulpwood cords	Hardwood	Softwood	Pulpwood tons	Pulpwood tons
							board-feet	board-feet		board-feet	tons		tons	pulpwood cords	pulpwood cords						
Compartment 1	3.1%	6.9%	11.1%	4.8%	0.8%	2.6%	18.8%	17.5%	14.6%	17.5%	21.4%	13.0%	43.9%	39.6%	23.2%	13.7%	22.4%	23.6%	13.7%	22.7%	
Forest type	H	4.7%	6.3%	28.6%	7.2%	1.2%	3.6%	19.1%	57.4%	19.0%	18.0%	62.3%	17.7%	224.7%	230.5%	22.9%	145.0%	22.2%	23.2%	145.0%	22.4%
	HP	6.0%	9.9%	17.2%	8.5%	1.6%	6.5%	29.6%	27.2%	18.9%	29.4%	30.7%	17.6%	88.7%	89.2%	23.1%	176.8%	22.3%	23.3%	176.8%	22.5%
	P	9.0%	37.1%	10.6%	16.2%	1.9%	18.8%	253.2%	27.9%	27.9%	259.4%	31.0%	26.6%	34.7%	31.1%	84.5%	8.4%	33.7%	82.5%	8.4%	33.1%
	PH	7.8%	21.1%	17.6%	9.5%	1.9%	13.8%	105.3%	24.1%	22.8%	107.7%	27.2%	21.6%	41.3%	38.6%	24.2%	21.6%	22.4%	24.2%	21.6%	22.4%
Total ¹	3.1%	5.1%	8.7%	4.7%	0.8%	3.7%	16.4%	17.6%	11.1%	15.9%	19.4%	10.3%	28.6%	27.5%	14.9%	15.9%	13.8%	15.1%	15.9%	13.9%	

¹Installation-level total uncertainty based upon stratification by forest type.

Appendix J
DNA Stock Tables

Appendix J-1: DNA Forest Installation Stock Tables: These tables summarize at the installation level, for each stock class (hardwood pulpwood, softwood pulpwood, chip-n-saw, and sawtimber by species) and 2" dbh class, the mean number of trees per acre, mean basal area per acre (ft²/ac), mean volume per acre (cords for pulp, board-feet Doyle log rule for hardwood sawlog volume, or board-feet Int'l ¼-inch log rule for softwood sawlog and chip-n-saw volume), and mean weight per acre (short tons, green volume basis, wood & bark in merchandised portion of tree); as well as the total number of trees and total weight using the above units, and total value. Installation means and totals are based on stratification by forest type and so vary from totals aggregated from compartment sub-totals. Total installation area is 710.14 acres. Null (blank) entries in the table indicate no trees were sampled of that particular combination of dbh and stock class.

DNA Forest Installation Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords; 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stock class	DBH class	Values				\$/acre	Total trees	Total volume	Total weight (t)	Total \$
		Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					
Hardwood pulpwood	6	16.2	3.2	0.6	1.2	\$8.64	11,472	413.9	862.9	\$6,135.04
	8	37.5	13.1	2.3	4.8	\$34.21	26,613	1,652.7	3,417.3	\$24,297.24
	10	32.9	17.9	3.2	6.6	\$47.00	23,334	2,274.1	4,694.6	\$33,378.82
	12	23.2	18.2	3.3	6.9	\$49.19	16,445	2,352.3	4,912.8	\$34,930.11
	14									
	16									
	18									
	20									
	22									
	24									
	26									
	28									
	30									
32										
34										
≥36										
Hardwood pulpwood Total		109.6	52.4	9.4	19.6	\$139.04	77,864	6,693.0	13,887.7	\$98,741.21
Softwood pulpwood	6	1.2	0.2	0.0	0.1	\$0.79	831	20.7	42.5	\$558.10
	8	8.6	3.0	0.4	0.8	\$10.31	6,133	271.5	557.1	\$7,319.87
	10									
	12									
	14									
	16									
	18									
	20									
	22									
	24									
	26									
	28									
	30									
32										
34										
≥36										
Softwood pulpwood Total		9.8	3.2	0.4	0.8	\$11.09	6,964	292.2	599.5	\$7,877.97
Chip-n-saw	6									
	8									
	10	12.0	6.6	385.7	2.0	\$45.12	8,534	273,886.3	1,434.7	\$32,044.70
	12	9.1	7.1	419.3	2.2	\$49.05	6,442	297,738.3	1,559.6	\$34,835.38
	14									
	16									
	18									
	20									
	22									
	24									
	26									
	28									
	30									
32										
34										
≥36										
Chip-n-saw Total		21.1	13.7	804.9	4.2	\$94.18	14,976	571,624.6	2,994.2	\$66,880.08

DNA Forest Installation Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords; 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stock class	DBH class	Values		Volume/ acre	Weight (t)/acre	\$/ acre	Total trees	Total volume	Total weight (t)	Total \$
		Trees/ acre	BA (ft ²)/acre							
baldcypress sawtimber	6									
	8									
	10									
	12									
	14	1.9	2.1	205.7	1.4	\$26.54	1,363	146,106.5	976.8	\$18,847.74
	16	2.5	3.5	350.4	2.3	\$45.21	1,777	248,862.9	1,663.8	\$32,103.32
	18	0.8	1.4	135.7	0.9	\$17.50	544	96,334.1	644.1	\$12,427.10
	20	0.4	0.9	90.4	0.6	\$11.67	294	64,222.8	429.4	\$8,284.73
	22	0.3	0.7	72.3	0.5	\$9.33	194	51,378.2	343.5	\$6,627.79
	24	0.1	0.2	18.1	0.1	\$2.33	41	12,844.6	85.9	\$1,656.95
	26	0.1	0.3	27.1	0.2	\$3.50	52	19,266.8	128.8	\$2,485.42
	28									
	30									
	32									
34										
≥36										
baldcypress sawtimber Total		6.0	9.0	899.8	6.0	\$116.08	4,265	639,016.0	4,272.2	\$82,433.06
blackgum sawtimber	6									
	8									
	10									
	12									
	14	0.4	0.5	37.4	0.3	\$4.83	299	26,569.2	231.0	\$3,427.42
	16	0.3	0.4	35.5	0.3	\$4.59	218	25,240.4	219.4	\$3,256.01
	18	0.1	0.2	15.0	0.1	\$1.93	72	10,634.7	92.5	\$1,371.88
	20	0.1	0.2	15.0	0.1	\$1.93	59	10,634.7	92.5	\$1,371.88
	22									
	24									
	26									
	28									
	30									
	32									
34										
≥36										
blackgum sawtimber Total		0.9	1.2	102.9	0.9	\$13.28	648	73,079.0	635.3	\$9,427.19
green ash sawtimber	6									
	8									
	10									
	12									
	14	0.2	0.2	13.5	0.1	\$1.74	120	9,592.8	67.3	\$1,237.47
	16									
	18									
	20									
	22									
	24									
	26									
	28									
	30									
	32									
34										
≥36										
green ash sawtimber Total		0.2	0.2	13.5	0.1	\$1.74	120	9,592.8	67.3	\$1,237.47

DNA Forest Installation Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords; 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stock class	DBH class	Values				\$/acre	Total trees	Total volume	Total weight (t)	Total \$
		Trees/acre	BA (ft ² /acre)	Volume/acre	Weight (t)/acre					
laurel oak sawtimber	6									
	8									
	10									
	12									
	14	0.1	0.1	6.6	0.1	\$1.26	60	4,668.7	48.2	\$896.40
	16	0.2	0.3	19.7	0.2	\$3.79	138	14,006.2	144.7	\$2,689.20
	18	0.3	0.5	39.4	0.4	\$7.57	217	28,012.5	289.5	\$5,378.39
	20	0.1	0.3	19.7	0.2	\$3.79	88	14,006.2	144.7	\$2,689.20
	22	0.1	0.2	13.1	0.1	\$2.52	49	9,337.5	96.5	\$1,792.80
	24	0.1	0.2	13.1	0.1	\$2.52	41	9,337.5	96.5	\$1,792.80
	26	0.0	0.1	6.6	0.1	\$1.26	17	4,668.7	48.2	\$896.40
	28									
	30	0.0	0.1	6.6	0.1	\$1.26	13	4,668.7	48.2	\$896.40
	32									
34										
≥36										
laurel oak sawtimber Total		0.9	1.7	124.9	1.3	\$23.98	623	88,706.1	916.7	\$17,031.58
loblolly pine sawtimber	6									
	8									
	10									
	12									
	14	7.3	7.8	1,205.5	5.5	\$195.29	5,194	856,079.5	3,920.3	\$138,684.89
	16	6.4	8.9	1,369.3	6.3	\$221.83	4,517	972,413.3	4,453.0	\$157,530.95
	18	4.3	7.6	1,170.7	5.4	\$189.66	3,051	831,368.1	3,807.1	\$134,681.63
	20	2.2	4.8	733.2	3.4	\$118.78	1,548	520,670.9	2,384.3	\$84,348.68
	22	1.3	3.3	513.5	2.4	\$83.19	896	364,664.8	1,669.9	\$59,075.70
	24	0.8	2.5	380.7	1.7	\$61.67	558	270,337.6	1,238.0	\$43,794.69
	26	0.3	1.0	159.7	0.7	\$25.88	200	113,435.0	519.5	\$18,376.47
	28	0.1	0.2	38.2	0.2	\$6.19	41	27,156.0	124.4	\$4,399.27
	30	0.1	0.3	48.7	0.2	\$7.88	46	34,561.9	158.3	\$5,599.03
	32									
34										
≥36										
loblolly pine sawtimber Total		22.6	36.4	5,619.6	25.7	\$910.37	16,050	3,990,687.1	18,274.7	\$646,491.31
red oak sawtimber	6									
	8									
	10									
	12									
	14	0.2	0.2	19.4	0.1	\$3.72	120	13,773.4	104.0	\$2,644.50
	16	0.2	0.3	36.3	0.3	\$6.98	172	25,803.0	194.8	\$4,954.18
	18									
	20	0.1	0.2	26.7	0.2	\$5.12	81	18,938.3	143.0	\$3,636.14
	22	0.2	0.5	55.8	0.4	\$10.71	140	39,598.4	299.0	\$7,602.90
	24	0.1	0.4	46.1	0.3	\$8.84	97	32,711.7	247.0	\$6,280.65
	26	0.0	0.1	14.5	0.1	\$2.79	26	10,329.6	78.0	\$1,983.29
	28	0.1	0.2	26.7	0.2	\$5.12	41	18,938.3	143.0	\$3,636.14
	30									
	32	0.0	0.1	7.3	0.1	\$1.40	9	5,164.8	39.0	\$991.64
34	0.0	0.1	7.3	0.1	\$1.40	8	5,164.8	39.0	\$991.64	
≥36	0.0	0.2	19.4	0.1	\$3.72	12	13,773.4	104.0	\$2,644.50	
red oak sawtimber Total		1.0	2.4	259.4	2.0	\$49.80	705	184,195.8	1,390.7	\$35,365.59

DNA Forest Installation Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords; 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stock class	DBH class	Values		Volume/ acre	Weight (t)/acre	\$/ acre	Total trees	Total volume	Total weight (t)	Total \$
		Trees/ acre	BA (ft ²)/acre							
soft maple sawtimber	6									
	8									
	10									
	12									
	14	4.1	4.3	324.8	2.3	\$41.90	2,881	230,643.5	1,617.2	\$29,753.01
	16	1.3	1.8	138.2	1.0	\$17.82	938	98,122.8	688.0	\$12,657.85
	18	0.9	1.7	124.9	0.9	\$16.12	670	88,717.2	622.1	\$11,444.52
	20	0.4	0.9	67.5	0.5	\$8.71	293	47,947.5	336.2	\$6,185.22
	22	0.3	0.8	57.4	0.4	\$7.41	206	40,769.1	285.9	\$5,259.21
	24	0.1	0.2	16.9	0.1	\$2.18	51	11,990.7	84.1	\$1,546.80
	26	0.0	0.2	13.5	0.1	\$1.74	35	9,592.8	67.3	\$1,237.47
	28									
	30									
32	0.0	0.1	6.8	0.0	\$0.87	11	4,796.4	33.6	\$618.74	
34										
≥36	0.0	0.1	6.8	0.0	\$0.87	8	4,796.4	33.6	\$618.74	
soft maple sawtimber Total		7.2	10.1	756.7	5.3	\$97.62	5,095	537,376.4	3,767.9	\$69,321.56
swamp chestnut oak sawtimber	6									
	8									
	10									
	12									
	14									
	16	0.1	0.1	9.7	0.1	\$1.86	46	6,886.7	52.0	\$1,322.25
	18									
	20									
	22	0.0	0.1	9.7	0.1	\$1.86	24	6,886.7	52.0	\$1,322.25
	24	0.0	0.1	9.7	0.1	\$1.86	20	6,886.7	52.0	\$1,322.25
	26									
	28	0.0	0.1	9.7	0.1	\$1.86	15	6,886.7	52.0	\$1,322.25
	30									
32										
34										
≥36										
swamp chestnut oak sawtimber Total		0.1	0.4	38.8	0.3	\$7.45	105	27,546.9	208.0	\$5,289.00
sweetgum sawtimber	6									
	8									
	10									
	12									
	14	6.0	6.4	638.2	4.3	\$82.33	4,228	453,234.0	3,030.2	\$58,467.19
	16	4.3	6.0	605.5	4.0	\$78.10	3,071	429,954.4	2,874.5	\$55,464.12
	18	1.5	2.7	270.6	1.8	\$34.91	1,084	192,165.3	1,284.7	\$24,789.32
	20	1.0	2.1	212.5	1.4	\$27.42	690	150,922.2	1,009.0	\$19,468.96
	22	0.3	0.9	90.1	0.6	\$11.62	242	63,992.2	427.8	\$8,254.99
	24	0.1	0.4	40.7	0.3	\$5.25	92	28,899.8	193.2	\$3,728.08
	26	0.1	0.2	24.9	0.2	\$3.21	48	17,661.0	118.1	\$2,278.27
	28	0.1	0.3	27.1	0.2	\$3.50	45	19,266.8	128.8	\$2,485.42
	30									
32	0.0	0.1	6.8	0.0	\$0.87	9	4,816.5	32.2	\$621.33	
34										
≥36										
sweetgum sawtimber Total		13.4	19.1	1,916.4	12.8	\$247.22	9,508	1,360,912.2	9,098.6	\$175,557.67

DNA Forest Installation Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords; 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stock class	DBH class	Values			Volume/ acre	Weight (t)/acre	\$/ acre	Total trees	Total volume	Total weight (t)	Total \$
		Trees/ acre	BA (ft ²)/acre								
tulip-poplar sawtimber	6										
	8										
	10										
	12										
	14	0.1	0.1		9.0	0.1	\$1.17	60	6,422.3	42.9	\$828.47
	16										
	18	0.0	0.1		6.8	0.0	\$0.87	27	4,816.5	32.2	\$621.33
	20										
	22										
	24										
	26										
	28										
	30	0.0	0.1		9.0	0.1	\$1.17	13	6,422.3	42.9	\$828.47
32											
34	0.0	0.1		9.0	0.1	\$1.17	10	6,422.3	42.9	\$828.47	
≥36											
tulip-poplar sawtimber Total		0.2	0.3		33.9	0.2	\$4.37	110	24,083.3	161.0	\$3,106.75
unknown hardwood sawtimber	6										
	8										
	10										
	12										
	14	0.2	0.2		13.5	0.1	\$1.74	120	9,592.8	67.3	\$1,237.47
	16										
	18										
	20										
	22										
	24										
	26										
	28										
	30										
32											
34											
≥36											
unknown hardwood sawtimber Total		0.2	0.2		13.5	0.1	\$1.74	120	9,592.8	67.3	\$1,237.47
water oak sawtimber	6										
	8										
	10										
	12										
	14	0.1	0.1		7.2	0.1	\$1.39	45	5,142.9	38.8	\$987.43
	16	0.0	0.1		7.2	0.1	\$1.39	34	5,142.9	38.8	\$987.43
	18	0.1	0.1		14.5	0.1	\$2.78	54	10,285.7	77.7	\$1,974.86
	20										
	22										
	24										
	26										
	28										
	30										
32											
34											
≥36											
water oak sawtimber Total		0.2	0.3		29.0	0.2	\$5.56	133	20,571.5	155.3	\$3,949.72

DNA Forest Installation Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords; 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stock class	DBH class	Values			Weight (t)/acre	\$/acre	Total trees	Total volume	Total weight (t)	Total \$
		Trees/acre	BA (ft ²)/acre	Volume/acre						
willow oak sawtimber	6									
	8									
	10									
	12									
	14	0.1	0.1	6.9	0.1	\$1.33	43	4,918.4	37.1	\$944.34
	16	0.1	0.1	14.5	0.1	\$2.79	69	10,307.7	77.8	\$1,979.08
	18	0.1	0.1	14.5	0.1	\$2.79	54	10,307.7	77.8	\$1,979.08
	20	0.1	0.1	14.5	0.1	\$2.78	44	10,285.7	77.7	\$1,974.86
	22	0.1	0.2	16.9	0.1	\$3.25	42	12,029.6	90.8	\$2,309.68
	24									
	26									
	28	0.0	0.1	7.3	0.1	\$1.40	11	5,164.8	39.0	\$991.64
	30									
	32									
34										
≥36										
willow oak sawtimber Total		0.4	0.7	74.7	0.6	\$14.33	263	53,014.0	400.3	\$10,178.68

Appendix J-2: DNA Forest Compartment Stock Tables: These tables summarize at the compartment level, for each stock class (hardwood pulpwood, softwood pulpwood, chip-n-saw, and sawtimber by species) and 2" dbh class, the mean number of trees per acre, mean basal area per acre (ft²/ac), mean volume per acre (cords for pulp, mean board-feet Doyle log rule for hardwood sawlog volume, or board-feet Int'l ¼-inch log rule for softwood sawlog and chip-n-saw volume), and mean weight per acre (short tons, green volume basis, wood & bark in merchandised portion of tree); as well as the total number of trees and total weight using the above units, and total value. The total area of the compartment is also provided. No stratification is performed to arrive at means and totals at this hierarchical level. Null (blank) entries in the table indicate no trees were sampled of that particular combination of dbh and stock class. Compartment designations were retained from the prior inventory, if present (which it was not for DNA), and compartment designations were not updated as part of the 2014 inventory. As such, there is a single compartment at DNA.

DNA Forest Compartment Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Cmp.	Acres	Stock class	DBH class	Values				\$/acre	Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre							
1	710.14	Hardwood pulpwood	6	15.8	3.1	0.6	1.2	\$8.47	11,224	405.5	845.5	\$6,011.48		
			8	35.9	12.5	2.2	4.6	\$32.94	25,488	1,589.0	3,290.4	\$23,394.76		
			10	32.0	17.5	3.1	6.5	\$45.91	22,748	2,219.5	4,585.4	\$32,602.18		
			12	21.9	17.2	3.1	6.5	\$46.51	15,555	2,224.2	4,645.4	\$33,028.94		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		105.6	50.3	9.1	18.8	\$133.83	75,015	6,438.2	13,366.7	$95,037.36
		Softwood pulpwood	6	1.4	0.3	0.0	0.1	\$0.92	970	24.2	49.6	\$651.21		
			8	9.9	3.4	0.4	0.9	\$11.79	7,015	310.6	637.2	\$8,372.65		
			10											
			12											
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Softwood pulpwood Total		11.2	3.7	0.5	1.0	\$12.71	7,985	334.7	686.7	\$9,023.85		
		Chip-n-saw	6											
			8											
			10	14.0	7.6	448.7	2.4	\$52.49	9,927	318,613.7	1,668.9	\$37,277.80		
			12	10.2	8.0	471.2	2.5	\$55.13	7,240	334,624.4	1,752.8	\$39,151.06		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		24.2	15.6	919.9	4.8	\$107.63	17,168	653,238.1	3,421.7	\$76,428.85		

DNA Forest Compartment Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Cmp.	Acres	Stock class	DBH class	Values							Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
		baldcypress sawtimber	6											
			8											
			10											
			12											
			14	1.6	1.8	176.7	1.2	\$22.80	1,171	125,501.7	839.1	\$16,189.72		
			16	2.1	3.0	299.7	2.0	\$38.66	1,520	212,807.2	1,422.8	\$27,452.13		
			18	0.7	1.1	115.3	0.8	\$14.87	462	81,848.9	547.2	\$10,558.51		
			20	0.4	0.8	76.8	0.5	\$9.91	249	54,566.0	364.8	\$7,039.01		
			22	0.2	0.6	61.5	0.4	\$7.93	165	43,652.8	291.8	\$5,631.21		
			24	0.0	0.2	15.4	0.1	\$1.98	35	10,913.2	73.0	\$1,407.80		
			26	0.1	0.2	23.1	0.2	\$2.97	44	16,369.8	109.4	\$2,111.70		
			28											
			30											
			32											
			34											
			≥36											
		baldcypress sawtimber Total		5.1	7.7	768.4	5.1	\$99.12	3,646	545,659.5	3,648.1	\$70,390.08		
		blackgum sawtimber	6											
			8											
			10											
			12											
			14	0.4	0.5	38.2	0.3	\$4.92	305	27,106.9	235.7	\$3,496.79		
			16	0.3	0.4	31.8	0.3	\$4.10	195	22,589.1	196.4	\$2,913.99		
			18	0.1	0.2	12.7	0.1	\$1.64	62	9,035.6	78.6	\$1,165.60		
			20	0.1	0.2	12.7	0.1	\$1.64	50	9,035.6	78.6	\$1,165.60		
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		blackgum sawtimber Total		0.9	1.1	95.4	0.8	\$12.31	612	67,767.3	589.1	\$8,741.98		
		green ash sawtimber	6											
			8											
			10											
			12											
			14	0.1	0.2	11.5	0.1	\$1.48	102	8,150.4	57.1	\$1,051.40		
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		green ash sawtimber Total		0.1	0.2	11.5	0.1	\$1.48	102	8,150.4	57.1	\$1,051.40		

DNA Forest Compartment Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Cmp.	Acres	Stock class	DBH class	Values							Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
		laurel oak sawtimber	6											
			8											
			10											
			12											
			14	0.1	0.1	5.6	0.1	\$1.07	51	3,966.7	41.0	\$761.61		
			16	0.2	0.2	16.8	0.2	\$3.22	117	11,900.2	123.0	\$2,284.84		
			18	0.3	0.5	33.5	0.3	\$6.43	185	23,800.4	246.0	\$4,569.68		
			20	0.1	0.2	16.8	0.2	\$3.22	75	11,900.2	123.0	\$2,284.84		
			22	0.1	0.2	11.2	0.1	\$2.14	41	7,933.5	82.0	\$1,523.23		
			24	0.0	0.2	11.2	0.1	\$2.14	35	7,933.5	82.0	\$1,523.23		
			26	0.0	0.1	5.6	0.1	\$1.07	15	3,966.7	41.0	\$761.61		
			28											
			30	0.0	0.1	5.6	0.1	\$1.07	11	3,966.7	41.0	\$761.61		
			32											
			34											
			≥36											
		laurel oak sawtimber Total		0.7	1.5	106.1	1.1	\$20.38	529	75,367.9	778.8	\$14,470.64		
		loblolly pine sawtimber	6											
			8											
			10											
			12											
			14	8.2	8.7	1,346.9	6.2	\$218.20	5,803	956,480.1	4,380.1	\$154,949.78		
			16	6.9	9.7	1,488.7	6.8	\$241.16	4,911	1,057,162.2	4,841.1	\$171,260.28		
			18	4.7	8.2	1,270.1	5.8	\$205.76	3,310	901,943.9	4,130.3	\$146,114.92		
			20	2.3	5.1	785.7	3.6	\$127.28	1,659	557,946.7	2,555.0	\$90,387.37		
			22	1.3	3.5	543.5	2.5	\$88.04	948	385,948.1	1,767.4	\$62,523.59		
			24	0.8	2.6	401.7	1.8	\$65.08	589	285,266.0	1,306.3	\$46,213.09		
			26	0.3	1.0	153.6	0.7	\$24.88	192	109,072.3	499.5	\$17,669.71		
			28	0.1	0.2	35.4	0.2	\$5.74	38	25,170.5	115.3	\$4,077.63		
			30	0.1	0.3	47.3	0.2	\$7.66	44	33,560.7	153.7	\$5,436.83		
			32											
			34											
			≥36											
		loblolly pine sawtimber Total		24.6	39.4	6,072.8	27.8	\$983.80	17,494	4,312,550.6	19,748.7	\$698,633.20		
		red oak sawtimber	6											
			8											
			10											
			12											
			14	0.1	0.2	16.5	0.1	\$3.16	102	11,702.4	88.4	\$2,246.86		
			16	0.2	0.3	33.0	0.2	\$6.33	156	23,404.8	176.7	\$4,493.73		
			18											
			20	0.1	0.2	24.7	0.2	\$4.75	75	17,553.6	132.5	\$3,370.29		
			22	0.2	0.5	49.4	0.4	\$9.49	124	35,107.2	265.1	\$6,740.59		
			24	0.1	0.4	41.2	0.3	\$7.91	87	29,256.0	220.9	\$5,617.16		
			26	0.0	0.2	16.5	0.1	\$3.16	30	11,702.4	88.4	\$2,246.86		
			28	0.1	0.2	24.7	0.2	\$4.75	38	17,553.6	132.5	\$3,370.29		
			30											
			32	0.0	0.1	8.2	0.1	\$1.58	10	5,851.2	44.2	\$1,123.43		
			34	0.0	0.1	8.2	0.1	\$1.58	9	5,851.2	44.2	\$1,123.43		
			≥36	0.0	0.2	16.5	0.1	\$3.16	11	11,702.4	88.4	\$2,246.86		
		red oak sawtimber Total		0.9	2.2	238.9	1.8	\$45.88	639	169,684.9	1,281.1	\$32,579.51		

DNA Forest Compartment Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Cmp.	Acres	Stock class	DBH class	Values			\$/acre	Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre					
		soft maple sawtimber	6								
			8								
			10								
			12								
			14	4.0	4.3	321.4	2.3	2,851	228,211.0	1,600.1	\$29,439.22
			16	1.2	1.7	129.1	0.9	877	91,691.9	642.9	\$11,828.26
			18	0.9	1.5	114.8	0.8	616	81,503.9	571.5	\$10,514.01
			20	0.4	0.9	68.9	0.5	299	48,902.4	342.9	\$6,308.40
			22	0.3	0.7	51.6	0.4	186	36,676.8	257.2	\$4,731.30
			24	0.1	0.2	17.2	0.1	52	12,225.6	85.7	\$1,577.10
			26	0.0	0.2	11.5	0.1	30	8,150.4	57.1	\$1,051.40
			28								
			30								
			32	0.0	0.1	5.7	0.0	10	4,075.2	28.6	\$525.70
			34								
			≥36	0.0	0.1	5.7	0.0	7	4,075.2	28.6	\$525.70
		soft maple sawtimber Total		6.9	9.7	725.9	5.1	4,926	515,512.3	3,614.6	\$66,501.08
		swamp chestnut oak sawtimber	6								
			8								
			10								
			12								
			14								
			16	0.1	0.1	8.2	0.1	39	5,851.2	44.2	\$1,123.43
			18								
			20								
			22	0.0	0.1	8.2	0.1	21	5,851.2	44.2	\$1,123.43
			24	0.0	0.1	8.2	0.1	17	5,851.2	44.2	\$1,123.43
			26								
			28	0.0	0.1	8.2	0.1	13	5,851.2	44.2	\$1,123.43
			30								
			32								
			34								
			≥36								
		swamp chestnut oak sawtimber Total		0.1	0.3	33.0	0.2	90	23,404.8	176.7	\$4,493.73
		sweetgum sawtimber	6								
			8								
			10								
			12								
			14	5.7	6.1	607.0	4.1	4,021	431,071.0	2,882.0	\$55,608.16
			16	4.1	5.7	568.6	3.8	2,884	403,788.0	2,699.6	\$52,088.66
			18	1.4	2.5	253.6	1.7	1,016	180,067.6	1,203.9	\$23,228.73
			20	0.9	1.9	192.1	1.3	624	136,414.9	912.0	\$17,597.52
			22	0.3	0.8	84.5	0.6	227	60,022.5	401.3	\$7,742.91
			24	0.1	0.4	38.4	0.3	87	27,283.0	182.4	\$3,519.50
			26	0.1	0.2	23.1	0.2	44	16,369.8	109.4	\$2,111.70
			28	0.1	0.2	23.1	0.2	38	16,369.8	109.4	\$2,111.70
			30								
			32	0.0	0.1	7.7	0.1	10	5,456.6	36.5	\$703.90
			34								
			≥36								
		sweetgum sawtimber Total		12.6	17.9	1,798.0	12.0	8,951	1,276,843.3	8,536.5	\$164,712.78

DNA Forest Compartment Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Cmp.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
		tulip-poplar sawtimber	6									
			8									
			10									
			12									
			14	0.1	0.1	7.7	0.1	\$0.99	51	5,456.6	36.5	\$703.90
			16									
			18	0.0	0.1	7.7	0.1	\$0.99	31	5,456.6	36.5	\$703.90
			20									
			22									
			24									
			26									
			28									
			30	0.0	0.1	7.7	0.1	\$0.99	11	5,456.6	36.5	\$703.90
			32									
			34	0.0	0.1	7.7	0.1	\$0.99	9	5,456.6	36.5	\$703.90
			≥36									
		tulip-poplar sawtimber Total		0.1	0.3	30.7	0.2	\$3.96	101	21,826.4	145.9	\$2,815.60
		unknown hardwood sawtimber	6									
			8									
			10									
			12									
			14	0.1	0.2	11.5	0.1	\$1.48	102	8,150.4	57.1	\$1,051.40
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		unknown hardwood sawtimber Total		0.1	0.2	11.5	0.1	\$1.48	102	8,150.4	57.1	\$1,051.40
		water oak sawtimber	6									
			8									
			10									
			12									
			14	0.1	0.1	8.2	0.1	\$1.58	51	5,851.2	44.2	\$1,123.43
			16	0.1	0.1	8.2	0.1	\$1.58	39	5,851.2	44.2	\$1,123.43
			18	0.1	0.2	16.5	0.1	\$3.16	62	11,702.4	88.4	\$2,246.86
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		water oak sawtimber Total		0.2	0.3	33.0	0.2	\$6.33	151	23,404.8	176.7	\$4,493.73

DNA Forest Compartment Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Cmp.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
		willow oak sawtimber	6									
			8									
			10									
			12									
			14	0.1	0.1	8.2	0.1	\$1.58	51	5,851.2	44.2	\$1,123.43
			16	0.1	0.2	16.5	0.1	\$3.16	78	11,702.4	88.4	\$2,246.86
			18	0.1	0.2	16.5	0.1	\$3.16	62	11,702.4	88.4	\$2,246.86
			20	0.1	0.2	16.5	0.1	\$3.16	50	11,702.4	88.4	\$2,246.86
			22	0.1	0.2	16.5	0.1	\$3.16	41	11,702.4	88.4	\$2,246.86
			24									
			26									
			28	0.0	0.1	8.2	0.1	\$1.58	13	5,851.2	44.2	\$1,123.43
			30									
			32									
			34									
			≥36									
		willow oak sawtimber Total		0.4	0.8	82.4	0.6	\$15.82	294	58,512.0	441.8	\$11,234.31

Appendix J-3: DNA Forest Type Stock Tables: These tables summarize at the forest type level, for each stock class (hardwood pulpwood, softwood pulpwood, chip-n-saw, and sawtimber by species) and 2" dbh class, the mean number of trees per acre, mean basal area per acre (ft²/ac), mean volume per acre (cords for pulp, board-feet Doyle log rule for hardwood sawlog volume, or board-feet Int'l ¼-inch log rule for softwood sawlog and chip-n-saw volume), and mean weight per acre (short tons, green volume basis, wood & bark in merchandised portion of tree); as well as the total number of trees and total weight using the above units, and total value. The total area of the type contained in the installation is also provided. Null (blank) entries in the table indicate no trees were sampled of that particular combination of dbh and stock class.

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values				\$/acre	Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre						
H	352.26	Hardwood pulpwood	6	18.5	3.6	0.7	1.4	\$9.79	6,524	233.2	485.0	\$3,448.64	
			8	47.1	16.5	2.9	5.9	\$41.79	16,605	1,009.5	2,070.7	\$14,722.69	
			10	37.3	20.4	3.6	7.4	\$52.77	13,152	1,272.4	2,614.7	\$18,590.25	
			12	31.0	24.4	4.4	9.3	\$65.96	10,927	1,565.2	3,267.7	\$23,233.54	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
34													
			≥36										
		Hardwood pulpwood Total		134.0	64.8	11.6	24.0	\$170.31	47,208	4,080.4	8,438.1	\$59,995.12	
		Softwood pulpwood	6										
			8	1.6	0.5	0.1	0.1	\$1.86	550	24.4	50.0	\$656.96	
			10										
			12										
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		Softwood pulpwood Total		1.6	0.5	0.1	0.1	\$1.86	550	24.4	50.0	\$656.96	
		Chip-n-saw	6										
			8										
			10	0.7	0.4	21.4	0.1	\$2.50	235	7,537.7	39.5	\$881.91	
			12	2.1	1.6	96.3	0.5	\$11.27	734	33,919.6	177.7	\$3,968.60	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		Chip-n-saw Total		2.8	2.0	117.7	0.6	\$13.77	969	41,457.3	217.2	\$4,850.51	

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values										
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre	Total trees	Total volume	Total weight (t)	Total \$		
352.26	baldcypress sawtimber	6												
		8												
		10												
		12												
		14	3.7	4.0	401.1	2.7	\$51.74	1,318	141,290.1	944.6	\$18,226.42			
		16	4.9	6.9	692.8	4.6	\$89.37	1,743	244,046.5	1,631.6	\$31,481.99			
		18	1.5	2.7	273.5	1.8	\$35.28	544	96,334.1	644.1	\$12,427.10			
		20	0.8	1.8	182.3	1.2	\$23.52	294	64,222.8	429.4	\$8,284.73			
		22	0.6	1.5	145.9	1.0	\$18.82	194	51,378.2	343.5	\$6,627.79			
		24	0.1	0.4	36.5	0.2	\$4.70	41	12,844.6	85.9	\$1,656.95			
		26	0.1	0.5	54.7	0.4	\$7.06	52	19,266.8	128.8	\$2,485.42			
		28												
		30												
		32												
		34												
		≥36												
		baldcypress sawtimber Total		11.9	17.8	1,786.7	11.9	\$230.48	4,185	629,383.0	4,207.8	\$81,190.40		
	blackgum sawtimber	6												
		8												
		10												
		12												
		14	0.3	0.4	30.2	0.3	\$3.89	120	10,634.7	92.5	\$1,371.88			
		16	0.5	0.7	60.4	0.5	\$7.79	183	21,269.4	184.9	\$2,743.76			
		18	0.2	0.4	30.2	0.3	\$3.89	72	10,634.7	92.5	\$1,371.88			
		20	0.2	0.4	30.2	0.3	\$3.89	59	10,634.7	92.5	\$1,371.88			
		22												
		24												
		26												
		28												
		30												
		32												
		34												
		≥36												
		blackgum sawtimber Total		1.2	1.8	150.9	1.3	\$19.47	435	53,173.6	462.3	\$6,859.40		
	green ash sawtimber	6												
		8												
		10												
		12												
		14	0.3	0.4	27.2	0.2	\$3.51	120	9,592.8	67.3	\$1,237.47			
		16												
		18												
		20												
		22												
		24												
		26												
		28												
		30												
		32												
		34												
		≥36												
		green ash sawtimber Total		0.3	0.4	27.2	0.2	\$3.51	120	9,592.8	67.3	\$1,237.47		

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values										
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre	Total trees	Total volume	Total weight (t)	Total \$		
352.26	laurel oak sawtimber	6												
		8												
		10												
		12												
		14	0.2	0.2	13.3	0.1	\$2.54	60	4,668.7	48.2	\$896.40			
		16	0.4	0.5	39.8	0.4	\$7.63	138	14,006.2	144.7	\$2,689.20			
		18	0.6	1.1	79.5	0.8	\$15.27	217	28,012.5	289.5	\$5,378.39			
		20	0.3	0.5	39.8	0.4	\$7.63	88	14,006.2	144.7	\$2,689.20			
		22	0.1	0.4	26.5	0.3	\$5.09	49	9,337.5	96.5	\$1,792.80			
		24	0.1	0.4	26.5	0.3	\$5.09	41	9,337.5	96.5	\$1,792.80			
		26	0.0	0.2	13.3	0.1	\$2.54	17	4,668.7	48.2	\$896.40			
		28												
		30	0.0	0.2	13.3	0.1	\$2.54	13	4,668.7	48.2	\$896.40			
		32												
		34												
				≥36										
		laurel oak sawtimber Total	1.8	3.5	251.8	2.6	\$48.35	623	88,706.1	916.7	\$17,031.58			
loblolly pine sawtimber	6													
	8													
	10													
	12													
	14	1.9	2.0	308.4	1.4	\$49.96	659	108,625.3	497.4	\$17,597.30				
	16	2.9	4.0	616.7	2.8	\$99.91	1,009	217,250.6	994.9	\$35,194.59				
	18	1.9	3.3	504.6	2.3	\$81.75	652	177,750.5	814.0	\$28,795.58				
	20	1.1	2.4	364.4	1.7	\$59.04	382	128,375.3	587.9	\$20,796.81				
	22	0.7	1.8	280.3	1.3	\$45.41	243	98,750.3	452.2	\$15,997.54				
	24	0.5	1.5	224.3	1.0	\$36.33	163	79,000.2	361.8	\$12,798.03				
	26	0.3	1.3	196.2	0.9	\$31.79	122	69,125.2	316.5	\$11,198.28				
	28	0.1	0.4	56.1	0.3	\$9.08	30	19,750.1	90.4	\$3,199.51				
	30	0.1	0.4	56.1	0.3	\$9.08	26	19,750.1	90.4	\$3,199.51				
	32													
	34													
			≥36											
		loblolly pine sawtimber Total	9.3	16.9	2,607.1	11.9	\$422.35	3,286	918,377.4	4,205.6	\$148,777.15			
red oak sawtimber	6													
	8													
	10													
	12													
	14	0.3	0.4	39.1	0.3	\$7.51	120	13,773.4	104.0	\$2,644.50				
	16	0.4	0.5	58.7	0.4	\$11.26	138	20,660.2	156.0	\$3,966.75				
	18													
	20	0.2	0.4	39.1	0.3	\$7.51	59	13,773.4	104.0	\$2,644.50				
	22	0.3	0.9	97.8	0.7	\$18.77	121	34,433.6	260.0	\$6,611.25				
	24	0.2	0.7	78.2	0.6	\$15.01	82	27,546.9	208.0	\$5,289.00				
	26													
	28	0.1	0.4	39.1	0.3	\$7.51	30	13,773.4	104.0	\$2,644.50				
	30													
	32													
	34													
			≥36											
		red oak sawtimber Total	1.6	3.6	391.0	3.0	\$75.07	561	137,734.4	1,039.9	\$26,445.01			

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values Trees/ acre	BA (ft ²)/acre	Volume/ acre	Weight (t)/acre	\$/ acre	Total trees	Total volume	Total weight (t)	Total \$	
352.26	tulip-poplar sawtimber	6											
		8											
		10											
		12											
		14	0.2	0.2	18.2	0.1	\$2.35	60	6,422.3	42.9	\$828.47		
		16											
		18											
		20											
		22											
		24											
		26											
		28											
		30	0.0	0.2	18.2	0.1	\$2.35	13	6,422.3	42.9	\$828.47		
		32											
34	0.0	0.2	18.2	0.1	\$2.35	10	6,422.3	42.9	\$828.47				
		≥36											
		tulip-poplar sawtimber Total		0.2	0.5	54.7	0.4	\$7.06	83	19,266.8	128.8	\$2,485.42	
		unknown hardwood sawtimber	6										
			8										
			10										
			12										
			14	0.3	0.4	27.2	0.2	\$3.51	120	9,592.8	67.3	\$1,237.47	
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		unknown hardwood sawtimber Total		0.3	0.4	27.2	0.2	\$3.51	120	9,592.8	67.3	\$1,237.47	
		willow oak sawtimber	6										
			8										
			10										
			12										
			14										
			16										
			18										
			20										
			22	0.1	0.2	19.6	0.1	\$3.75	24	6,886.7	52.0	\$1,322.25	
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		willow oak sawtimber Total		0.1	0.2	19.6	0.1	\$3.75	24	6,886.7	52.0	\$1,322.25	

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values				\$/acre	Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre							
HP	172.92	Hardwood pulpwood	6	10.6	2.1	0.4	0.8	\$5.56	1,835	65.1	135.2	\$960.96		
			8	35.4	12.4	2.3	4.7	\$33.39	6,123	389.6	812.1	\$5,773.99		
			10	38.7	21.1	3.8	8.0	\$56.71	6,693	662.2	1,379.1	\$9,805.74		
			12	21.9	17.2	3.2	6.6	\$47.15	3,792	547.0	1,146.7	\$8,152.87		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
					Hardwood pulpwood Total		106.7	52.8	9.6	20.1	\$142.80	18,443	1,664.0	3,473.1	$24,693.56
		Softwood pulpwood	6											
			8	1.6	0.6	0.1	0.1	\$1.90	275	12.2	25.0	\$328.47		
			10											
			12											
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Softwood pulpwood Total		1.6	0.6	0.1	0.1	\$1.90	275	12.2	25.0	\$328.47		
		Chip-n-saw	6											
			8											
			10	4.3	2.4	138.9	0.7	\$16.26	749	24,025.3	125.8	\$2,810.96		
			12	5.7	4.4	261.5	1.4	\$30.60	979	45,224.2	236.9	\$5,291.23		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		10.0	6.8	400.5	2.1	\$46.86	1,727	69,249.5	362.7	\$8,102.19		

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values			\$/acre	Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre						
172.92	baldcypress sawtimber	6										
		8										
		10										
		12										
		14	0.3	0.3	27.9	0.2	\$3.59	45	4,816.5	32.2	\$621.33	
		16	0.2	0.3	27.9	0.2	\$3.59	34	4,816.5	32.2	\$621.33	
		18										
		20										
		22										
		24										
		26										
		28										
		30										
		32										
		34										
		≥36										
		baldcypress sawtimber Total		0.5	0.6	55.7	0.4	\$7.19	79	9,633.0	64.4	\$1,242.66
	blackgum sawtimber	6										
		8										
		10										
		12										
		14	0.8	0.8	69.2	0.6	\$8.92	135	11,963.5	104.0	\$1,543.30	
		16										
		18										
		20										
		22										
		24										
		26										
		28										
		30										
		32										
		34										
		≥36										
		blackgum sawtimber Total		0.8	0.8	69.2	0.6	\$8.92	135	11,963.5	104.0	\$1,543.30
	loblolly pine sawtimber	6										
		8										
		10										
		12										
		14	6.2	6.7	1,027.9	4.7	\$166.52	1,078	177,742.6	813.9	\$28,794.31	
		16	5.9	8.2	1,263.4	5.8	\$204.68	1,015	218,475.3	1,000.5	\$35,393.00	
		18	5.8	10.3	1,584.7	7.3	\$256.72	1,006	274,019.9	1,254.8	\$44,391.22	
		20	3.3	7.2	1,113.5	5.1	\$180.39	572	192,554.5	881.8	\$31,193.83	
		22	2.5	6.7	1,027.9	4.7	\$166.52	437	177,742.6	813.9	\$28,794.31	
		24	1.6	5.0	770.9	3.5	\$124.89	275	133,307.0	610.5	\$21,595.73	
		26	0.2	0.6	85.7	0.4	\$13.88	26	14,811.9	67.8	\$2,399.53	
		28	0.1	0.3	42.8	0.2	\$6.94	11	7,405.9	33.9	\$1,199.76	
		30	0.1	0.6	85.7	0.4	\$13.88	20	14,811.9	67.8	\$2,399.53	
		32										
		34										
		≥36										
		loblolly pine sawtimber Total		25.7	45.4	7,002.5	32.1	\$1,134.40	4,440	1,210,871.6	5,545.0	\$196,161.20

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values										
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre	Total trees	Total volume	Total weight (t)	Total \$		
172.92	red oak sawtimber	6												
		8												
		10												
		12												
		14												
		16												
		18												
		20	0.1	0.3	29.9	0.2	\$5.73	22	5,164.8	39.0	\$991.64			
		22	0.1	0.3	29.9	0.2	\$5.73	18	5,164.8	39.0	\$991.64			
		24	0.1	0.3	29.9	0.2	\$5.73	15	5,164.8	39.0	\$991.64			
		26	0.2	0.6	59.7	0.5	\$11.47	26	10,329.6	78.0	\$1,983.29			
		28	0.1	0.3	29.9	0.2	\$5.73	11	5,164.8	39.0	\$991.64			
		30												
		32	0.0	0.3	29.9	0.2	\$5.73	9	5,164.8	39.0	\$991.64			
		34	0.0	0.3	29.9	0.2	\$5.73	8	5,164.8	39.0	\$991.64			
				≥36										
			red oak sawtimber Total		0.6	2.2	238.9	1.8	\$45.88	109	41,318.5	312.0	\$7,933.15	
	soft maple sawtimber	6												
		8												
		10												
		12												
		14	5.5	5.8	436.8	3.1	\$56.35	944	75,540.0	529.7	\$9,744.66			
		16	1.0	1.4	104.0	0.7	\$13.42	172	17,985.7	126.1	\$2,320.16			
		18	0.8	1.4	104.0	0.7	\$13.42	136	17,985.7	126.1	\$2,320.16			
		20	0.9	1.9	145.6	1.0	\$18.78	154	25,180.0	176.6	\$3,248.22			
		22	0.2	0.6	41.6	0.3	\$5.37	36	7,194.3	50.4	\$928.06			
		24	0.2	0.6	41.6	0.3	\$5.37	31	7,194.3	50.4	\$928.06			
		26												
		28												
		30												
		32												
		34												
				≥36										
			soft maple sawtimber Total		8.5	11.7	873.7	6.1	\$112.71	1,473	151,080.0	1,059.3	\$19,489.32	
	sweetgum sawtimber	6												
		8												
		10												
		12												
		14	7.1	7.6	766.0	5.1	\$98.81	1,236	132,453.6	885.5	\$17,086.51			
		16	4.4	6.1	612.8	4.1	\$79.05	757	105,962.9	708.4	\$13,669.21			
		18	1.3	2.2	222.8	1.5	\$28.75	217	38,531.9	257.6	\$4,970.62			
		20	0.8	1.7	167.1	1.1	\$21.56	132	28,899.0	193.2	\$3,727.97			
		22	0.3	0.8	83.6	0.6	\$10.78	55	14,449.5	96.6	\$1,863.98			
		24	0.2	0.6	55.7	0.4	\$7.19	31	9,633.0	64.4	\$1,242.66			
		26	0.1	0.3	27.9	0.2	\$3.59	13	4,816.5	32.2	\$621.33			
		28												
		30												
		32	0.0	0.3	27.9	0.2	\$3.59	9	4,816.5	32.2	\$621.33			
		34												
				≥36										
			sweetgum sawtimber Total		14.2	19.6	1,963.7	13.1	\$253.32	2,449	339,562.8	2,270.2	\$43,803.60	

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values									
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre	Total trees	Total volume	Total weight (t)	Total \$	
	172.92	tulip-poplar sawtimber	6										
			8										
			10										
			12										
			14										
			16										
			18	0.2	0.3	27.9	0.2	\$3.59	27	4,816.5	32.2	\$621.33	
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		tulip-poplar sawtimber Total		0.2	0.3	27.9	0.2	\$3.59	27	4,816.5	32.2	\$621.33	
		willow oak sawtimber	6										
			8										
			10										
			12										
			14										
			16	0.2	0.3	29.9	0.2	\$5.73	34	5,164.8	39.0	\$991.64	
			18	0.2	0.3	29.9	0.2	\$5.73	27	5,164.8	39.0	\$991.64	
			20										
			22										
			24										
			26										
			28	0.1	0.3	29.9	0.2	\$5.73	11	5,164.8	39.0	\$991.64	
			30										
			32										
			34										
			≥36										
		willow oak sawtimber Total		0.4	0.8	89.6	0.7	\$17.20	73	15,494.4	117.0	\$2,974.93	

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values				\$/acre	Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre						
PH	98.05	Hardwood pulpwood	6	19.9	3.9	0.8	1.7	\$11.77	1,949	75.4	162.4	\$1,154.52	
			8	34.9	12.2	2.3	4.9	\$34.74	3,426	226.3	479.1	\$3,406.07	
			10	31.3	17.1	3.1	6.3	\$45.08	3,069	300.7	621.7	\$4,420.16	
			12	15.5	12.2	2.2	4.5	\$32.07	1,522	212.0	442.2	\$3,144.06	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
34													
			≥36										
		Hardwood pulpwood Total		101.6	45.4	8.3	17.4	\$123.66	9,966	814.4	1,705.3	\$12,124.81	
		Softwood pulpwood	6	3.7	0.7	0.1	0.2	\$2.50	365	9.1	18.7	\$245.30	
			8	15.4	5.4	0.7	1.4	\$18.35	1,507	66.7	136.9	\$1,798.88	
			10										
			12										
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		Softwood pulpwood Total		19.1	6.1	0.8	1.6	\$20.85	1,873	75.8	155.6	\$2,044.19	
		Chip-n-saw	6										
			8										
			10	20.1	11.0	645.9	3.4	\$75.57	1,973	63,326.3	331.7	\$7,409.18	
			12	23.3	18.3	1,076.4	5.6	\$125.94	2,284	105,543.8	552.9	\$12,348.63	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		Chip-n-saw Total		43.4	29.3	1,722.3	9.0	\$201.51	4,257	168,870.1	884.6	\$19,757.81	

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values			\$/acre	Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre						
98.05		blackgum sawtimber	6									
			8									
			10									
			12									
			14	0.5	0.5	40.5	0.4	\$5.22	45	3,970.9	34.5	\$512.25
			16	0.3	0.5	40.5	0.4	\$5.22	34	3,970.9	34.5	\$512.25
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		blackgum sawtimber Total		0.8	1.0	81.0	0.7	\$10.45	79	7,941.8	69.0	\$1,024.49
		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	17.8	19.0	2,933.2	13.4	\$475.19	1,745	287,604.7	1,317.0	\$46,591.96
			16	12.2	17.1	2,632.4	12.1	\$426.45	1,199	258,106.8	1,182.0	\$41,813.30
			18	8.0	14.1	2,181.1	10.0	\$353.34	785	213,859.9	979.3	\$34,645.30
			20	4.0	8.8	1,353.8	6.2	\$219.32	395	132,740.6	607.9	\$21,503.98
			22	2.0	5.4	827.3	3.8	\$134.03	199	81,119.3	371.5	\$13,141.32
			24	0.8	2.4	376.1	1.7	\$60.92	76	36,872.4	168.9	\$5,973.33
			26	0.5	2.0	300.8	1.4	\$48.74	52	29,497.9	135.1	\$4,778.66
			28									
			30									
			32									
34												
			≥36									
		loblolly pine sawtimber Total		45.4	68.8	10,604.8	48.6	\$1,717.98	4,451	1,039,801.6	4,761.6	\$168,447.85
		red oak sawtimber	6									
			8									
			10									
			12									
			14									
			16	0.3	0.5	52.5	0.4	\$10.07	34	5,142.9	38.8	\$987.43
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		red oak sawtimber Total		0.3	0.5	52.5	0.4	\$10.07	34	5,142.9	38.8	\$987.43

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values			\$/acre	Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre						
98.05	soft maple sawtimber	6										
		8										
		10										
		12										
		14	2.7	2.9	219.2	1.5	\$28.27	268	21,491.2	150.7	\$2,772.36	
		16	0.7	1.0	73.1	0.5	\$9.42	69	7,163.7	50.2	\$924.12	
		18	0.3	0.5	36.5	0.3	\$4.71	27	3,581.9	25.1	\$462.06	
		20	0.2	0.5	36.5	0.3	\$4.71	22	3,581.9	25.1	\$462.06	
		22										
		24										
		26										
		28										
		30										
		32										
		34										
		≥36										
		soft maple sawtimber Total		3.9	4.9	365.3	2.6	\$47.12	386	35,818.6	251.1	\$4,620.60
	sweetgum sawtimber	6										
		8										
		10										
		12										
		14	2.3	2.4	244.6	1.6	\$31.55	224	23,980.2	160.3	\$3,093.44	
		16	1.7	2.4	244.6	1.6	\$31.55	171	23,980.2	160.3	\$3,093.44	
		18	0.6	1.0	97.8	0.7	\$12.62	54	9,592.1	64.1	\$1,237.38	
		20										
		22										
		24										
		26										
		28										
		30										
		32										
		34										
		≥36										
		sweetgum sawtimber Total		4.6	5.9	587.0	3.9	\$75.72	449	57,552.4	384.8	\$7,424.26
	water oak sawtimber	6										
		8										
		10										
		12										
		14	0.5	0.5	52.5	0.4	\$10.07	45	5,142.9	38.8	\$987.43	
		16	0.3	0.5	52.5	0.4	\$10.07	34	5,142.9	38.8	\$987.43	
		18	0.6	1.0	104.9	0.8	\$20.14	54	10,285.7	77.7	\$1,974.86	
		20										
		22										
		24										
		26										
		28										
		30										
		32										
		34										
		≥36										
		water oak sawtimber Total		1.4	2.0	209.8	1.6	\$40.28	133	20,571.5	155.3	\$3,949.72

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
98.05	willow oak	sawtimber	6									
			8									
			10									
			12									
			14									
			16	0.3	0.5	52.5	0.4	\$10.07	34	5,142.9	38.8	\$987.43
			18	0.3	0.5	52.5	0.4	\$10.07	27	5,142.9	38.8	\$987.43
			20	0.4	1.0	104.9	0.8	\$20.14	44	10,285.7	77.7	\$1,974.86
			22	0.2	0.5	52.5	0.4	\$10.07	18	5,142.9	38.8	\$987.43
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
willow oak sawtimber Total				1.3	2.4	262.3	2.0	\$50.35	123	25,714.4	194.1	\$4,937.16

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values				\$/acre	Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre						
P	86.91	Hardwood pulpwood	6	13.4	2.6	0.5	0.9	\$6.57	1,165	40.1	80.3	\$570.91	
			8	5.3	1.8	0.3	0.6	\$4.54	459	27.2	55.5	\$394.49	
			10	4.8	2.6	0.4	0.9	\$6.47	419	38.7	79.1	\$562.67	
			12	2.3	1.8	0.3	0.6	\$4.60	204	28.1	56.2	\$399.64	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
34													
			≥36										
		Hardwood pulpwood Total		25.9	8.9	1.5	3.1	\$22.18	2,247	134.2	271.1	\$1,927.71	
		Softwood pulpwood	6	5.4	1.1	0.1	0.3	\$3.60	466	11.6	23.8	\$312.80	
			8	43.7	15.3	1.9	4.0	\$52.19	3,800	168.2	345.2	\$4,535.56	
			10										
			12										
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		Softwood pulpwood Total		49.1	16.3	2.1	4.2	\$55.79	4,266	179.8	369.0	\$4,848.36	
		Chip-n-saw	6										
			8										
			10	64.2	35.0	2,059.6	10.8	\$240.97	5,577	178,997.0	937.6	\$20,942.64	
			12	28.1	22.1	1,300.8	6.8	\$152.19	2,446	113,050.7	592.2	\$13,226.93	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		Chip-n-saw Total		92.3	57.1	3,360.3	17.6	\$393.16	8,023	292,047.7	1,529.8	\$34,169.58	

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values									
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre	Total trees	Total volume	Total weight (t)	Total \$	
86.91	loblolly pine sawtimber	6											
		8											
		10											
		12											
		14	19.7	21.1	3,246.0	14.9	\$525.85	1,712	282,106.9	1,291.9	\$45,701.32		
		16	14.9	20.8	3,205.4	14.7	\$519.27	1,294	278,580.6	1,275.7	\$45,130.06		
		18	7.0	12.4	1,907.0	8.7	\$308.93	608	165,737.8	759.0	\$26,849.53		
		20	2.3	5.0	770.9	3.5	\$124.89	199	67,000.4	306.8	\$10,854.06		
		22	0.2	0.5	81.1	0.4	\$13.15	17	7,052.7	32.3	\$1,142.53		
		24	0.5	1.6	243.4	1.1	\$39.44	44	21,158.0	96.9	\$3,427.60		
		26											
		28											
		30											
		32											
34													
≥36													
loblolly pine sawtimber Total			44.6	61.3	9,453.9	43.3	\$1,531.53	3,874	821,636.4	3,762.6	\$133,105.10		
soft maple sawtimber	6												
	8												
	10												
	12												
	14	2.0	2.1	157.7	1.1	\$20.34	171	13,702.2	96.1	\$1,767.59			
	16	0.4	0.5	39.4	0.3	\$5.08	33	3,425.6	24.0	\$441.90			
	18												
	20												
	22												
	24												
	26												
	28												
	30												
	32												
34													
≥36													
soft maple sawtimber Total			2.3	2.6	197.1	1.4	\$25.42	204	17,127.8	120.1	\$2,209.48		
sweetgum sawtimber	6												
	8												
	10												
	12												
	14	0.5	0.5	52.8	0.4	\$6.81	43	4,586.7	30.7	\$591.69			
	16	0.4	0.5	52.8	0.4	\$6.81	33	4,586.7	30.7	\$591.69			
	18	0.6	1.1	105.6	0.7	\$13.62	52	9,173.5	61.3	\$1,183.38			
	20												
	22	0.2	0.5	52.8	0.4	\$6.81	17	4,586.7	30.7	\$591.69			
	24												
	26												
	28												
	30												
	32												
34													
≥36													
sweetgum sawtimber Total			1.7	2.6	263.9	1.8	\$34.04	145	22,933.7	153.3	\$2,958.45		

DNA Forest Type Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Int'l 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Forest type	Acres	Stock class	DBH class	Values										
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre	Total trees	Total volume	Total weight (t)	Total \$		
86.91	willow oak	sawtimber	6											
			8											
			10											
			12											
			14	0.5	0.5	56.6	0.4	\$10.87	43	4,918.4	37.1	\$944.34		
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
34														
			≥36											
willow oak sawtimber Total				0.5	0.5	56.6	0.4	\$10.87	43	4,918.4	37.1	\$944.34		

Appendix J-4: DNA Forest Stand Stock Tables: These tables summarize at the forest stand level, for each stock class (hardwood pulpwood, softwood pulpwood, chip-n-saw, and sawtimber by species) and 2" dbh class, the mean number of trees per acre, basal area per acre (ft²/ac), mean volume per acre (cords for pulp, board-feet Doyle log rule for hardwood sawlog volume, or board-feet Int'l ¼-inch log rule for softwood sawlog and chip-n-saw volume), and mean weight per acre (short tons, green volume basis, wood & bark in merchandised portion of tree); as well as the total number of trees and total weight using the above units, and total value. The total area of the stand is also provided. Null (blank) entries in the table indicate no trees were sampled of that particular combination of dbh and stock class.

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
1	23.22	Hardwood pulpwood	6	31.8	6.3	1.1	2.2	\$15.49	739	25.0	50.6	\$359.65		
			8	21.5	7.5	1.3	2.6	\$18.61	499	30.1	60.8	\$432.10		
			10	16.0	8.8	1.6	3.3	\$23.45	373	36.8	76.6	\$544.45		
			12	11.1	8.8	1.6	3.3	\$23.67	259	37.7	77.3	\$549.68		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
					Hardwood pulpwood Total		80.5	31.3	5.6	11.4	\$81.22	1,869	129.7	265.2	$1,885.88
		Chip-n-saw	6											
			8											
			10	4.6	2.5	147.1	0.8	\$17.21	106	3,415.9	17.9	\$399.66		
			12	3.2	2.5	147.1	0.8	\$17.21	74	3,415.9	17.9	\$399.66		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		7.8	5.0	294.2	1.5	\$34.42	180	6,831.9	35.8	\$799.33		
		blackgum sawtimber	6											
			8											
			10											
			12											
			14	2.3	2.5	207.6	1.8	\$26.77	54	4,819.5	41.9	\$621.71		
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		blackgum sawtimber Total		2.3	2.5	207.6	1.8	\$26.77	54	4,819.5	41.9	\$621.71		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
23.22		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	2.3	2.5	385.5	1.8	\$62.44	54	8,950.3	41.0	\$1,449.96
			16									
			18									
			20	1.1	2.5	385.5	1.8	\$62.44	27	8,950.3	41.0	\$1,449.96
			22	2.8	7.5	1,156.4	5.3	\$187.33	66	26,851.0	123.0	\$4,349.87
			24	1.6	5.0	770.9	3.5	\$124.89	37	17,900.7	82.0	\$2,899.91
			26	0.7	2.5	385.5	1.8	\$62.44	16	8,950.3	41.0	\$1,449.96
			28									
			30	0.5	2.5	385.5	1.8	\$62.44	12	8,950.3	41.0	\$1,449.96
			32									
34												
			≥36									
		loblolly pine sawtimber Total		9.1	22.5	3,469.1	15.9	\$562.00	211	80,553.1	368.9	\$13,049.61
		soft maple sawtimber	6									
			8									
			10									
			12									
			14	7.0	7.5	561.7	3.9	\$72.45	163	13,041.8	91.4	\$1,682.40
			16									
			18									
			20									
			22									
			24	0.8	2.5	187.2	1.3	\$24.15	18	4,347.3	30.5	\$560.80
			26									
			28									
			30									
			32									
			34									
			≥36									
		soft maple sawtimber Total		7.8	10.0	748.9	5.3	\$96.61	181	17,389.1	121.9	\$2,243.19
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	4.7	5.0	501.4	3.4	\$64.68	109	11,641.8	77.8	\$1,501.79
			16	7.2	10.0	1,002.7	6.7	\$129.35	166	23,283.6	155.7	\$3,003.59
			18	2.8	5.0	501.4	3.4	\$64.68	66	11,641.8	77.8	\$1,501.79
			20									
			22									
			24	0.8	2.5	250.7	1.7	\$32.34	18	5,820.9	38.9	\$750.90
			26	0.7	2.5	250.7	1.7	\$32.34	16	5,820.9	38.9	\$750.90
			28									
			30									
			32	0.4	2.5	250.7	1.7	\$32.34	10	5,820.9	38.9	\$750.90
			34									
			≥36									
		sweetgum sawtimber Total		16.6	27.5	2,757.5	18.4	\$355.72	385	64,030.0	428.1	\$8,259.86

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
23.22		tulip-poplar sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18	1.4	2.5	250.7	1.7	\$32.34	33	5,820.9	38.9	\$750.90
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		tulip-poplar sawtimber Total		1.4	2.5	250.7	1.7	\$32.34	33	5,820.9	38.9	\$750.90

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
2	45.64	Hardwood pulpwood	6	15.7	3.1	0.5	1.1	\$7.54	715	23.6	48.4	\$344.22		
			8	13.2	4.6	0.9	1.9	\$13.70	603	41.4	88.0	\$625.49		
			10	22.6	12.3	2.2	4.6	\$32.49	1,030	99.8	208.6	\$1,482.89		
			12	15.7	12.3	2.1	4.3	\$30.38	715	95.9	195.0	\$1,386.37		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		67.1	32.3	5.7	11.8	\$84.11	3,064	260.6	539.9	$3,838.98
		blackgum sawtimber	6											
			8											
			10											
			12											
			14	1.4	1.5	127.7	1.1	\$16.48	66	5,829.5	50.7	\$752.00		
			16											
			18											
			20	0.7	1.5	127.7	1.1	\$16.48	32	5,829.5	50.7	\$752.00		
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		blackgum sawtimber Total		2.1	3.1	255.5	2.2	\$32.95	98	11,658.9	101.4	\$1,504.00		
		loblolly pine sawtimber	6											
			8											
			10											
			12											
			14											
			16	4.4	6.2	948.8	4.3	\$153.71	201	43,304.2	198.3	\$7,015.28		
			18	3.5	6.2	948.8	4.3	\$153.71	159	43,304.2	198.3	\$7,015.28		
			20	2.8	6.2	948.8	4.3	\$153.71	129	43,304.2	198.3	\$7,015.28		
			22	0.6	1.5	237.2	1.1	\$38.43	27	10,826.0	49.6	\$1,753.82		
			24	1.0	3.1	474.4	2.2	\$76.85	45	21,652.1	99.2	\$3,507.64		
			26											
			28	0.4	1.5	237.2	1.1	\$38.43	16	10,826.0	49.6	\$1,753.82		
			30											
			32											
			34											
			≥36											
		loblolly pine sawtimber Total		12.6	24.6	3,795.3	17.4	\$614.84	577	173,216.7	793.2	\$28,061.11		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
45.64		red oak sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18									
			20									
			22	0.6	1.5	165.4	1.2	\$31.76	27	7,550.0	57.0	\$1,449.59
			24	1.0	3.1	330.8	2.5	\$63.52	45	15,099.9	114.0	\$2,899.18
			26									
			28									
			30									
			32									
34												
			≥36	0.1	1.5	165.4	1.2	\$31.76	6	7,550.0	57.0	\$1,449.59
		red oak sawtimber Total		1.7	6.2	661.7	5.0	\$127.05	77	30,199.8	228.0	\$5,798.36
		soft maple sawtimber	6									
			8									
			10									
			12									
			14	2.9	3.1	230.4	1.6	\$29.72	131	10,516.6	73.7	\$1,356.65
			16	1.1	1.5	115.2	0.8	\$14.86	50	5,258.3	36.9	\$678.32
			18	0.9	1.5	115.2	0.8	\$14.86	40	5,258.3	36.9	\$678.32
			20	1.4	3.1	230.4	1.6	\$29.72	64	10,516.6	73.7	\$1,356.65
			22									
			24	0.5	1.5	115.2	0.8	\$14.86	22	5,258.3	36.9	\$678.32
			26	0.4	1.5	115.2	0.8	\$14.86	19	5,258.3	36.9	\$678.32
			28									
			30									
			32									
			34									
			≥36	0.2	1.5	115.2	0.8	\$14.86	9	5,258.3	36.9	\$678.32
		soft maple sawtimber Total		7.4	13.8	1,036.9	7.3	\$133.76	336	47,324.9	331.8	\$6,104.91
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	10.1	10.8	1,079.9	7.2	\$139.30	460	49,285.4	329.5	\$6,357.82
			16	6.6	9.2	925.6	6.2	\$119.40	302	42,244.7	282.4	\$5,449.56
			18	3.5	6.2	617.1	4.1	\$79.60	159	28,163.1	188.3	\$3,633.04
			20	4.2	9.2	925.6	6.2	\$119.40	193	42,244.7	282.4	\$5,449.56
			22	1.7	4.6	462.8	3.1	\$59.70	80	21,122.3	141.2	\$2,724.78
			24									
			26	0.4	1.5	154.3	1.0	\$19.90	19	7,040.8	47.1	\$908.26
			28	0.7	3.1	308.5	2.1	\$39.80	33	14,081.6	94.1	\$1,816.52
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		27.3	44.6	4,473.8	29.9	\$577.12	1,245	204,182.5	1,365.1	\$26,339.54

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
45.64		tulip-poplar sawtimber	6									
			8									
			10									
			12									
			14	1.4	1.5	154.3	1.0	\$19.90	66	7,040.8	47.1	\$908.26
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30	0.3	1.5	154.3	1.0	\$19.90	14	7,040.8	47.1	\$908.26
			32									
34												
			≥36									
		tulip-poplar sawtimber Total		1.8	3.1	308.5	2.1	\$39.80	80	14,081.6	94.1	\$1,816.52
		unknown hardwood sawtimber	6									
			8									
			10									
			12									
			14	2.9	3.1	230.4	1.6	\$29.72	131	10,516.6	73.7	\$1,356.65
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		unknown hardwood sawtimber Total		2.9	3.1	230.4	1.6	\$29.72	131	10,516.6	73.7	\$1,356.65

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
3	140.59	Hardwood pulpwood	6	19.3	3.8	0.8	1.7	\$11.75	2,709	107.7	232.3	\$1,651.53		
			8	44.9	15.7	2.7	5.7	\$40.46	6,314	385.1	800.0	\$5,687.76		
			10	37.7	20.5	3.8	7.8	\$55.59	5,295	528.5	1,099.1	\$7,814.77		
			12	31.7	24.9	4.7	9.8	\$69.97	4,451	660.5	1,383.6	\$9,837.27		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
					Hardwood pulpwood Total		133.5	64.9	12.0	25.0	\$177.76	18,768	1,681.8	3,515.0	$24,991.33
		Softwood pulpwood	6											
			8	4.6	1.6	0.2	0.4	\$5.54	653	28.9	59.3	\$779.51		
			10											
			12											
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Softwood pulpwood Total		4.6	1.6	0.2	0.4	\$5.54	653	28.9	59.3	\$779.51		
		Chip-n-saw	6											
			8											
			10	2.0	1.1	63.6	0.3	\$7.44	279	8,943.8	46.8	\$1,046.42		
			12	5.5	4.3	254.5	1.3	\$29.77	774	35,775.1	187.4	\$4,185.68		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		7.5	5.4	318.1	1.7	\$37.22	1,053	44,718.8	234.2	\$5,232.10		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
140.59		blackgum sawtimber	6									
			8									
			10									
			12									
			14									
			16	0.8	1.1	89.8	0.8	\$11.58	109	12,618.5	109.7	\$1,627.79
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		blackgum sawtimber Total		0.8	1.1	89.8	0.8	\$11.58	109	12,618.5	109.7	\$1,627.79
		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	5.1	5.4	833.4	3.8	\$135.01	711	117,171.1	536.6	\$18,981.71
			16	4.3	5.9	916.8	4.2	\$148.52	599	128,888.2	590.2	\$20,879.88
			18	1.5	2.7	416.7	1.9	\$67.51	215	58,585.5	268.3	\$9,490.86
			20	1.2	2.7	416.7	1.9	\$67.51	174	58,585.5	268.3	\$9,490.86
			22	0.8	2.2	333.4	1.5	\$54.01	115	46,868.4	214.6	\$7,592.68
			24									
			26	0.1	0.5	83.3	0.4	\$13.50	21	11,717.1	53.7	\$1,898.17
			28	0.1	0.5	83.3	0.4	\$13.50	18	11,717.1	53.7	\$1,898.17
			30	0.1	0.5	83.3	0.4	\$13.50	15	11,717.1	53.7	\$1,898.17
			32									
			34									
			≥36									
		loblolly pine sawtimber Total		13.3	20.5	3,167.0	14.5	\$513.06	1,868	445,250.0	2,039.0	\$72,130.50
		red oak sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18									
			20	0.5	1.1	116.2	0.9	\$22.32	70	16,342.7	123.4	\$3,137.80
			22	0.4	1.1	116.2	0.9	\$22.32	58	16,342.7	123.4	\$3,137.80
			24	0.2	0.5	58.1	0.4	\$11.16	24	8,171.4	61.7	\$1,568.90
			26									
			28	0.1	0.5	58.1	0.4	\$11.16	18	8,171.4	61.7	\$1,568.90
			30									
			32									
			34									
			≥36	0.1	0.5	58.1	0.4	\$11.16	9	8,171.4	61.7	\$1,568.90
		red oak sawtimber Total		1.3	3.8	406.9	3.1	\$78.12	178	57,199.5	431.9	\$10,982.31

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				\$/acre	Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					
140.59		soft maple sawtimber	6									
			8									
			10									
			12									
			14	6.6	7.0	526.2	3.7	924	73,984.6	518.8	\$9,544.01	
			16	1.9	2.7	202.4	1.4	272	28,455.6	199.5	\$3,670.77	
			18	0.9	1.6	121.4	0.9	129	17,073.4	119.7	\$2,202.46	
			20	0.5	1.1	81.0	0.6	70	11,382.2	79.8	\$1,468.31	
			22	0.6	1.6	121.4	0.9	86	17,073.4	119.7	\$2,202.46	
			24									
			26	0.1	0.5	40.5	0.3	21	5,691.1	39.9	\$734.15	
			28									
			30									
			32	0.1	0.5	40.5	0.3	14	5,691.1	39.9	\$734.15	
			34									
			≥36									
		soft maple sawtimber Total		10.8	15.1	1,133.4	7.9	1,516	159,351.4	1,117.3	\$20,556.32	
		swamp chestnut oak sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18									
			20									
			22									
			24									
			26									
			28	0.1	0.5	58.1	0.4	18	8,171.4	61.7	\$1,568.90	
			30									
			32									
			34									
			≥36									
		swamp chestnut oak sawtimber Total		0.1	0.5	58.1	0.4	18	8,171.4	61.7	\$1,568.90	
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	9.6	10.3	1,029.8	6.9	1,351	144,785.3	968.0	\$18,677.31	
			16	9.7	13.5	1,355.1	9.1	1,361	190,507.0	1,273.7	\$24,575.41	
			18	4.0	7.0	704.6	4.7	559	99,063.6	662.3	\$12,779.21	
			20	2.7	5.9	596.2	4.0	383	83,823.1	560.4	\$10,813.18	
			22	0.4	1.1	108.4	0.7	58	15,240.6	101.9	\$1,966.03	
			24	0.3	1.1	108.4	0.7	48	15,240.6	101.9	\$1,966.03	
			26	0.1	0.5	54.2	0.4	21	7,620.3	50.9	\$983.02	
			28	0.1	0.5	54.2	0.4	18	7,620.3	50.9	\$983.02	
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		27.0	40.0	4,011.0	26.8	3,798	563,900.8	3,770.0	\$72,743.20	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
140.59		tulip-poplar sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34	0.1	0.5	54.2	0.4	\$6.99	12	7,620.3	50.9	\$983.02
			≥36									
		tulip-poplar sawtimber Total		0.1	0.5	54.2	0.4	\$6.99	12	7,620.3	50.9	\$983.02
		willow oak sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18									
			20									
			22	0.2	0.5	58.1	0.4	\$11.16	29	8,171.4	61.7	\$1,568.90
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		willow oak sawtimber Total		0.2	0.5	58.1	0.4	\$11.16	29	8,171.4	61.7	\$1,568.90

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
4	12.90	Hardwood pulpwood	6	29.1	5.7	1.2	2.6	\$18.32	375	15.2	33.2	\$236.33		
			8	24.6	8.6	1.5	3.0	\$21.14	317	18.8	38.4	\$272.69		
			10	26.2	14.3	2.7	5.6	\$39.72	338	34.7	72.1	\$512.34		
			12	7.3	5.7	1.0	2.0	\$14.26	94	12.9	25.9	\$184.01		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		87.1	34.3	6.3	13.1	\$93.44	1,124	81.7	169.5	$1,205.36
		Softwood pulpwood	6	14.6	2.9	0.4	0.7	\$9.77	188	4.7	9.6	\$126.02		
			8	40.9	14.3	1.8	3.7	\$48.84	528	23.4	48.0	\$630.10		
			10											
			12											
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Softwood pulpwood Total		55.5	17.1	2.2	4.5	\$58.61	716	28.0	57.5	\$756.12		
		Chip-n-saw	6											
			8											
			10	52.4	28.6	1,681.3	8.8	\$196.71	676	21,688.5	113.6	\$2,537.55		
			12	58.2	45.7	2,690.0	14.1	\$314.74	751	34,701.6	181.8	\$4,060.09		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		110.6	74.3	4,371.3	22.9	\$511.45	1,427	56,390.1	295.4	\$6,597.64		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
12.90		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	5.3	5.7	881.0	4.0	\$142.73	69	11,365.5	52.0	\$1,841.21
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		loblolly pine sawtimber Total		5.3	5.7	881.0	4.0	\$142.73	69	11,365.5	52.0	\$1,841.21
		soft maple sawtimber	6									
			8									
			10									
			12									
			14	2.7	2.9	214.0	1.5	\$27.60	34	2,760.2	19.4	\$356.06
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		soft maple sawtimber Total		2.7	2.9	214.0	1.5	\$27.60	34	2,760.2	19.4	\$356.06

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre	
5	22.25	Hardwood pulpwood	6										
			8	51.6	18.0	3.3	7.1	\$50.16	1,147	74.2	157.0	\$1,116.06	
			10	58.7	32.0	5.9	12.3	\$87.68	1,305	130.6	274.4	\$1,950.79	
			12	38.2	30.0	5.5	11.3	\$80.20	850	121.4	251.0	\$1,784.55	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		Hardwood pulpwood Total		148.4	80.0	14.7	30.7	\$218.04	3,303	326.2	682.3	\$4,851.40	
		Chip-n-saw	6										
			8										
			10										
			12	2.5	2.0	117.7	0.6	\$13.77	57	2,618.6	13.7	\$306.38	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		Chip-n-saw Total		2.5	2.0	117.7	0.6	\$13.77	57	2,618.6	13.7	\$306.38	
		loblolly pine sawtimber	6										
			8										
			10										
			12										
			14	5.6	6.0	925.1	4.2	\$149.87	125	20,583.5	94.3	\$3,334.52	
			16	8.6	12.0	1,850.2	8.5	\$299.73	191	41,167.0	188.5	\$6,669.05	
			18	6.8	12.0	1,850.2	8.5	\$299.73	151	41,167.0	188.5	\$6,669.05	
			20	0.9	2.0	308.4	1.4	\$49.96	20	6,861.2	31.4	\$1,111.51	
			22	1.5	4.0	616.7	2.8	\$99.91	34	13,722.3	62.8	\$2,223.02	
			24	1.3	4.0	616.7	2.8	\$99.91	28	13,722.3	62.8	\$2,223.02	
			26										
			28										
			30										
			32										
			34										
			≥36										
		loblolly pine sawtimber Total		24.7	40.0	6,167.3	28.2	\$999.11	550	137,223.2	628.4	\$22,230.16	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
22.25		soft maple sawtimber	6									
			8									
			10									
			12									
			14	5.6	6.0	449.3	3.2	\$57.96	125	9,997.6	70.1	\$1,289.69
			16									
			18	2.3	4.0	299.6	2.1	\$38.64	50	6,665.1	46.7	\$859.79
			20	1.8	4.0	299.6	2.1	\$38.64	41	6,665.1	46.7	\$859.79
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		soft maple sawtimber Total		9.7	14.0	1,048.4	7.4	\$135.25	216	23,327.8	163.6	\$3,009.28
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	16.8	18.0	1,804.9	12.1	\$232.84	375	40,159.7	268.5	\$5,180.61
			16	7.2	10.0	1,002.7	6.7	\$129.35	159	22,311.0	149.2	\$2,878.11
			18	1.1	2.0	200.5	1.3	\$25.87	25	4,462.2	29.8	\$575.62
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		25.1	30.0	3,008.2	20.1	\$388.06	559	66,932.9	447.5	\$8,634.34

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre					
6	16.72	Hardwood pulpwood	6	12.7	2.5	0.4	0.9	\$6.24	213	7.3	14.7	\$104.34	
			8	25.1	8.8	1.7	3.6	\$25.28	419	28.0	59.4	\$422.65	
			10	36.7	20.0	3.5	7.3	\$51.78	613	58.5	121.8	\$865.76	
			12	9.5	7.5	1.3	2.6	\$18.50	160	21.4	43.5	\$309.26	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
34													
			≥36										
		Hardwood pulpwood Total		84.0	38.8	6.9	14.3	\$101.80	1,405	115.2	239.4	\$1,702.02	
		Chip-n-saw	6										
			8										
			10	20.6	11.3	662.0	3.5	\$77.45	345	11,068.7	58.0	\$1,295.04	
			12	22.3	17.5	1,029.8	5.4	\$120.48	373	17,218.0	90.2	\$2,014.50	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		Chip-n-saw Total		42.9	28.8	1,691.8	8.9	\$197.94	717	28,286.7	148.2	\$3,309.54	
		loblolly pine sawtimber	6										
			8										
			10										
			12										
			14	11.7	12.5	1,927.3	8.8	\$312.22	196	32,224.3	147.6	\$5,220.34	
			16	2.7	3.8	578.2	2.6	\$93.67	45	9,667.3	44.3	\$1,566.10	
			18										
			20	2.3	5.0	770.9	3.5	\$124.89	38	12,889.7	59.0	\$2,088.14	
			22	0.9	2.5	385.5	1.8	\$62.44	16	6,444.9	29.5	\$1,044.07	
			24	1.6	5.0	770.9	3.5	\$124.89	27	12,889.7	59.0	\$2,088.14	
			26										
			28										
			30										
			32										
			34										
			≥36										
		loblolly pine sawtimber Total		19.2	28.8	4,432.8	20.3	\$718.11	321	74,116.0	339.4	\$12,006.79	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					
16.72		soft maple sawtimber	6									
			8									
			10									
			12									
			14	14.0	15.0	1,123.3	7.9	\$144.91	235	18,782.0	131.7	\$2,422.88
			16									
			18	1.4	2.5	187.2	1.3	\$24.15	24	3,130.3	21.9	\$403.81
			20	1.1	2.5	187.2	1.3	\$24.15	19	3,130.3	21.9	\$403.81
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		soft maple sawtimber Total		16.6	20.0	1,497.8	10.5	\$193.21	277	25,042.7	175.6	\$3,230.51
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	2.3	2.5	250.7	1.7	\$32.34	39	4,191.5	28.0	\$540.70
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		2.3	2.5	250.7	1.7	\$32.34	39	4,191.5	28.0	\$540.70

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
7	44.51	Hardwood pulpwood	6	12.7	2.5	0.4	0.9	\$6.13	567	18.7	38.4	\$272.76		
			8	39.4	13.8	2.6	5.3	\$37.82	1,753	114.0	236.7	\$1,683.17		
			10	34.4	18.8	3.5	7.3	\$52.13	1,530	157.0	326.3	\$2,320.19		
			12	19.1	15.0	2.7	5.5	\$38.94	850	118.5	243.7	\$1,733.05		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		105.6	50.0	9.2	19.0	\$135.01	4,700	408.2	845.2	$6,009.17
		Chip-n-saw	6											
			8											
			10	4.6	2.5	147.1	0.8	\$17.21	204	6,548.0	34.3	\$766.11		
			12	4.8	3.8	220.7	1.2	\$25.82	213	9,821.9	51.4	\$1,149.17		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		9.4	6.3	367.8	1.9	\$43.03	417	16,369.9	85.7	\$1,915.28		
		loblolly pine sawtimber	6											
			8											
			10											
			12											
			14	7.0	7.5	1,156.4	5.3	\$187.33	312	51,470.3	235.7	\$8,338.18		
			16	7.2	10.0	1,541.8	7.1	\$249.78	319	68,627.0	314.3	\$11,117.58		
			18	5.7	10.0	1,541.8	7.1	\$249.78	252	68,627.0	314.3	\$11,117.58		
			20	5.7	12.5	1,927.3	8.8	\$312.22	255	85,783.8	392.8	\$13,896.97		
			22	5.7	15.0	2,312.8	10.6	\$374.67	253	102,940.5	471.4	\$16,676.37		
			24	2.0	6.3	963.6	4.4	\$156.11	89	42,891.9	196.4	\$6,948.49		
			26	0.3	1.3	192.7	0.9	\$31.22	15	8,578.4	39.3	\$1,389.70		
			28	0.3	1.3	192.7	0.9	\$31.22	13	8,578.4	39.3	\$1,389.70		
			30	0.3	1.3	192.7	0.9	\$31.22	11	8,578.4	39.3	\$1,389.70		
			32											
			34											
			≥36											
		loblolly pine sawtimber Total		34.1	65.0	10,021.9	45.9	\$1,623.55	1,519	446,075.7	2,042.7	\$72,264.26		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
44.51		red oak sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18									
			20	0.6	1.3	134.4	1.0	\$25.81	26	5,982.5	45.2	\$1,148.63
			22									
			24	0.4	1.3	134.4	1.0	\$25.81	18	5,982.5	45.2	\$1,148.63
			26	0.3	1.3	134.4	1.0	\$25.81	15	5,982.5	45.2	\$1,148.63
			28	0.3	1.3	134.4	1.0	\$25.81	13	5,982.5	45.2	\$1,148.63
			30									
			32									
34	0.2	1.3	134.4	1.0	\$25.81	9	5,982.5	45.2	\$1,148.63			
			≥36									
		red oak sawtimber Total		1.8	6.3	672.0	5.1	\$129.03	80	29,912.3	225.8	\$5,743.16
		soft maple sawtimber	6									
			8									
			10									
			12									
			14	4.7	5.0	374.4	2.6	\$48.30	208	16,666.4	116.9	\$2,149.97
			16	1.8	2.5	187.2	1.3	\$24.15	80	8,333.2	58.4	\$1,074.98
			18	0.7	1.3	93.6	0.7	\$12.08	31	4,166.6	29.2	\$537.49
			20	1.7	3.8	280.8	2.0	\$36.23	77	12,499.8	87.6	\$1,612.48
			22	0.5	1.3	93.6	0.7	\$12.08	21	4,166.6	29.2	\$537.49
			24	0.4	1.3	93.6	0.7	\$12.08	18	4,166.6	29.2	\$537.49
			26									
			28									
			30									
			32									
			34									
			≥36									
		soft maple sawtimber Total		9.8	15.0	1,123.3	7.9	\$144.91	435	49,999.3	350.6	\$6,449.91
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	4.7	5.0	501.4	3.4	\$64.68	208	22,316.0	149.2	\$2,878.76
			16	2.7	3.8	376.0	2.5	\$48.51	120	16,737.0	111.9	\$2,159.07
			18	0.7	1.3	125.3	0.8	\$16.17	31	5,579.0	37.3	\$719.69
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		8.1	10.0	1,002.7	6.7	\$129.35	359	44,631.9	298.4	\$5,757.52

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
44.51		willow oak sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18	0.7	1.3	134.4	1.0	\$25.81	31	5,982.5	45.2	\$1,148.63
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		willow oak sawtimber Total		0.7	1.3	134.4	1.0	\$25.81	31	5,982.5	45.2	\$1,148.63

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
8	14.74	Hardwood pulpwood	6	20.4	4.0	1.0	2.2	\$15.84	300	14.5	32.8	\$233.53		
			8	57.3	20.0	4.6	10.5	\$74.88	845	67.3	155.2	\$1,103.72		
			10	7.3	4.0	0.7	1.4	\$9.98	108	10.3	20.7	\$147.18		
			12	15.3	12.0	2.1	4.2	\$29.95	225	31.0	62.1	\$441.53		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		100.3	40.0	8.4	18.4	\$130.66	1,478	123.2	270.9	$1,925.96
		Chip-n-saw	6											
			8											
			10	44.0	24.0	1,412.3	7.4	\$165.24	649	20,816.9	109.0	\$2,435.58		
			12	30.6	24.0	1,412.3	7.4	\$165.24	450	20,816.9	109.0	\$2,435.58		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		74.6	48.0	2,824.5	14.8	\$330.47	1,099	41,633.9	218.1	\$4,871.16		
		loblolly pine sawtimber	6											
			8											
			10											
			12											
			14	22.5	24.0	3,700.4	16.9	\$599.47	331	54,543.9	249.8	\$8,836.12		
			16	2.9	4.0	616.7	2.8	\$99.91	42	9,090.7	41.6	\$1,472.69		
			18	4.5	8.0	1,233.5	5.6	\$199.82	67	18,181.3	83.3	\$2,945.37		
			20	1.8	4.0	616.7	2.8	\$99.91	27	9,090.7	41.6	\$1,472.69		
			22											
			24	1.3	4.0	616.7	2.8	\$99.91	19	9,090.7	41.6	\$1,472.69		
			26											
			28											
			30											
			32											
			34											
			≥36											
		loblolly pine sawtimber Total		32.9	44.0	6,784.1	31.1	\$1,099.02	486	99,997.2	457.9	\$16,199.54		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
14.74	willow oak	sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18	2.3	4.0	430.1	3.2	\$82.58	33	6,339.7	47.9	\$1,217.22
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		willow oak sawtimber Total		2.3	4.0	430.1	3.2	\$82.58	33	6,339.7	47.9	\$1,217.22

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
9	17.87	Hardwood pulpwood	6	17.0	3.3	0.6	1.1	\$8.17	303	10.0	20.5	\$146.01		
			8	38.2	13.3	2.6	5.4	\$38.16	683	46.0	95.9	\$682.01		
			10	61.1	33.3	6.5	13.7	\$97.55	1,092	116.2	245.2	\$1,743.27		
			12	12.7	10.0	1.7	3.5	\$24.81	228	30.9	62.4	\$443.39		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
					Hardwood pulpwood Total		129.0	60.0	11.4	23.7	\$168.70	2,306	203.1	424.0	$3,014.68
		Softwood pulpwood	6											
			8	19.1	6.7	0.8	1.7	\$22.79	341	15.1	31.0	\$407.33		
			10											
			12											
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Softwood pulpwood Total		19.1	6.7	0.8	1.7	\$22.79	341	15.1	31.0	\$407.33		
		Chip-n-saw	6											
			8											
			10	6.1	3.3	196.1	1.0	\$22.95	109	3,505.2	18.4	\$410.11		
			12	17.0	13.3	784.6	4.1	\$91.80	303	14,020.7	73.4	\$1,640.43		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		23.1	16.7	980.7	5.1	\$114.75	413	17,525.9	91.8	\$2,050.53		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
17.87		blackgum sawtimber	6									
			8									
			10									
			12									
			14	3.1	3.3	276.7	2.4	\$35.70	56	4,945.4	43.0	\$637.95
			16	2.4	3.3	276.7	2.4	\$35.70	43	4,945.4	43.0	\$637.95
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		blackgum sawtimber Total		5.5	6.7	553.5	4.8	\$71.40	98	9,890.7	86.0	\$1,275.91
		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	34.3	36.7	5,653.4	25.9	\$915.85	613	101,026.1	462.6	\$16,366.23
			16	19.1	26.7	4,111.6	18.8	\$666.07	341	73,473.5	336.5	\$11,902.71
			18	7.5	13.3	2,055.8	9.4	\$333.04	135	36,736.8	168.2	\$5,951.36
			20	4.6	10.0	1,541.8	7.1	\$249.78	82	27,552.6	126.2	\$4,463.52
			22	2.5	6.7	1,027.9	4.7	\$166.52	45	18,368.4	84.1	\$2,975.68
			24	2.1	6.7	1,027.9	4.7	\$166.52	38	18,368.4	84.1	\$2,975.68
			26									
			28									
			30									
			32									
			34									
			≥36									
		loblolly pine sawtimber Total		70.2	100.0	15,418.3	70.6	\$2,497.77	1,254	275,525.7	1,261.7	\$44,635.17
		soft maple sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18	1.9	3.3	249.6	1.8	\$32.20	34	4,460.9	31.3	\$575.45
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		soft maple sawtimber Total		1.9	3.3	249.6	1.8	\$32.20	34	4,460.9	31.3	\$575.45

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
17.87	sweetgum sawtimber	6										
		8										
		10										
		12										
		14	6.2	6.7	668.5	4.5	\$86.24	111	11,946.0	79.9	\$1,541.03	
		16	2.4	3.3	334.2	2.2	\$43.12	43	5,973.0	39.9	\$770.52	
		18	1.9	3.3	334.2	2.2	\$43.12	34	5,973.0	39.9	\$770.52	
		20										
		22										
		24										
		26										
		28										
		30										
		32										
34												
		≥36										
sweetgum sawtimber Total				10.5	13.3	1,337.0	8.9	\$172.47	188	23,891.9	159.7	\$3,082.06

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre	
10	12.06	Hardwood pulpwood	6										
			8	21.5	7.5	1.3	2.6	\$18.50	259	15.4	31.4	\$223.07	
			10	41.3	22.5	4.0	8.4	\$59.38	498	48.8	100.7	\$716.07	
			12	35.0	27.5	5.6	12.4	\$88.52	422	67.1	150.1	\$1,067.52	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
					Hardwood pulpwood Total		97.8	57.5	10.9	23.4	\$166.39	1,179	131.3	282.2	$2,006.67
		Softwood pulpwood	6										
			8	7.2	2.5	0.3	0.7	\$8.55	86	3.8	7.8	\$103.09	
			10										
			12										
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		Softwood pulpwood Total		7.2	2.5	0.3	0.7	\$8.55	86	3.8	7.8	\$103.09	
		Chip-n-saw	6										
			8										
			10	4.6	2.5	147.1	0.8	\$17.21	55	1,774.2	9.3	\$207.58	
			12	3.2	2.5	147.1	0.8	\$17.21	38	1,774.2	9.3	\$207.58	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		Chip-n-saw Total		7.8	5.0	294.2	1.5	\$34.42	94	3,548.3	18.6	\$415.16	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
12.06		blackgum sawtimber	6									
			8									
			10									
			12									
			14	2.3	2.5	207.6	1.8	\$26.77	28	2,503.1	21.8	\$322.90
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		blackgum sawtimber Total		2.3	2.5	207.6	1.8	\$26.77	28	2,503.1	21.8	\$322.90
		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	4.7	5.0	770.9	3.5	\$124.89	56	9,297.3	42.6	\$1,506.16
			16	1.8	2.5	385.5	1.8	\$62.44	22	4,648.6	21.3	\$753.08
			18	12.7	22.5	3,469.1	15.9	\$562.00	154	41,837.7	191.6	\$6,777.70
			20	5.7	12.5	1,927.3	8.8	\$312.22	69	23,243.1	106.4	\$3,765.39
			22	1.9	5.0	770.9	3.5	\$124.89	23	9,297.3	42.6	\$1,506.16
			24	1.6	5.0	770.9	3.5	\$124.89	19	9,297.3	42.6	\$1,506.16
			26									
			28									
			30									
			32									
34												
			≥36									
		loblolly pine sawtimber Total		28.4	52.5	8,094.6	37.1	\$1,311.33	343	97,621.2	447.0	\$15,814.64
		soft maple sawtimber	6									
			8									
			10									
			12									
			14	2.3	2.5	187.2	1.3	\$24.15	28	2,257.9	15.8	\$291.27
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		soft maple sawtimber Total		2.3	2.5	187.2	1.3	\$24.15	28	2,257.9	15.8	\$291.27

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
12.06		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	4.7	5.0	501.4	3.4	\$64.68	56	6,046.5	40.4	\$780.00
			16	1.8	2.5	250.7	1.7	\$32.34	22	3,023.3	20.2	\$390.00
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		sweetgum sawtimber Total		6.5	7.5	752.1	5.0	\$97.02	78	9,069.8	60.6	\$1,170.00
		willow oak sawtimber	6									
			8									
			10									
			12									
			14									
			16	1.8	2.5	268.8	2.0	\$51.61	22	3,241.9	24.5	\$622.44
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		willow oak sawtimber Total		1.8	2.5	268.8	2.0	\$51.61	22	3,241.9	24.5	\$622.44

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$			
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre							
11	37.60	Hardwood pulpwood	6	15.7	3.1	0.6	1.4	\$9.86	589	23.9	52.2	\$370.91			
			8	30.9	10.8	2.0	4.1	\$29.00	1,160	74.3	153.3	\$1,090.29			
			10	25.4	13.8	2.3	4.8	\$34.08	955	88.3	180.2	\$1,281.33			
			12	25.5	20.0	3.6	7.8	\$55.32	957	136.3	292.6	\$2,080.18			
			14												
			16												
			18												
			20												
			22												
			24												
			26												
			28												
			30												
			32												
			34												
			≥36												
					Hardwood pulpwood Total		97.4	47.7	8.6	18.0	\$128.26	3,661	322.8	678.3	\$4,822.71
					Softwood pulpwood	6	3.9	0.8	0.1	0.2	\$2.63	147	3.7	7.5	\$98.89
						8	8.8	3.1	0.4	0.8	\$10.52	331	14.7	30.1	\$395.57
			10												
			12												
			14												
			16												
			18												
			20												
			22												
			24												
			26												
			28												
			30												
			32												
			34												
			≥36												
		Softwood pulpwood Total		12.7	3.8	0.5	1.0	\$13.15	479	18.3	37.6	\$494.46			
		Chip-n-saw	6												
			8												
			10	4.2	2.3	135.8	0.7	\$15.89	159	5,105.9	26.7	\$597.39			
			12	4.9	3.8	226.3	1.2	\$26.48	184	8,509.9	44.6	\$995.65			
			14												
			16												
			18												
			20												
			22												
			24												
			26												
			28												
			30												
			32												
			34												
			≥36												
		Chip-n-saw Total		9.1	6.2	362.1	1.9	\$42.37	343	13,615.8	71.3	\$1,593.05			

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre	
37.60		loblolly pine sawtimber	6										
			8										
			10										
			12										
			14	8.6	9.2	1,423.2	6.5	\$230.56	325	53,513.5	245.1	\$8,669.19	
			16	14.3	20.0	3,083.7	14.1	\$499.55	539	115,945.9	531.0	\$18,783.24	
			18	13.1	23.1	3,558.1	16.3	\$576.41	491	133,783.8	612.6	\$21,672.97	
			20	6.3	13.8	2,134.8	9.8	\$345.85	239	80,270.3	367.6	\$13,003.78	
			22	2.9	7.7	1,186.0	5.4	\$192.14	110	44,594.6	204.2	\$7,224.32	
			24	1.0	3.1	474.4	2.2	\$76.85	37	17,837.8	81.7	\$2,889.73	
			26	0.8	3.1	474.4	2.2	\$76.85	31	17,837.8	81.7	\$2,889.73	
			28										
			30										
			32										
			34										
			≥36										
		loblolly pine sawtimber Total		47.1	80.0	12,334.7	56.5	\$1,998.22	1,771	463,783.7	2,123.8	\$75,132.95	
		red oak sawtimber	6										
			8										
			10										
			12										
			14										
			16	1.1	1.5	165.4	1.2	\$31.76	41	6,219.9	47.0	\$1,194.23	
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		red oak sawtimber Total		1.1	1.5	165.4	1.2	\$31.76	41	6,219.9	47.0	\$1,194.23	
		soft maple sawtimber	6										
			8										
			10										
			12										
			14	2.9	3.1	230.4	1.6	\$29.72	108	8,664.0	60.7	\$1,117.66	
			16	2.2	3.1	230.4	1.6	\$29.72	83	8,664.0	60.7	\$1,117.66	
			18										
			20	0.7	1.5	115.2	0.8	\$14.86	27	4,332.0	30.4	\$558.83	
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		soft maple sawtimber Total		5.8	7.7	576.1	4.0	\$74.31	218	21,660.1	151.9	\$2,794.15	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
37.60		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	4.3	4.6	462.8	3.1	\$59.70	162	17,401.4	116.3	\$2,244.78
			16	3.3	4.6	462.8	3.1	\$59.70	124	17,401.4	116.3	\$2,244.78
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		7.6	9.2	925.6	6.2	\$119.40	287	34,802.8	232.7	\$4,489.56
		water oak sawtimber	6									
			8									
			10									
			12									
			14	1.4	1.5	165.4	1.2	\$31.76	54	6,219.9	47.0	\$1,194.23
			16	1.1	1.5	165.4	1.2	\$31.76	41	6,219.9	47.0	\$1,194.23
			18	1.7	3.1	330.8	2.5	\$63.52	65	12,439.9	93.9	\$2,388.46
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		water oak sawtimber Total		4.3	6.2	661.7	5.0	\$127.05	161	24,879.8	187.8	\$4,776.92
		willow oak sawtimber	6									
			8									
			10									
			12									
			14									
			16	1.1	1.5	165.4	1.2	\$31.76	41	6,219.9	47.0	\$1,194.23
			18									
			20	1.4	3.1	330.8	2.5	\$63.52	53	12,439.9	93.9	\$2,388.46
			22	0.6	1.5	165.4	1.2	\$31.76	22	6,219.9	47.0	\$1,194.23
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		willow oak sawtimber Total		3.1	6.2	661.7	5.0	\$127.05	116	24,879.8	187.8	\$4,776.92

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
12	11.03	Hardwood pulpwood	6									
			8	14.3	5.0	0.8	1.7	\$12.26	158	9.3	19.0	\$135.18
			10	9.2	5.0	0.8	1.7	\$12.26	101	9.3	19.0	\$135.18
			12									
			14									
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		Hardwood pulpwood Total		23.5	10.0	1.7	3.4	\$24.51	259	18.5	38.0	\$270.37
		Softwood pulpwood	6									
			8	71.6	25.0	3.2	6.5	\$85.48	790	35.0	71.8	\$942.83
			10									
			12									
			14									
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		Softwood pulpwood Total		71.6	25.0	3.2	6.5	\$85.48	790	35.0	71.8	\$942.83
		Chip-n-saw	6									
			8									
			10	73.3	40.0	2,353.8	12.3	\$275.39	809	25,962.3	136.0	\$3,037.59
			12	25.5	20.0	1,176.9	6.2	\$137.70	281	12,981.2	68.0	\$1,518.80
			14									
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		Chip-n-saw Total		98.8	60.0	3,530.7	18.5	\$413.09	1,090	38,943.5	204.0	\$4,556.39

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
11.03		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	14.0	15.0	2,312.8	10.6	\$374.67	155	25,509.6	116.8	\$4,132.56
			16									
			18	2.8	5.0	770.9	3.5	\$124.89	31	8,503.2	38.9	\$1,377.52
			20									
			22									
			24	1.6	5.0	770.9	3.5	\$124.89	18	8,503.2	38.9	\$1,377.52
			26									
			28									
			30									
			32									
34												
			≥36									
		loblolly pine sawtimber Total		18.5	25.0	3,854.6	17.7	\$624.44	204	42,516.1	194.7	\$6,887.60
		soft maple sawtimber	6									
			8									
			10									
			12									
			14	4.7	5.0	374.4	2.6	\$48.30	52	4,130.1	29.0	\$532.78
			16	3.6	5.0	374.4	2.6	\$48.30	39	4,130.1	29.0	\$532.78
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		soft maple sawtimber Total		8.3	10.0	748.9	5.3	\$96.61	91	8,260.2	57.9	\$1,065.57
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	4.7	5.0	501.4	3.4	\$64.68	52	5,530.1	37.0	\$713.38
			16									
			18	2.8	5.0	501.4	3.4	\$64.68	31	5,530.1	37.0	\$713.38
			20									
			22	1.9	5.0	501.4	3.4	\$64.68	21	5,530.1	37.0	\$713.38
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		9.4	15.0	1,504.1	10.1	\$194.03	104	16,590.3	110.9	\$2,140.15

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre	
13	6.83	Hardwood pulpwood	6										
			8	57.3	20.0	3.5	7.0	\$49.70	391	23.7	47.7	\$339.44	
			10	64.2	35.0	6.0	12.2	\$86.69	438	41.2	83.3	\$592.11	
			12	50.9	40.0	7.0	14.0	\$99.62	348	47.7	95.7	\$680.43	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
34													
			≥36										
		Hardwood pulpwood Total		172.4	95.0	16.5	33.2	\$236.01	1,177	112.6	226.7	\$1,611.98	
		sweetgum sawtimber	6										
			8										
			10										
			12										
			14	23.4	25.0	2,506.8	16.8	\$323.38	160	17,121.8	114.5	\$2,208.71	
			16	7.2	10.0	1,002.7	6.7	\$129.35	49	6,848.7	45.8	\$883.48	
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		sweetgum sawtimber Total		30.5	35.0	3,509.6	23.5	\$452.74	209	23,970.5	160.3	\$3,092.19	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre					
14	14.34	Hardwood pulpwood	6	17.0	3.3	0.8	1.9	\$13.20	243	11.8	26.6	\$189.33	
			8	28.6	10.0	2.2	4.9	\$34.58	411	31.5	69.7	\$495.82	
			10	42.8	23.3	4.7	10.2	\$72.29	613	67.3	145.8	\$1,036.65	
			12	21.2	16.7	3.4	7.2	\$51.22	304	48.3	103.3	\$734.46	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
34													
			≥36										
		Hardwood pulpwood Total		109.6	53.3	11.1	24.1	\$171.29	1,572	158.9	345.5	\$2,456.26	
		blackgum sawtimber	6										
			8										
			10										
			12										
			14	3.1	3.3	276.7	2.4	\$35.70	45	3,968.5	34.5	\$511.93	
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		blackgum sawtimber Total		3.1	3.3	276.7	2.4	\$35.70	45	3,968.5	34.5	\$511.93	
		loblolly pine sawtimber	6										
			8										
			10										
			12										
			14	6.2	6.7	1,027.9	4.7	\$166.52	89	14,739.9	67.5	\$2,387.87	
			16	2.4	3.3	513.9	2.4	\$83.26	34	7,370.0	33.7	\$1,193.93	
			18	13.2	23.3	3,597.6	16.5	\$582.81	189	51,589.8	236.2	\$8,357.54	
			20	3.1	6.7	1,027.9	4.7	\$166.52	44	14,739.9	67.5	\$2,387.87	
			22	3.8	10.0	1,541.8	7.1	\$249.78	54	22,109.9	101.2	\$3,581.80	
			24	1.1	3.3	513.9	2.4	\$83.26	15	7,370.0	33.7	\$1,193.93	
			26										
			28										
			30										
			32										
			34										
			≥36										
		loblolly pine sawtimber Total		29.7	53.3	8,223.1	37.7	\$1,332.14	426	117,919.5	540.0	\$19,102.95	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
14.34		soft maple sawtimber	6									
			8									
			10									
			12									
			14	9.4	10.0	748.9	5.3	\$96.61	134	10,739.0	75.3	\$1,385.33
			16									
			18	1.9	3.3	249.6	1.8	\$32.20	27	3,579.7	25.1	\$461.78
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		soft maple sawtimber Total		11.2	13.3	998.5	7.0	\$128.81	161	14,318.7	100.4	\$1,847.11
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	6.2	6.7	668.5	4.5	\$86.24	89	9,586.2	64.1	\$1,236.62
			16	4.8	6.7	668.5	4.5	\$86.24	68	9,586.2	64.1	\$1,236.62
			18	5.7	10.0	1,002.7	6.7	\$129.35	81	14,379.3	96.1	\$1,854.93
			20	6.1	13.3	1,337.0	8.9	\$172.47	88	19,172.4	128.2	\$2,473.24
			22	1.3	3.3	334.2	2.2	\$43.12	18	4,793.1	32.0	\$618.31
			24	1.1	3.3	334.2	2.2	\$43.12	15	4,793.1	32.0	\$618.31
			26									
			28									
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		25.1	43.3	4,345.2	29.1	\$560.53	360	62,310.3	416.6	\$8,038.02

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
15	13.69	Hardwood pulpwood	6									
			8									
			10	9.2	5.0	0.8	1.7	\$12.26	126	11.5	23.6	\$167.78
			12	6.4	5.0	0.9	1.8	\$12.48	87	12.0	24.0	\$170.87
			14									
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		Hardwood pulpwood Total		15.5	10.0	1.7	3.5	\$24.74	213	23.5	47.6	\$338.65
		Chip-n-saw	6									
			8									
			10	27.5	15.0	882.7	4.6	\$103.27	377	12,083.8	63.3	\$1,413.80
			12	6.4	5.0	294.2	1.5	\$34.42	87	4,027.9	21.1	\$471.27
			14									
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		Chip-n-saw Total		33.9	20.0	1,176.9	6.2	\$137.70	464	16,111.7	84.4	\$1,885.07
		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	28.1	30.0	4,625.5	21.2	\$749.33	384	63,323.1	290.0	\$10,258.35
			16	21.5	30.0	4,625.5	21.2	\$749.33	294	63,323.1	290.0	\$10,258.35
			18	19.8	35.0	5,396.4	24.7	\$874.22	271	73,877.0	338.3	\$11,968.07
			20	13.8	30.0	4,625.5	21.2	\$749.33	188	63,323.1	290.0	\$10,258.35
			22									
			24	3.2	10.0	1,541.8	7.1	\$249.78	44	21,107.7	96.7	\$3,419.45
			26									
			28									
			30									
			32									
			34									
			≥36									
		loblolly pine sawtimber Total		86.3	135.0	20,814.8	95.3	\$3,371.99	1,181	284,954.1	1,304.9	\$46,162.56

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
13.69		soft maple sawtimber	6									
			8									
			10									
			12									
			14	4.7	5.0	374.4	2.6	\$48.30	64	5,126.1	35.9	\$661.27
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		soft maple sawtimber Total		4.7	5.0	374.4	2.6	\$48.30	64	5,126.1	35.9	\$661.27
		willow oak sawtimber	6									
			8									
			10									
			12									
			14	4.7	5.0	537.6	4.1	\$103.22	64	7,360.1	55.6	\$1,413.14
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		willow oak sawtimber Total		4.7	5.0	537.6	4.1	\$103.22	64	7,360.1	55.6	\$1,413.14

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
16	9.94	Hardwood pulpwood	6	20.4	4.0	0.7	1.4	\$9.80	202	6.7	13.7	\$97.46		
			8	45.8	16.0	2.7	5.5	\$39.40	456	27.0	55.1	\$391.63		
			10	40.3	22.0	3.7	7.6	\$54.11	401	37.0	75.6	\$537.82		
			12	33.1	26.0	4.4	9.0	\$64.00	329	43.8	89.5	\$636.17		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		139.6	68.0	11.5	23.5	\$167.31	1,388	114.5	233.9	$1,663.07
		Softwood pulpwood	6											
			8	11.5	4.0	0.5	1.0	\$13.68	114	5.0	10.3	\$135.94		
			10											
			12											
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Softwood pulpwood Total		11.5	4.0	0.5	1.0	\$13.68	114	5.0	10.3	\$135.94		
		Chip-n-saw	6											
			8											
			10											
			12	5.1	4.0	235.4	1.2	\$27.54	51	2,339.7	12.3	\$273.74		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		5.1	4.0	235.4	1.2	\$27.54	51	2,339.7	12.3	\$273.74		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
9.94		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	3.7	4.0	616.7	2.8	\$99.91	37	6,130.3	28.1	\$993.11
			16	14.3	20.0	3,083.7	14.1	\$499.55	142	30,651.7	140.4	\$4,965.57
			18	6.8	12.0	1,850.2	8.5	\$299.73	67	18,391.0	84.2	\$2,979.34
			20	1.8	4.0	616.7	2.8	\$99.91	18	6,130.3	28.1	\$993.11
			22									
			24									
			26									
			28									
			30									
			loblolly pine sawtimber Total				26.7	40.0	6,167.3	28.2	\$999.11	265	61,303.3	280.7	$9,931.14
		soft maple sawtimber	6									
			8									
			10									
			12									
			14	3.7	4.0	299.6	2.1	\$38.64	37	2,977.6	20.9	\$384.11
			16	2.9	4.0	299.6	2.1	\$38.64	28	2,977.6	20.9	\$384.11
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			soft maple sawtimber Total				6.6	8.0	599.1	4.2	\$77.28	66	5,955.1	41.8	$768.21
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	1.9	2.0	200.5	1.3	\$25.87	19	1,993.4	13.3	\$257.15
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			sweetgum sawtimber Total				1.9	2.0	200.5	1.3	\$25.87	19	1,993.4	13.3	$257.15

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
9.94	willow oak	sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18									
			20									
			22									
			24									
			26									
			28	0.9	4.0	430.1	3.2	\$82.58	9	4,275.2	32.3	\$820.84
			30									
32												
34												
		≥36										
		willow oak sawtimber Total		0.9	4.0	430.1	3.2	\$82.58	9	4,275.2	32.3	\$820.84

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre	
17	9.93	Hardwood pulpwood	6										
			8	76.4	26.7	4.5	9.2	\$65.36	759	44.4	91.3	\$649.07	
			10	97.8	53.3	9.0	18.4	\$131.03	971	89.4	183.0	\$1,301.13	
			12	8.5	6.7	1.1	2.3	\$16.34	84	11.1	22.8	\$162.27	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
					Hardwood pulpwood Total		182.7	86.7	14.6	29.9	\$212.74	1,814	145.0	297.1	$2,112.47
		loblolly pine sawtimber	6										
			8										
			10										
			12										
			14	6.2	6.7	1,027.9	4.7	\$166.52	62	10,206.9	46.7	\$1,653.52	
			16	9.5	13.3	2,055.8	9.4	\$333.04	95	20,413.9	93.5	\$3,307.05	
			18	7.5	13.3	2,055.8	9.4	\$333.04	75	20,413.9	93.5	\$3,307.05	
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		loblolly pine sawtimber Total		23.3	33.3	5,139.4	23.5	\$832.59	232	51,034.7	233.7	\$8,267.62	
		soft maple sawtimber	6										
			8										
			10										
			12										
			14										
			16										
			18										
			20	3.1	6.7	499.3	3.5	\$64.40	30	4,957.6	34.8	\$639.53	
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		soft maple sawtimber Total		3.1	6.7	499.3	3.5	\$64.40	30	4,957.6	34.8	\$639.53	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
18	52.33	Hardwood pulpwood	6	17.0	3.3	0.6	1.2	\$8.27	888	30.2	60.9	\$432.80		
			8	15.9	5.6	1.0	2.0	\$13.87	833	51.0	102.1	\$725.70		
			10	28.5	15.6	2.8	5.7	\$40.31	1,492	145.6	296.7	\$2,109.28		
			12	26.9	21.1	4.0	8.8	\$62.75	1,407	207.5	461.8	\$3,283.58		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		88.3	45.6	8.3	17.6	\$125.19	4,620	434.4	921.4	$6,551.37
		blackgum sawtimber	6											
			8											
			10											
			12											
			14											
			16	1.6	2.2	184.5	1.6	\$23.80	83	9,654.6	83.9	\$1,245.44		
			18	1.3	2.2	184.5	1.6	\$23.80	66	9,654.6	83.9	\$1,245.44		
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		blackgum sawtimber Total		2.8	4.4	369.0	3.2	\$47.60	149	19,309.2	167.9	\$2,490.88		
		laurel oak sawtimber	6											
			8											
			10											
			12											
			14	1.0	1.1	81.0	0.8	\$15.55	54	4,238.5	43.8	\$813.78		
			16	2.4	3.3	243.0	2.5	\$46.65	125	12,715.4	131.4	\$2,441.35		
			18	3.8	6.7	486.0	5.0	\$93.31	197	25,430.7	262.8	\$4,882.70		
			20	1.5	3.3	243.0	2.5	\$46.65	80	12,715.4	131.4	\$2,441.35		
			22	0.8	2.2	162.0	1.7	\$31.10	44	8,476.9	87.6	\$1,627.57		
			24	0.7	2.2	162.0	1.7	\$31.10	37	8,476.9	87.6	\$1,627.57		
			26	0.3	1.1	81.0	0.8	\$15.55	16	4,238.5	43.8	\$813.78		
			28											
			30	0.2	1.1	81.0	0.8	\$15.55	12	4,238.5	43.8	\$813.78		
			32											
			34											
			≥36											
		laurel oak sawtimber Total		10.8	21.1	1,538.9	15.9	\$295.47	565	80,530.7	832.2	\$15,461.88		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
52.33		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14									
			16	3.2	4.4	685.3	3.1	\$111.01	167	35,859.6	164.2	\$5,809.26
			18	5.0	8.9	1,370.5	6.3	\$222.02	263	71,719.3	328.4	\$11,618.52
			20									
			22	2.1	5.6	856.6	3.9	\$138.77	110	44,824.5	205.3	\$7,261.58
			24	2.1	6.7	1,027.9	4.7	\$166.52	111	53,789.4	246.3	\$8,713.89
			26	1.8	6.7	1,027.9	4.7	\$166.52	95	53,789.4	246.3	\$8,713.89
			28									
			30	0.2	1.1	171.3	0.8	\$27.75	12	8,964.9	41.1	\$1,452.32
			32									
			34									
			≥36									
		loblolly pine sawtimber Total		14.5	33.3	5,139.4	23.5	\$832.59	757	268,947.2	1,231.6	\$43,569.45
		red oak sawtimber	6									
			8									
			10									
			12									
			14	2.1	2.2	238.9	1.8	\$45.88	109	12,504.0	94.4	\$2,400.77
			16	2.4	3.3	358.4	2.7	\$68.82	125	18,756.0	141.6	\$3,601.16
			18									
			20									
			22	0.8	2.2	238.9	1.8	\$45.88	44	12,504.0	94.4	\$2,400.77
			24	0.4	1.1	119.5	0.9	\$22.94	19	6,252.0	47.2	\$1,200.39
			26									
			28	0.3	1.1	119.5	0.9	\$22.94	14	6,252.0	47.2	\$1,200.39
			30									
			32									
			34									
			≥36									
		red oak sawtimber Total		5.9	10.0	1,075.3	8.1	\$206.45	310	56,268.1	424.8	\$10,803.48
		soft maple sawtimber	6									
			8									
			10									
			12									
			14	2.1	2.2	166.4	1.2	\$21.47	109	8,708.7	61.1	\$1,123.42
			16	3.2	4.4	332.8	2.3	\$42.94	167	17,417.4	122.1	\$2,246.84
			18	1.9	3.3	249.6	1.8	\$32.20	99	13,063.0	91.6	\$1,685.13
			20									
			22	1.3	3.3	249.6	1.8	\$32.20	66	13,063.0	91.6	\$1,685.13
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		soft maple sawtimber Total		8.4	13.3	998.5	7.0	\$128.81	440	52,252.2	366.4	\$6,740.53

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
52.33		swamp chestnut oak sawtimber	6									
			8									
			10									
			12									
			14									
			16	0.8	1.1	119.5	0.9	\$22.94	42	6,252.0	47.2	\$1,200.39
			18									
			20									
			22	0.4	1.1	119.5	0.9	\$22.94	22	6,252.0	47.2	\$1,200.39
			24	0.4	1.1	119.5	0.9	\$22.94	19	6,252.0	47.2	\$1,200.39
			26									
			28									
			30									
			32									
34												
			≥36									
		swamp chestnut oak sawtimber Total		1.6	3.3	358.4	2.7	\$68.82	82	18,756.0	141.6	\$3,601.16
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	11.4	12.2	1,225.6	8.2	\$158.10	598	64,134.1	428.8	\$8,273.30
			16	8.8	12.2	1,225.6	8.2	\$158.10	458	64,134.1	428.8	\$8,273.30
			18	1.3	2.2	222.8	1.5	\$28.75	66	11,660.8	78.0	\$1,504.24
			20	0.5	1.1	111.4	0.7	\$14.37	27	5,830.4	39.0	\$752.12
			22	0.4	1.1	111.4	0.7	\$14.37	22	5,830.4	39.0	\$752.12
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		22.4	28.9	2,896.8	19.4	\$373.69	1,171	151,589.8	1,013.5	\$19,555.08

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre					
19	9.96	Hardwood pulpwood	6										
			8	128.9	45.0	7.8	15.7	\$111.65	1,284	77.5	156.4	\$1,112.07	
			10	64.2	35.0	6.0	12.2	\$86.47	639	59.7	121.1	\$861.21	
			12	50.9	40.0	6.9	13.9	\$99.17	507	68.8	138.9	\$987.76	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
					Hardwood pulpwood Total		244.0	120.0	20.7	41.8	\$297.29	2,430	206.0	416.5	$2,961.05
		baldcypress sawtimber	6										
			8										
			10										
			12										
			14										
			16	7.2	10.0	1,002.7	6.7	\$129.35	71	9,987.3	66.8	\$1,288.36	
			18	2.8	5.0	501.4	3.4	\$64.68	28	4,993.6	33.4	\$644.18	
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		baldcypress sawtimber Total		10.0	15.0	1,504.1	10.1	\$194.03	100	14,980.9	100.2	\$1,932.54	
		loblolly pine sawtimber	6										
			8										
			10										
			12										
			14										
			16										
			18										
			20	4.6	10.0	1,541.8	7.1	\$249.78	46	15,356.7	70.3	\$2,487.78	
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		loblolly pine sawtimber Total		4.6	10.0	1,541.8	7.1	\$249.78	46	15,356.7	70.3	\$2,487.78	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
9.96		soft maple sawtimber	6									
			8									
			10									
			12									
			14	9.4	10.0	748.9	5.3	\$96.61	93	7,458.9	52.3	\$962.20
			16	3.6	5.0	374.4	2.6	\$48.30	36	3,729.4	26.1	\$481.10
			18	5.7	10.0	748.9	5.3	\$96.61	56	7,458.9	52.3	\$962.20
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		soft maple sawtimber Total		18.6	25.0	1,872.2	13.1	\$241.52	185	18,647.2	130.7	\$2,405.49
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	9.4	10.0	1,002.7	6.7	\$129.35	93	9,987.3	66.8	\$1,288.36
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		9.4	10.0	1,002.7	6.7	\$129.35	93	9,987.3	66.8	\$1,288.36

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
20	24.92	Hardwood pulpwood	6	14.6	2.9	0.5	1.0	\$7.00	363	12.0	24.5	\$174.52		
			8	90.0	31.4	5.4	10.9	\$77.68	2,244	134.2	272.3	\$1,935.80		
			10	47.1	25.7	4.4	8.9	\$63.42	1,175	109.2	222.3	\$1,580.34		
			12	25.5	20.0	3.6	7.6	\$53.72	635	90.9	188.3	\$1,338.77		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		177.2	80.0	13.9	28.4	\$201.82	4,416	346.2	707.4	$5,029.43
		baldcypress sawtimber	6											
			8											
			10											
			12											
			14	10.7	11.4	1,146.0	7.7	\$147.83	266	28,558.0	190.9	\$3,683.99		
			16	12.3	17.1	1,719.0	11.5	\$221.75	306	42,837.0	286.4	\$5,525.98		
			18	4.9	8.6	859.5	5.7	\$110.87	121	21,418.5	143.2	\$2,762.99		
			20	1.3	2.9	286.5	1.9	\$36.96	33	7,139.5	47.7	\$921.00		
			22	1.1	2.9	286.5	1.9	\$36.96	27	7,139.5	47.7	\$921.00		
			24	1.8	5.7	573.0	3.8	\$73.92	45	14,279.0	95.5	\$1,841.99		
			26											
			28											
			30											
			32											
			34											
			≥36											
		baldcypress sawtimber Total		32.0	48.6	4,870.5	32.6	\$628.29	798	121,371.6	811.4	\$15,656.94		
		green ash sawtimber	6											
			8											
			10											
			12											
			14	5.3	5.7	427.9	3.0	\$55.20	133	10,664.1	74.8	\$1,375.67		
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		green ash sawtimber Total		5.3	5.7	427.9	3.0	\$55.20	133	10,664.1	74.8	\$1,375.67		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
24.92		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18									
			20	2.6	5.7	881.0	4.0	\$142.73	65	21,955.7	100.5	\$3,556.83
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		loblolly pine sawtimber Total		2.6	5.7	881.0	4.0	\$142.73	65	21,955.7	100.5	\$3,556.83
		soft maple sawtimber	6									
			8									
			10									
			12									
			14	2.7	2.9	214.0	1.5	\$27.60	67	5,332.1	37.4	\$687.84
			16									
			18	3.2	5.7	427.9	3.0	\$55.20	81	10,664.1	74.8	\$1,375.67
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		soft maple sawtimber Total		5.9	8.6	641.9	4.5	\$82.81	147	15,996.2	112.2	\$2,063.51
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14	5.3	5.7	573.0	3.8	\$73.92	133	14,279.0	95.5	\$1,841.99
			16									
			18									
			20									
			22	1.1	2.9	286.5	1.9	\$36.96	27	7,139.5	47.7	\$921.00
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		6.4	8.6	859.5	5.7	\$110.87	160	21,418.5	143.2	\$2,762.99

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre					
21	12.17	Hardwood pulpwood	6	34.0	6.7	1.1	2.3	\$16.42	413	13.8	28.1	\$199.79	
			8	81.2	28.3	4.8	9.8	\$69.68	988	58.3	119.3	\$847.95	
			10	45.8	25.0	4.3	8.7	\$61.80	558	52.2	105.8	\$752.17	
			12	4.2	3.3	0.6	1.2	\$8.25	52	7.0	14.1	\$100.35	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
34													
			≥36										
		Hardwood pulpwood Total		165.2	63.3	10.8	22.0	\$156.14	2,011	131.2	267.3	\$1,900.25	
		soft maple sawtimber	6										
			8										
			10										
			12										
			14										
			16	1.2	1.7	124.8	0.9	\$16.10	15	1,519.0	10.7	\$195.95	
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		soft maple sawtimber Total		1.2	1.7	124.8	0.9	\$16.10	15	1,519.0	10.7	\$195.95	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
22	5.53	Hardwood pulpwood	6									
			8									
			10	24.4	13.3	2.2	4.6	\$32.68	135	12.4	25.4	\$180.73
			12									
			14									
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		Hardwood pulpwood Total		24.4	13.3	2.2	4.6	\$32.68	135	12.4	25.4	\$180.73
		Chip-n-saw	6									
			8									
			10									
			12	25.5	20.0	1,176.9	6.2	\$137.70	141	6,508.2	34.1	\$761.46
			14									
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		Chip-n-saw Total		25.5	20.0	1,176.9	6.2	\$137.70	141	6,508.2	34.1	\$761.46
		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	18.7	20.0	3,083.7	14.1	\$499.55	103	17,052.7	78.1	\$2,762.53
			16	14.3	20.0	3,083.7	14.1	\$499.55	79	17,052.7	78.1	\$2,762.53
			18	11.3	20.0	3,083.7	14.1	\$499.55	63	17,052.7	78.1	\$2,762.53
			20									
			22	2.5	6.7	1,027.9	4.7	\$166.52	14	5,684.2	26.0	\$920.84
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		loblolly pine sawtimber Total		46.9	66.7	10,278.9	47.1	\$1,665.18	259	56,842.3	260.3	\$9,208.45

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
5.53	soft maple sawtimber	6										
		8										
		10										
		12										
		14	6.2	6.7	499.3	3.5	\$64.40	34	2,760.9	19.4	\$356.15	
		16										
		18										
		20										
		22										
		24										
		26										
		28										
		30										
		32										
34												
			≥36									
soft maple sawtimber Total				6.2	6.7	499.3	3.5	\$64.40	34	2,760.9	19.4	\$356.15

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$			
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre		
23	12.80	Hardwood pulpwood	6											
			8	28.6	10.0	1.7	3.5	\$24.74	367	22.0	44.5	\$316.63		
			10	18.3	10.0	1.7	3.5	\$24.74	235	22.0	44.5	\$316.63		
			12	44.6	35.0	6.0	12.2	\$86.69	570	77.2	156.1	\$1,109.66		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		91.5	55.0	9.5	19.2	\$136.17	1,172	121.1	245.1	$1,742.92
		baldcypress sawtimber	6											
			8											
			10											
			12											
			14	23.4	25.0	2,506.8	16.8	\$323.38	299	32,087.7	214.5	\$4,139.31		
			16	25.1	35.0	3,509.6	23.5	\$452.74	321	44,922.7	300.3	\$5,795.03		
			18											
			20	6.9	15.0	1,504.1	10.1	\$194.03	88	19,252.6	128.7	\$2,483.59		
			22	5.7	15.0	1,504.1	10.1	\$194.03	73	19,252.6	128.7	\$2,483.59		
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		baldcypress sawtimber Total		61.0	90.0	9,024.7	60.3	\$1,164.18	781	115,515.6	772.3	\$14,901.52		
		soft maple sawtimber	6											
			8											
			10											
			12											
			14	4.7	5.0	374.4	2.6	\$48.30	60	4,792.9	33.6	\$618.28		
			16	3.6	5.0	374.4	2.6	\$48.30	46	4,792.9	33.6	\$618.28		
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		soft maple sawtimber Total		8.3	10.0	748.9	5.3	\$96.61	106	9,585.7	67.2	\$1,236.56		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					
12.80	sweetgum sawtimber	6										
		8										
		10										
		12										
		14	4.7	5.0	501.4	3.4	\$64.68	60	6,417.5	42.9	\$827.86	
		16	3.6	5.0	501.4	3.4	\$64.68	46	6,417.5	42.9	\$827.86	
		18										
		20	2.3	5.0	501.4	3.4	\$64.68	29	6,417.5	42.9	\$827.86	
		22										
		24										
		26										
		28										
		30										
		32										
34												
		≥36										
sweetgum sawtimber Total				10.6	15.0	1,504.1	10.1	\$194.03	135	19,252.6	128.7	\$2,483.59

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
24	20.87	Hardwood pulpwood	6	34.0	6.7	1.1	2.3	\$16.49	709	23.9	48.4	\$344.17		
			8	38.2	13.3	2.3	4.6	\$32.83	797	47.2	96.4	\$685.22		
			10	24.4	13.3	2.3	4.6	\$32.98	510	47.8	96.8	\$688.35		
			12	29.7	23.3	4.3	8.8	\$62.68	620	88.8	184.0	\$1,308.06		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		126.3	56.7	10.0	20.4	\$144.98	2,636	207.7	425.6	$3,025.80
		baldcypress sawtimber	6											
			8											
			10											
			12											
			14	24.9	26.7	2,674.0	17.9	\$344.94	521	55,805.8	373.1	\$7,198.95		
			16	19.1	26.7	2,674.0	17.9	\$344.94	399	55,805.8	373.1	\$7,198.95		
			18	9.4	16.7	1,671.2	11.2	\$215.59	197	34,878.6	233.2	\$4,499.34		
			20	7.6	16.7	1,671.2	11.2	\$215.59	159	34,878.6	233.2	\$4,499.34		
			22	3.8	10.0	1,002.7	6.7	\$129.35	79	20,927.2	139.9	\$2,699.61		
			24											
			26	1.8	6.7	668.5	4.5	\$86.24	38	13,951.5	93.3	\$1,799.74		
			28											
			30											
			32											
			34											
			≥36											
		baldcypress sawtimber Total		66.7	103.3	10,361.6	69.3	\$1,336.65	1,392	216,247.5	1,445.8	\$27,895.93		
		soft maple sawtimber	6											
			8											
			10											
			12											
			14											
			16											
			18	3.8	6.7	499.3	3.5	\$64.40	79	10,419.5	73.1	\$1,344.11		
			20											
			22	1.3	3.3	249.6	1.8	\$32.20	26	5,209.7	36.5	\$672.06		
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		soft maple sawtimber Total		5.0	10.0	748.9	5.3	\$96.61	105	15,629.2	109.6	\$2,016.17		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
20.87	sweetgum sawtimber	6										
		8										
		10										
		12										
		14	3.1	3.3	334.2	2.2	\$43.12	65	6,975.7	46.6	\$899.87	
		16	2.4	3.3	334.2	2.2	\$43.12	50	6,975.7	46.6	\$899.87	
		18										
		20										
		22										
		24	1.1	3.3	334.2	2.2	\$43.12	22	6,975.7	46.6	\$899.87	
		26										
		28										
		30										
		32										
34												
≥36												
sweetgum sawtimber Total				6.6	10.0	1,002.7	6.7	\$129.35	137	20,927.2	139.9	\$2,699.61

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre	
25	19.95	Hardwood pulpwood	6										
			8	28.6	10.0	1.7	3.5	\$24.74	572	34.3	69.4	\$493.50	
			10	18.3	10.0	1.7	3.5	\$24.74	366	34.3	69.4	\$493.50	
			12	15.9	12.5	2.2	4.4	\$30.98	318	43.0	86.9	\$618.00	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
					Hardwood pulpwood Total		62.9	32.5	5.6	11.3	\$80.45	1,255	111.5	225.7	$1,605.01
		Chip-n-saw	6										
			8										
			10										
			12	6.4	5.0	294.2	1.5	\$34.42	127	5,869.8	30.7	\$686.76	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		Chip-n-saw Total		6.4	5.0	294.2	1.5	\$34.42	127	5,869.8	30.7	\$686.76	
		baldcypress sawtimber	6										
			8										
			10										
			12										
			14	2.3	2.5	250.7	1.7	\$32.34	47	5,001.2	33.4	\$645.15	
			16	1.8	2.5	250.7	1.7	\$32.34	36	5,001.2	33.4	\$645.15	
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		baldcypress sawtimber Total		4.1	5.0	501.4	3.4	\$64.68	82	10,002.3	66.9	\$1,290.30	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre	
19.95		loblolly pine sawtimber	6										
			8										
			10										
			12										
			14	7.0	7.5	1,156.4	5.3	\$187.33	140	23,069.7	105.6	\$3,737.29	
			16	9.0	12.5	1,927.3	8.8	\$312.22	179	38,449.5	176.1	\$6,228.82	
			18	2.8	5.0	770.9	3.5	\$124.89	56	15,379.8	70.4	\$2,491.53	
			20	4.6	10.0	1,541.8	7.1	\$249.78	91	30,759.6	140.9	\$4,983.05	
			22	0.9	2.5	385.5	1.8	\$62.44	19	7,689.9	35.2	\$1,245.76	
			24	3.2	10.0	1,541.8	7.1	\$249.78	64	30,759.6	140.9	\$4,983.05	
			26										
			28										
			30										
			32										
			34										
			≥36										
					loblolly pine sawtimber Total		27.5	47.5	7,323.7	33.5	\$1,186.44	549	146,108.0	669.1	$23,669.50
		red oak sawtimber	6										
			8										
			10										
			12										
			14										
			16										
			18										
			20										
			22	0.9	2.5	268.8	2.0	\$51.61	19	5,362.8	40.5	\$1,029.67	
			24										
			26	0.7	2.5	268.8	2.0	\$51.61	14	5,362.8	40.5	\$1,029.67	
			28										
			30										
			32	0.4	2.5	268.8	2.0	\$51.61	9	5,362.8	40.5	\$1,029.67	
			34										
			≥36										
		red oak sawtimber Total		2.1	7.5	806.4	6.1	\$154.84	41	16,088.5	121.5	\$3,089.00	
		soft maple sawtimber	6										
			8										
			10										
			12										
			14										
			16	3.6	5.0	374.4	2.6	\$48.30	71	7,470.1	52.4	\$963.65	
			18										
			20										
			22	0.9	2.5	187.2	1.3	\$24.15	19	3,735.1	26.2	\$481.82	
			24										
			26										
			28										
			30										
			32										
			34										
			≥36										
		soft maple sawtimber Total		4.5	7.5	561.7	3.9	\$72.45	90	11,205.2	78.6	\$1,445.47	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
19.95	sweetgum sawtimber	6										
		8										
		10										
		12										
		14	16.4	17.5	1,754.8	11.7	\$226.37	327	35,008.2	234.1	\$4,516.05	
		16	12.5	17.5	1,754.8	11.7	\$226.37	250	35,008.2	234.1	\$4,516.05	
		18	1.4	2.5	250.7	1.7	\$32.34	28	5,001.2	33.4	\$645.15	
		20	2.3	5.0	501.4	3.4	\$64.68	46	10,002.3	66.9	\$1,290.30	
		22	1.9	5.0	501.4	3.4	\$64.68	38	10,002.3	66.9	\$1,290.30	
		24										
		26										
		28										
		30										
		32										
		34										
		≥36										
sweetgum sawtimber Total				34.5	47.5	4,763.0	31.8	\$614.43	688	95,022.1	635.3	\$12,257.86

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
26	6.94	Hardwood pulpwood	6	40.7	8.0	1.4	2.8	\$19.79	283	9.5	19.3	\$137.34		
			8	80.2	28.0	5.1	10.6	\$75.21	557	35.4	73.4	\$521.97		
			10	58.7	32.0	5.9	12.0	\$85.56	407	40.7	83.5	\$593.77		
			12	61.1	48.0	8.7	17.7	\$125.50	424	60.2	122.5	\$870.95		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		240.7	116.0	21.0	43.0	\$306.06	1,671	145.9	298.7	$2,124.02
		baldcypress sawtimber	6											
			8											
			10											
			12											
			14	18.7	20.0	2,005.5	13.4	\$258.71	130	13,918.0	93.1	\$1,795.43		
			16	31.5	44.0	4,412.1	29.5	\$569.16	219	30,619.7	204.7	\$3,949.94		
			18	11.3	20.0	2,005.5	13.4	\$258.71	79	13,918.0	93.1	\$1,795.43		
			20	1.8	4.0	401.1	2.7	\$51.74	13	2,783.6	18.6	\$359.09		
			22	1.5	4.0	401.1	2.7	\$51.74	11	2,783.6	18.6	\$359.09		
			24											
			26	1.1	4.0	401.1	2.7	\$51.74	8	2,783.6	18.6	\$359.09		
			28											
			30											
			32											
			34											
			≥36											
		baldcypress sawtimber Total		66.0	96.0	9,626.3	64.4	\$1,241.79	458	66,806.5	446.6	\$8,618.04		
		blackgum sawtimber	6											
			8											
			10											
			12											
			14	3.7	4.0	332.1	2.9	\$42.84	26	2,304.7	20.0	\$297.31		
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		blackgum sawtimber Total		3.7	4.0	332.1	2.9	\$42.84	26	2,304.7	20.0	\$297.31		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
6.94		soft maple sawtimber	6									
			8									
			10									
			12									
			14	3.7	4.0	299.6	2.1	\$38.64	26	2,078.9	14.6	\$268.18
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		soft maple sawtimber Total		3.7	4.0	299.6	2.1	\$38.64	26	2,078.9	14.6	\$268.18
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14									
			16	2.9	4.0	401.1	2.7	\$51.74	20	2,783.6	18.6	\$359.09
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		2.9	4.0	401.1	2.7	\$51.74	20	2,783.6	18.6	\$359.09

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				\$/acre	Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre							
27	19.21	Hardwood pulpwood	6	12.7	2.5	0.4	0.9	\$6.24	245	8.4	16.9	\$119.88		
			8	71.6	25.0	4.3	8.7	\$61.62	1,376	81.7	166.5	\$1,183.67		
			10	50.4	27.5	4.7	9.5	\$67.75	969	89.8	183.0	\$1,301.39		
			12	47.7	37.5	6.6	13.5	\$96.26	917	126.5	260.1	\$1,849.09		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		182.5	92.5	16.0	32.6	\$231.86	3,506	306.4	626.4	$4,454.02
		Chip-n-saw	6											
			8											
			10											
			12	3.2	2.5	147.1	0.8	\$17.21	61	2,826.0	14.8	\$330.64		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		3.2	2.5	147.1	0.8	\$17.21	61	2,826.0	14.8	\$330.64		
		baldcypress sawtimber	6											
			8											
			10											
			12											
			14											
			16	7.2	10.0	1,002.7	6.7	\$129.35	138	19,262.6	128.8	\$2,484.88		
			18	1.4	2.5	250.7	1.7	\$32.34	27	4,815.7	32.2	\$621.22		
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		baldcypress sawtimber Total		8.6	12.5	1,253.4	8.4	\$161.69	165	24,078.3	161.0	\$3,106.10		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					
19.21		blackgum sawtimber	6									
			8									
			10									
			12									
			14									
			16									
			18									
			20	1.1	2.5	207.6	1.8	\$26.77	22	3,987.2	34.7	\$514.34
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		blackgum sawtimber Total		1.1	2.5	207.6	1.8	\$26.77	22	3,987.2	34.7	\$514.34
		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	2.3	2.5	385.5	1.8	\$62.44	45	7,404.7	33.9	\$1,199.55
			16	5.4	7.5	1,156.4	5.3	\$187.33	103	22,214.0	101.7	\$3,598.66
			18	1.4	2.5	385.5	1.8	\$62.44	27	7,404.7	33.9	\$1,199.55
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		loblolly pine sawtimber Total		9.1	12.5	1,927.3	8.8	\$312.22	175	37,023.3	169.5	\$5,997.77
		soft maple sawtimber	6									
			8									
			10									
			12									
			14	7.0	7.5	561.7	3.9	\$72.45	135	10,789.6	75.7	\$1,391.85
			16	3.6	5.0	374.4	2.6	\$48.30	69	7,193.0	50.4	\$927.90
			18	1.4	2.5	187.2	1.3	\$24.15	27	3,596.5	25.2	\$463.95
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		soft maple sawtimber Total		12.0	15.0	1,123.3	7.9	\$144.91	231	21,579.1	151.3	\$2,783.71

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
19.21	sweetgum sawtimber	6										
		8										
		10										
		12										
		14										
		16										
		18	2.8	5.0	501.4	3.4	\$64.68	54	9,631.3	64.4	\$1,242.44	
		20										
		22										
		24										
		26										
		28										
		30										
		32										
34												
		≥36										
		sweetgum sawtimber Total		2.8	5.0	501.4	3.4	\$64.68	54	9,631.3	64.4	\$1,242.44

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre				
28	12.68	Softwood pulpwood	6									
			8	14.3	5.0	0.6	1.3	\$17.10	182	8.0	16.5	\$216.77
			10									
			12									
			14									
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		Softwood pulpwood Total		14.3	5.0	0.6	1.3	\$17.10	182	8.0	16.5	\$216.77
		Chip-n-saw	6									
			8									
			10	110.0	60.0	3,530.7	18.5	\$413.09	1,395	44,769.1	234.5	\$5,237.98
			12	31.8	25.0	1,471.1	7.7	\$172.12	404	18,653.8	97.7	\$2,182.49
			14									
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		Chip-n-saw Total		141.8	85.0	5,001.8	26.2	\$585.21	1,799	63,422.9	332.2	\$7,420.48
		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	9.4	10.0	1,541.8	7.1	\$249.78	119	19,550.5	89.5	\$3,167.17
			16	3.6	5.0	770.9	3.5	\$124.89	45	9,775.2	44.8	\$1,583.59
			18	2.8	5.0	770.9	3.5	\$124.89	36	9,775.2	44.8	\$1,583.59
			20	2.3	5.0	770.9	3.5	\$124.89	29	9,775.2	44.8	\$1,583.59
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		loblolly pine sawtimber Total		18.1	25.0	3,854.6	17.7	\$624.44	229	48,876.1	223.8	\$7,917.93

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
29	14.94	Hardwood pulpwood	6	20.4	4.0	0.7	1.4	\$9.80	304	10.0	20.6	\$146.48		
			8	34.4	12.0	2.0	4.2	\$29.59	514	30.6	62.2	\$442.14		
			10	36.7	20.0	3.4	6.9	\$49.20	548	50.6	103.4	\$735.11		
			12	10.2	8.0	1.4	2.8	\$19.70	152	20.3	41.4	\$294.31		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		101.6	44.0	7.5	15.2	\$108.30	1,518	111.5	227.6	$1,618.04
		Softwood pulpwood	6											
			8	11.5	4.0	0.5	1.0	\$13.68	171	7.6	15.6	\$204.33		
			10											
			12											
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Softwood pulpwood Total		11.5	4.0	0.5	1.0	\$13.68	171	7.6	15.6	\$204.33		
		Chip-n-saw	6											
			8											
			10	14.7	8.0	470.8	2.5	\$55.08	219	7,033.1	36.8	\$822.88		
			12	22.9	18.0	1,059.2	5.5	\$123.93	342	15,824.5	82.9	\$1,851.47		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		37.6	26.0	1,530.0	8.0	\$179.01	562	22,857.7	119.7	\$2,674.35		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
14.94		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	26.2	28.0	4,317.1	19.8	\$699.38	391	64,498.0	295.4	\$10,448.68
			16	18.6	26.0	4,008.8	18.4	\$649.42	278	59,891.0	274.3	\$9,702.34
			18	9.1	16.0	2,466.9	11.3	\$399.64	135	36,856.0	168.8	\$5,970.67
			20	4.6	10.0	1,541.8	7.1	\$249.78	68	23,035.0	105.5	\$3,731.67
			22	3.0	8.0	1,233.5	5.6	\$199.82	45	18,428.0	84.4	\$2,985.34
			24									
			26	1.1	4.0	616.7	2.8	\$99.91	16	9,214.0	42.2	\$1,492.67
			28									
			30									
			32									
34												
			≥36									
		loblolly pine sawtimber Total		62.6	92.0	14,184.9	65.0	\$2,297.95	935	211,922.0	970.5	\$34,331.36
		soft maple sawtimber	6									
			8									
			10									
			12									
			14	5.6	6.0	449.3	3.2	\$57.96	84	6,713.0	47.1	\$865.98
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		soft maple sawtimber Total		5.6	6.0	449.3	3.2	\$57.96	84	6,713.0	47.1	\$865.98
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14									
			16	1.4	2.0	200.5	1.3	\$25.87	21	2,996.2	20.0	\$386.51
			18	1.1	2.0	200.5	1.3	\$25.87	17	2,996.2	20.0	\$386.51
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		2.6	4.0	401.1	2.7	\$51.74	38	5,992.4	40.1	\$773.02

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre					
30	9.55	Hardwood pulpwood	6	17.0	3.3	0.6	1.2	\$8.32	162	5.6	11.2	\$79.46	
			8										
			10										
			12	8.5	6.7	1.2	2.3	\$16.64	81	11.2	22.4	\$158.93	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
34													
		Hardwood pulpwood Total	≥36	25.5	10.0	1.8	3.5	\$24.96	243	16.8	33.5	\$238.39	
		Softwood pulpwood	6										
			8	9.5	3.3	0.4	0.9	\$11.40	91	4.0	8.3	\$108.84	
			10										
			12										
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
		Softwood pulpwood Total	≥36	9.5	3.3	0.4	0.9	\$11.40	91	4.0	8.3	\$108.84	
		Chip-n-saw	6										
			8										
			10	30.6	16.7	980.7	5.1	\$114.75	292	9,366.1	49.1	\$1,095.84	
			12	29.7	23.3	1,373.0	7.2	\$160.65	284	13,112.6	68.7	\$1,534.17	
			14										
			16										
			18										
			20										
			22										
			24										
			26										
			28										
			30										
			32										
			34										
		Chip-n-saw Total	≥36	60.3	40.0	2,353.8	12.3	\$275.39	576	22,478.7	117.7	\$2,630.01	

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
9.55	loblolly pine sawtimber	6										
		8										
		10										
		12										
		14	21.8	23.3	3,597.6	16.5	\$582.81	208	34,357.2	157.3	\$5,565.87	
		16	31.0	43.3	6,681.3	30.6	\$1,082.37	296	63,806.2	292.2	\$10,336.61	
		18	9.4	16.7	2,569.7	11.8	\$416.30	90	24,540.9	112.4	\$3,975.62	
		20										
		22										
		24										
		26										
		28										
		30										
		32										
34												
			≥36									
		loblolly pine sawtimber Total		62.3	83.3	12,848.6	58.8	\$2,081.48	595	122,704.3	561.9	\$19,878.09

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
31	14.70	Hardwood pulpwood	6	43.7	8.6	1.5	3.0	\$21.40	642	22.1	44.2	\$314.52		
			8	16.4	5.7	1.0	2.0	\$14.14	241	14.4	29.2	\$207.79		
			10	5.2	2.9	0.5	1.0	\$7.13	77	7.4	14.7	\$104.84		
			12											
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		65.3	17.1	3.0	6.0	\$42.66	959	43.9	88.2	$627.15
		Softwood pulpwood	6	29.1	5.7	0.7	1.5	\$19.54	428	10.7	21.9	\$287.21		
			8	73.7	25.7	3.3	6.7	\$87.92	1,083	47.9	98.4	\$1,292.43		
			10											
			12											
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Softwood pulpwood Total		102.8	31.4	4.0	8.2	\$107.46	1,511	58.6	120.2	\$1,579.64		
		Chip-n-saw	6											
			8											
			10	123.1	67.1	3,951.0	20.7	\$462.27	1,810	58,079.8	304.2	\$6,795.33		
			12	29.1	22.9	1,345.0	7.0	\$157.37	428	19,771.8	103.6	\$2,313.31		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		152.2	90.0	5,296.0	27.7	\$619.64	2,237	77,851.6	407.8	\$9,108.64		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
14.70		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	24.1	25.7	3,964.7	18.2	\$642.28	354	58,281.3	266.9	\$9,441.57
			16	12.3	17.1	2,643.1	12.1	\$428.19	180	38,854.2	177.9	\$6,294.38
			18	4.9	8.6	1,321.6	6.1	\$214.09	71	19,427.1	89.0	\$3,147.19
			20									
			22									
			24									
			26									
			28									
			30									
			32									
34												
			≥36									
		loblolly pine sawtimber Total		41.2	51.4	7,929.4	36.3	\$1,284.57	605	116,562.7	533.8	\$18,883.15
		soft maple sawtimber	6									
			8									
			10									
			12									
			14	2.7	2.9	214.0	1.5	\$27.60	39	3,145.3	22.1	\$405.75
			16									
			18									
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		soft maple sawtimber Total		2.7	2.9	214.0	1.5	\$27.60	39	3,145.3	22.1	\$405.75

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values					Total trees	Total volume	Total weight (t)	Total \$		
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre	\$/acre						
32	19.73	Hardwood pulpwood	6	10.2	2.0	0.4	0.7	\$4.99	201	6.9	13.9	\$98.50		
			8	2.9	1.0	0.2	0.3	\$2.45	57	3.3	6.8	\$48.36		
			10											
			12	1.3	1.0	0.2	0.4	\$2.50	25	3.5	6.9	\$49.25		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
						≥36								
					Hardwood pulpwood Total		14.3	4.0	0.7	1.4	\$9.94	283	13.7	27.6	$196.11
		Softwood pulpwood	6											
			8	74.5	26.0	3.3	6.8	\$88.90	1,470	65.1	133.5	\$1,753.95		
			10											
			12											
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Softwood pulpwood Total		74.5	26.0	3.3	6.8	\$88.90	1,470	65.1	133.5	\$1,753.95		
		Chip-n-saw	6											
			8											
			10	55.0	30.0	1,765.3	9.2	\$206.55	1,085	34,830.2	182.4	\$4,075.14		
			12	35.7	28.0	1,647.7	8.6	\$192.78	703	32,508.2	170.3	\$3,803.46		
			14											
			16											
			18											
			20											
			22											
			24											
			26											
			28											
			30											
			32											
			34											
			≥36											
		Chip-n-saw Total		90.7	58.0	3,413.0	17.9	\$399.32	1,789	67,338.4	352.7	\$7,878.60		

DNA Forest Stand Stock Tables
Based on field reconnaissance 4/14 - 5/14

Volume units are:

- Hardwood sawtimber: Board-feet, Doyle log rule (form class 78)
- Softwood sawtimber and chip-n-saw: Board-feet, Intl 1/4 inch log rule (form class 80)
- Hardwood and softwood pulpwood: Cords: 80 ft³ of wood and bark in one cord

Weight units are:

- Tons, equivalent to the cubic volume of wood and bark in the merchandised portion of the tree, converted to green weight in tons

Stand no.	Acres	Stock class	DBH class	Values				Total trees	Total volume	Total weight (t)	Total \$	
				Trees/acre	BA (ft ²)/acre	Volume/acre	Weight (t)/acre					\$/acre
19.73		loblolly pine sawtimber	6									
			8									
			10									
			12									
			14	18.7	20.0	3,083.7	14.1	\$499.55	369	60,840.8	278.6	\$9,856.20
			16	15.0	21.0	3,237.9	14.8	\$524.53	297	63,882.8	292.5	\$10,349.01
			18	4.0	7.0	1,079.3	4.9	\$174.84	78	21,294.3	97.5	\$3,449.67
			20	2.3	5.0	770.9	3.5	\$124.89	45	15,210.2	69.7	\$2,464.05
			22									
			24									
			26									
			28									
			30									
						≥36						
		loblolly pine sawtimber Total		40.0	53.0	8,171.7	37.4	\$1,323.82	789	161,228.0	738.3	\$26,118.94
		sweetgum sawtimber	6									
			8									
			10									
			12									
			14									
			16	1.4	2.0	200.5	1.3	\$25.87	28	3,956.8	26.5	\$510.43
			18	1.1	2.0	200.5	1.3	\$25.87	22	3,956.8	26.5	\$510.43
			20									
			22									
			24									
			26									
			28									
			30									
			32									
			34									
			≥36									
		sweetgum sawtimber Total		2.6	4.0	401.1	2.7	\$51.74	51	7,913.6	52.9	\$1,020.86

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Enclosure 14. Stream and Pond Assessments

NAVFAC Atlantic Biological Resource Services

Contract: N62470-08-D-1008; Task Order: WE85

FINAL - 01 June 2015



Stream and Pond Assessment Surveys for Naval Air Station Oceana (NASO), Dam Neck Annex (DNA)



Prepared for:
NAVFAC Mid-Atlantic
9742 Maryland Ave.
Building Z-144
Norfolk, VA 23508



Prepared by:
Tetra Tech, Inc.
1320 North Courthouse Road, Suite 600
Arlington, VA 22201



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EXECUTIVE SUMMARY

This Project assessed the current condition of selected streams and ponds at Naval Air Station Oceana (NASO) Dam Neck Annex (DNA). The pond assessments included seasonal boat electrofishing surveys, water quality, shoreline habitat, and fish habitat improvements. The stream assessments included seasonal backpack electrofishing surveys, evaluating the existing suitability of habitat (e.g., fish passage) and the potential for enhancements to habitat accessibility.

These data will be used to supplement the existing data and used in current and future environmental planning and management at DNA. Additionally, these data were analyzed to develop improvement recommendations to habitat as well as fish populations, which are presented in this report. Survey biologists used a modified version of the U.S. Environmental Protection Agency's (EPA) Rapid Bioassessment Protocol (RBP) for fish to collect a representative sample of the fish assemblage from the appropriate habitat composition in DNA ponds and streams (Barbour et al. 1999). Field crews used the Habitat Assessment Field Data Sheets for Low Gradient Streams, as provided in Barbour et al. (1999). The RBP protocols are included as Appendix D to this report. A "score" was assigned to each of these categories for each surveyed reach so that relative comparisons can be made between reaches and streams. Qualitative habitat surveys were also used to assess pond habitat quality. Additionally, a barrier survey using a combination of assessment protocols was used to identify potential impediments to fish migration within DNA streams. Water quality was recorded *in situ* at every stream and pond during sampling, using a hand held multi-parameter meter. Additionally, water grab samples were obtained with a horizontal water sampler in ponds and submitted for laboratory analyses.

In accordance with EPA RBP standards, DNA streams all fell within marginal categories for habitat quality. Fish surveys at DNA streams yielded fish assemblages typical of degraded, channelized coastal plain streams. DNA streams yielded 130 individual fishes represented by 15 species. Notably, migratory species were present in DNA water bodies (gizzard shad and American eel). No migration barriers were encountered in any of the surveyed streams at the DNA Installation. Fish data show that DNA streams offer little to no recreational value and periodic monitoring is necessary. DNA ponds offered suitable habitat to support healthy fish communities and a recreational fishery. DNA P3 and P5 both support healthy fish assemblages and DNA P5 can support a healthy recreational fishery. Pond fish survey results yielded 3,198 individual fish represented by 24 species.

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1 INTRODUCTION

1.1 OBJECTIVES

The purpose of this survey was to assess the current condition of selected streams and ponds at Naval Air Station Oceana (NASO) Dam Neck Annex (DNA). The stream assessment included seasonal backpack electrofishing surveys, habitat and water quality measurements, and the characterization of physical barriers to migratory fishes, especially American eel (*Anguilla rostrata*) and alosines, including alewife (*Alosa pseudoharengus*), blueback herring (*A. aestivalis*), American shad (*A. sapidissima*), and hickory shad (*A. mediocris*). The pond assessment included seasonal electrofishing surveys, shoreline habitat, and water quality measurements .

The results of this survey and assessment will be used to supplement the existing data that will be incorporated into future environmental planning documents, such as the Integrated Natural Resource Management Plans (INRMP) or Environmental Assessments (EA) at DNA.

1.2 SITE DESCRIPTION

DNA is located in the southeastern portion of the City of Virginia Beach, Virginia (Figure 1) and encompasses approximately 1,900 acres (ac) (769 hectares [ha]). The Installation is bound by the community of Sandbridge to the south; the Atlantic Ocean to the east; Hampton Roads Sanitation Division, City of Virginia Beach Properties, and private properties to the west; and Virginia Army National Guard - Camp Pendleton to the north. Land uses surrounding the Installation include industrial, commercial, residential, recreational, and agricultural, though most of the agricultural lands are rapidly being converted to residential and recreational developments. Because of the intense level of development in the region, DNA and the other coastal military installations are extremely important to the region's ecology (Navy 2014).

Surface waters at DNA are limited to mostly drainage ditches, channelized streams, and several small ponds. Surface water that occurs on DNA includes a small portion (0.5 ac [0.2 ha]) of Lake Christine, which lies almost entirely within the State Military Reservation to the north of the Installation; approximately 51 ac (21 ha) of Redwing Lake (DNA-P3); Fish surveys were conducted on Lake Christine during 2013 and 2008, which documented 15 species of fish present (see Table 5), all of which had already been previously documented at other DNA ponds, including Lake Tecumseh (Williamsburg Environmental Group 2013, Fritz and Wolf 2008).

Sadler Pond (DNA-P5), located within the central support area; and several small ponds such as Lotus Pond and Lilly Pond, and areas of open water, which are associated with the extensive marsh system. DNA-P5 (4.5 ac [1.8 ha]) was excavated in 1969 as part of the Installation picnic area to provide recreational fishing at DNA. DNA-P3 has historically been extremely shallow, and both turbid and eutrophic (Swihart 1982). Redwing Lake and adjacent Lake Tecumseh are connected through an open drainage channel and are connected to Back Bay, which is part of the U.S. Fish and Wildlife Service (USFWS) National Wildlife Refuge System, through open canal. Lake Tecumseh (also known as Brinson Lake Inlet) forms the southern boundary of DNA but is not on Navy property. In 2011, the Hampton Roads Sanitation Division (who owns Lake Tecumseh) in cooperation with the USFWS, installed a weir on Lake Tecumseh to help control sedimentation from the lake into Back Bay.

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Figure 1: Dam Neck Annex (DNA) Site Overview of Proposed Stream and Pond Survey Locations

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1.3 FISHERIES MANAGEMENT

Previous fish surveys at DNA have documented several species of fish that have been introduced into Redwing Lake and Sadler Pond for recreational fishing including largemouth bass (*Micropterus salmoides*), pumpkinseed (*Lepomis gibbosus*), common carp (*Cyprinus carpio*), and bluegill (*Lepomis macrochirus*). Other species collected during previous fisheries surveys are listed in Table 1.

Saltwater fishing is permitted along the shoreline and freshwater fishing is permitted at DNA-P5, as well as in drainage canals throughout the Installation. Fishing along the shores of Lake Tecumseh also is authorized; however, the Navy Natural Resources Program (NRP) does not manage the Lake Tecumseh fisheries because the lake is owned by the Hampton Roads Sanitation District.

DNA-P3 and DNA-P5 have been managed as recreational fisheries to varying degrees at DNA for many years, and past support for fisheries management has been provided by the Virginia Department of Game and Inland Fisheries VDGIF and USFWS fisheries biologists beginning in 1961 (Corning 1968) and has continued through recent years. Fish and water quality surveys found that fisheries potential was marginal at Redwing Lake because of its shallow water (less than 4.0 ft. [1.2 m] maximum depth), low productivity, and high turbidity (Corning 1968, Galvez and Swihart 2000, and Swihart 1982). Turbidity is the most limiting factor because it interferes with successful reproduction in nest-building species, such as bass and sunfishes, and prevents the establishment of a self-sustaining sport fish population. The lake's high turbidity is attributed to wave action and a high population of common carp, which churn bottom sediments when feeding (Drenner et al. 1997). Because the sediments in the lake largely results from off-Installation activities, management actions taken at DNA are not expected to be effective in correcting the situation.

Fishing at DNA-P3 was formerly authorized; however, this lake has been closed to fishing due to military mission/security reasons. The Southeast Redwing Lake Wetlands Special Interest Area (SIA) ponds are currently not authorized for inclusion in the recreational fishing program as this area is being managed as a conservation site. Although DNA-P3 has minimal potential for quality recreational fishing, it provides habitat for a variety of fishes, birds, and other wildlife and provides valuable habitat at DNA and in the region.

DNA-P5 was excavated in 1969 as an alternative site for recreational fishing at DNA. The pond, however, was constructed in a soil formation composed of colloidal clay material. Clay particles are negatively charged, which causes them to repel each other and remain suspended in the water column, creating a turbidity problem at this pond as well.

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Table 1: Historical Fish Species Observed at Naval Air Station Oceana Dam Neck Annex

Date of Observation	Common Name	Species	Abundance [†]	Length (mm)	Weight (g)
2011-2012 Lake Tecumseh (post-weir) ¹	Alewife	<i>Alosa pseudoharengus</i>	1	--	--
	American eel	<i>Anguilla rostrata</i>	33	--	--
	Banded killifish	<i>Fundulus diaphanus</i>	3	--	--
	Black crappie	<i>Pomoxis nigromaculatus</i>	2	--	--
	Bluegill	<i>Lepomis macrochirus</i>	58	--	--
	Bluespotted sunfish	<i>Enneacanthus gloriosus</i>	2	--	--
	Bowfin	<i>Amia calva</i>	3	--	--
	Chain pickerel	<i>Esox niger</i>	6	--	--
	Channel catfish	<i>Ictalurus punctatus</i>	1	--	--
	Common carp	<i>Cyprinus carpio</i>	2	--	--
	Creek chubsucker	<i>Erimyzon oblongus</i>	5	--	--
	Eastern silvery minnow	<i>Hybognathus regius</i>	4	--	--
	Gizzard shad	<i>Dorosoma cepedianum</i>	22	--	--
	Golden shiner	<i>Notemigonus crysoleucas</i>	4	--	--
	Largemouth bass	<i>Micropterus salmoides</i>	35	--	--
	Longnose gar	<i>Lepisosteus osseus</i>	1	--	--
	Eastern Mosquitofish	<i>Gambusia holbrooki</i>	3	--	--
	Pumpkinseed	<i>Lepomis gibbosus</i>	44	--	--
	Redear sunfish	<i>Lepomis microlophus</i>	62	--	--
	Striped bass	<i>Morone saxatilis</i>	8	--	--
	Striped mullet	<i>Mugil cephalus</i>	3	--	--
	Tidewater silverside	<i>Menidia peninsulae</i>	6	--	--
	Warmouth	<i>Lepomis gulosus</i>	1	--	--
White catfish	<i>Ameiurus catus</i>	1	--	--	
White perch	<i>Morone americana</i>	140	--	--	
Yellow perch	<i>Perca flavescens</i>	108	--	--	

Date of Observation	Common Name	Species	Abundance [†]	Length (mm)	Weight (g)
2008-2013 Lake Christine ^{2,3}	American eel	<i>Anguilla rostrata</i>	5 (29)	214*	--
	Black Crappie	<i>Pomoxis nigromaculatus</i>	4 (77)	147*	87*
	Bluegill	<i>Lepomis macrochirus</i>	9 (88)	124*	104*
	Chain pickerel	<i>Esox niger</i>	3 (2)	178*	--
	Common carp	<i>Cyprinus carpio</i>	14 (19)	--	--
	Flier	<i>Centrarchus macropterus</i>	(1)	--	--
	Gizzard shad	<i>Dorosoma cepedianum</i>	(2)	--	--
	Golden shiner	<i>Notemigonus crysoleucas</i>	(16)	--	--
	Inland silverside	<i>Menidia beryllina</i>	(1)	--	--
	Largemouth bass	<i>Micropterus salmoides</i>	43 (24)	102–533	226–2722
	Pumpkinseed	<i>Lepomis gibbosus</i>	21 (57)	107*	93*
	Striped mullet	<i>Mugil cephalus</i>	(1)	--	--
	Warmouth	<i>Lepomis gulosus</i>	3	--	--
	White perch	<i>Morone americana</i>	3 (56)	149*	111*
	Yellow bullhead	<i>Ameiurus natalis</i>	2 (3)	302*	--
Yellow perch	<i>Perca flavescens</i>	17 (56)	140*	94*	

Sources:

¹ USFWS Lake Tecumseh Weir Project. http://www.fws.gov/northeast/virginiafield/partners/Lake_Tecumseh_monitoring_fish_surveys.html (2012).

² Williamsburg Environmental Group, Inc. Lake Christine Water Quality Management Plan. Prepared for, Commonwealth of Virginia Department of Military Affairs (2013).

³ Fritz, M.T. and E.D. Wolf. State Military Reservation Camp Pendleton Fish Survey of Lake Christine. Conservation Management Institute at Virginia Tech. (2008)

† First number represents total abundance from the 2013 survey. Number in parentheses represents catch-per-hour, as reported for the 2008 survey

* Average across surveys. Length and weight not consistently reported.

No rare, threatened, or endangered fish species have been identified at the Installation, however two individual sturgeon have been reported as stranded (washed ashore dead) on DNA beaches (Wright, personal communication 2015). Both the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*), federally listed fish species, have ranges that overlap DNA based on geographic range. However, these species are rarely expected to occur in any of the available freshwater habitats within DNA. American eel (*Anguilla rostrata*) has been identified on the DNA Installation. The American eel was petitioned for listing under the ESA in 2010. In 2011, the U.S. Fish and Wildlife Service (USFWS) issued a finding that listing of the species may be warranted, and initiated a status review (76 FR 60431-60444), which has not yet been completed. Blueback herring also have the potential to occur on DNA and were petitioned for listing under ESA previously. However, a 2013 status review by the National Marine Fisheries Service (NMFS) of blueback herring (*Alosa aestivalis*) found that a listing under the ESA was not warranted (78 FR 48943-48994), this determination continues to be controversial and could be revisited by regulators and stakeholders.

2 ASSESSMENT METHODS

The purpose of this study was to perform fish community assessments on targeted streams and ponds located at DNA. An additional goal was to qualitatively characterize habitat and identify barriers to fish movement that may affect anadromous and catadromous species by performing a walk-over survey of the streams. In total, two streams and three ponds were surveyed on a seasonal basis (spring, early summer, late summer, and fall); habitat and barrier surveys were conducted once. The resulting data and analyses presented here will help characterize existing fish populations and habitat within these installations; this characterization will aid in ensuring compliance with applicable federal, state, and local statutes and regulations, and with Department of Defense (DOD) policies, instructions, and guidance.

2.1 WATERBODY SELECTION

Geographic Information System (GIS) layers were used to identify all freshwater stream reaches and ponds within the DNA boundaries, as shown in Figure 2. Identified water bodies were cross-referenced with the U.S. Geological Survey (USGS) stream layer and the surface water course centerlines layer to focus only on freshwater streams (no marine or estuarine areas). A list of streams and ponds were selected during a site visit on 19 September 2013, based on data needs, accessibility, and scoping requirements. The streams and ponds listed in Table 2 represent those selected for evaluation during this survey.

Table 2: Streams Surveyed at Naval Air Station Oceana, Dam Neck Annex

Waterbody type	Site ID	Name	Location and description
Streams	DNA-S1	Unnamed	Connecting slough between Redwing and Tecumseh
	DNA-S2	Unnamed	Stream at south Dam Neck fence
Ponds	DNA-P2	Unnamed	Wetland east of Terrier Ave., with floating dock
	DNA-P3	Redwing Lake	Behind Navy Lodge, within Naval Special Warfare Development Group (DEVGRU) area
	DNA-P5	Sadler Pond	Park near main gate (corner of Dam Neck/Terrier)

For consistency throughout this report, the streams (S1, S2) and ponds (Unnamed Pond [P2], Redwing Lake [P3], Sadler Pond [P5]) surveyed will be referred to by their assigned numbers, as shown in Table 2.

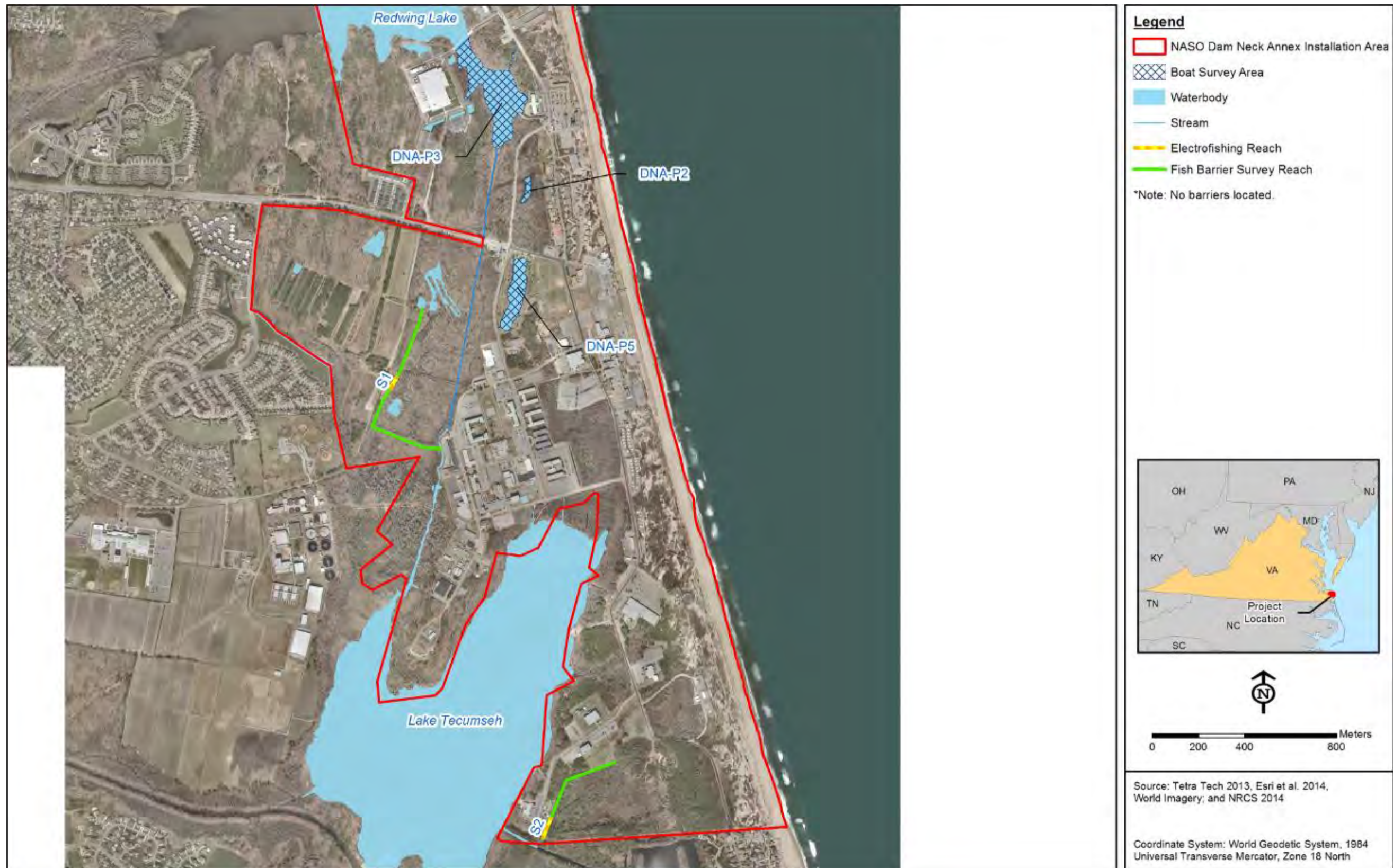


Figure 2: Selected Streams and Ponds Surveyed at Naval Air Station Oceana – Dam Neck Annex

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2.2 STREAMS

The stream survey methods consisted of a biological (fish) and physical habitat assessment, as modified from the U.S. Environmental Protection Agency’s (EPA) Rapid Bioassessment Protocols (RBP) developed by Barbour et al. (1999). Seasonal fish surveys at all stream locations used backpack electrofishing methods in accordance with the modified RBP. The one-time habitat assessment used visual-based observations to quantify the conditions of the habitat. Water quality was collected seasonally.

2.2.1 HABITAT SURVEY

Most of the stream habitat assessment parameters are based on physical characteristics; therefore, the habitat characterization was conducted as a “one-time” characterization for each stream reach. Other parameters, such as water quality (*in-situ* and grab samples), flow, channel depth, wetted channel width, etc. are dynamic and were recorded during more than one visit.

The RBP habitat survey was performed once on each stream reach that was also sampled for the fish assessment by a small field team during a walk-over survey. Tetra Tech biologists attempted to walk the wadeable portions of each stream, ensuring that the 150-m survey reaches would capture a representative sample of stream features (e.g., riffles, runs, pools). Where applicable, natural fish barriers or habitat breaks were used to delineate the start or end of a reach.

For this study, Tetra Tech used the Habitat Assessment Field Data Sheets for Low Gradient Streams, as provided in Barbour et al. (1999) (see Appendix B for data sheets). The data sheets assigned a “score” was assigned to each of these categories for each surveyed reach so that relative comparisons can be made between reaches and streams (Table 3). Further detail on scoring and criteria used can be found in Barbour et al. 1999.

By assigning a score and condition category to the ten visual-based habitat assessment parameters, described in Table 3, a stream can be assessed and given a total score related to its condition. Scores ranging from 0 to 20 were assigned to each of the ten visual-based habitat assessment parameters, with 0 being a “poor” score and 20 being an “optimal” score. After scoring all parameters, a final score was determined for each reach. The final score can range from 0 to 200 with a score of 0 to 59 representing a “poor” condition; 60 to 112 representing a “marginal” condition; 113 to 165 representing a “suboptimal” condition; and 166 to 200 representing an “optimal” condition. This rapid, qualitative physical habitat assessment was conducted at each DNA stream reach that was also assessed for fish populations. Water quality sampling methods were similar between streams and ponds, and are therefore described in Section 2.3.2.

Table 3 : Rapid Bioassessment Protocol (RBP) Parameters

RBP habitat parameter	Components analyzed in this survey
Physical characterization (one-time)	<ul style="list-style-type: none"> • Riparian and watershed land use • Stream origin and type • Riparian/canopy vegetation features • Instream parameters – channel width, depth, relative flow, high water mark, and substrate • Proportion of riffles, runs, and pools • Degree of channelization • Potential fish barriers (not part of RBP, but included in this survey)
Water quality (each visit)	<ul style="list-style-type: none"> • <i>In situ</i> measurements, such as water temperature, dissolved oxygen, and conductivity will be collected for each stream reach. • Grab samples will be collected to measure a total of three parameters (listed below) for each stream reach: <ul style="list-style-type: none"> ○ Total Nitrogen (TN) ○ Total Phosphorus (TPhos) & ortho-Phosphate (SRP) – Method 365.1 ○ Total Suspended Solids (TSS) – Method SM 2340D
Habitat features (one-time)	<ul style="list-style-type: none"> • Large woody debris/debris dams • Aquatic vegetation • Available cover
Visual-based habitat assessment (low gradient streams) (one-time)	<ul style="list-style-type: none"> • Epifaunal substrate/available cover • Pool substrate characterization • Pool variability • Sediment deposition • Channel flow status • Channel alteration • Channel sinuosity • Bank stability • Bank vegetative protection • Riparian vegetative zone width

2.2.2 BARRIER SURVEY

A combination of assessment protocols was used to identify potential barriers to fish migration within DNA streams. Fish barrier surveys are typically implemented to assess the potential for habitat use by migratory fishes that may encounter obstacles in their migration, such as culverts, debris dams, beaver dams, or other physical blockages to migration. Additional data forms were included to facilitate the fish barrier survey as a supplement to the modified RBP survey. The fish barrier survey and accompanying data forms were adapted from a similar survey on the Rappahannock River (McInnich and Garman 2004, 1999), which were also applied to a stream habitat survey at NSA Northwest Annex (Tetra Tech and Stell 2014). Additional input for culvert and bridge data were incorporated in the form, adapted from the Vermont Agency of Natural Resources (2009). Copies of field data forms are included in Appendix C. During the modified RBP survey, each of the potential barriers to fish migration were inventoried for as much of a stream as possible, beyond the reaches assessed for habitat and fish. The entire stream was

walked by two field scientists starting at the downstream end of each stream (at the installation boundary, or confluence with another stream) and walking upstream until reaching an apparent habitat break or other boundary. Tetra Tech staff walked the entire wadeable length of each stream to the furthest extent practical to record and characterize potential barriers to fish migration. Each bridge or culvert crossing and other potential barrier (e.g., beaver dam or large debris dam) was inventoried during the survey and physical measurements of the barrier were obtained in accordance with the data sheet. Photographs were also taken for each potential barrier and included in the photograph log (Appendix A).

2.2.3 FISH SURVEY

Fish surveys were conducted at two stream sites within DNA. Both sites were sampled in June, August, and September. The fish sampling methods were modified from the EPA's RBP for fish (Barbour et al. 1999). Field biologists used the 150 meter (m) fixed-distance sampling reach to collect a representative sample of the fish assemblage from the appropriate habitat composition (e.g., riffles, runs, pools) (further details described in EPA 2007). Where applicable, natural fish barriers or habitat breaks were used to delineate the start or end of a reach.

The downstream start point at each surveyed reach was marked with a temporary pin flag and recorded as a GPS point. A tape measure was used to delineate the 150-m reach of the stream. The upstream end of the reach was also marked with a temporary pin flag and a GPS point. Water quality measurements, including temperature, specific conductance, dissolved oxygen, and percent oxygen saturation, were obtained at the downstream start point of each surveyed reach.

A Smith-Root LR-24 backpack electrofishing unit was used for all stream sites. The LR-24 was calibrated through the "auto-setup" function; then settings such as voltage, frequency, and duty-cycle were fine-tuned according to water parameters to maximize the effectiveness of the electrofishing unit and safety of the fish and operator. A single-pass protocol was used. Backpack electrofishing protocols were consistent with those used by the U.S. Fish and Wildlife Service (USFWS 2010) and the American Fisheries Society (AFS 2008). The survey began at the downstream end of each reach at physical fish barriers to prevent fish escape, as recommended by the RBP protocol. The fish survey continued upstream in a bank-to-bank sweeping technique, covering all wadeable habitats within the reach. Effort was measured in duration (seconds) of active electrofishing, or "trigger" time. Variation between reaches is typical due to stream width, depth, and habitat types.

At the end of the reach, fish were identified and counted. A subsample of up to 30 specimens of each species were measured and weighed (total length [TL] to the nearest millimeter [mm], mass in grams [g]), prior to being released back into the stream. All individuals were observed for any deformities, erosion, lesions, or tumors (DELT anomalies). All individuals were identified to lowest practicable taxonomic level in the field based on external characteristics using taxonomic keys, including "The Freshwater Fishes of Virginia" (Jenkins and Burkhead 1994). Page et al. (2013) was used to ensure accurate common and scientific fish names.

2.3 PONDS

Similar to streams, most of the pond habitat assessment parameters are based on physical characteristics; therefore the habitat characterization was conducted as a "one-time" characterization for each pond. Other parameters, such as water quality (*in-situ* and grab samples) and vegetation are dynamic and were recorded during each visit.

The methods used for pond surveys for this study consisted of a biological (fish) assessment, as well as a physical habitat assessment, within a similar framework as outlined above for streams.

2.3.1 HABITAT SURVEY

The pond habitat assessment at DNA included a site-walk (or by boat) around the perimeter of each accessible pond to collect qualitative habitat data. The pond habitat survey was limited to DNA-P2 and DNA-P3. Security restrictions at DNA-P5 precluded its inclusion in the habitat portion of the survey. Data sheets modified from the EPA National Lakes Assessment Program (EPA 2012) were used to support the qualitative assessment of the ponds, by characterizing the shoreline/littoral zone, macrophytes, and water quality (see Appendix C). Table 4 lists the parameters included in the pond habitat assessment. These data were used to develop an overall assessment of fisheries habitat for the selected DNA ponds. These data were used to develop an overall assessment of fisheries habitat for the selected NASO ponds.

Table 4 : Pond Habitat Survey Parameters

Pond habitat parameter	Components analyzed in this survey
Physical characterization (one-time)	<ul style="list-style-type: none"> • Shoreline and watershed land use • Pond origin and type • Inlet/outlet stream(s) • Shoreline vegetation features • Hydrology – depth, high water mark, modifications, and substrate • Shoreline stability/erosion
Water quality (seasonal)	<ul style="list-style-type: none"> • <i>In situ</i> measurements, such as water temperature, dissolved oxygen, and conductivity will be collected at the middle, or deepest point, of each pond. • Grab samples will be collected to measure a total of three parameters (listed below) for each stream reach: <ul style="list-style-type: none"> ○ Total Nitrogen (TN) ○ Total Phosphorus (TPhos) & ortho-Phosphate (SRP) – Method 365.1 ○ Total Suspended Solids (TSS) – Method SM 2340D
Habitat features (one-time)	<ul style="list-style-type: none"> • Aquatic vegetation • Available cover

2.3.2 WATER QUALITY

Water quality was recorded *in situ* at every stream and pond during each sampling event, using a hand held multi-parameter meter (YSI 556). Parameters measured included water temperature (degrees Celsius [°C]), dissolved oxygen (milligrams per liter [mg/L] and percent [%] saturation), pH, and conductivity (milliSiemens per centimeter [mS/cm]).

Additionally, water grab samples were obtained with a horizontal water sampler in ponds and submitted for laboratory analyses at Test America Laboratories Inc. in Savannah, GA. Laboratory analysis measured total nitrogen (TN), total phosphorus (TPhos), ortho-phosphate (SRP), and total suspended solids (TSS). TN was measured using EPA Method 351.2, as well as a calculated method. TPhos was analyzed in

accordance with EPA Method 365.4. SRP analysis used EPA Method 365.1. TSS was measured using SM 2540D.

2.3.3 FISH SURVEY

Fish surveys at all pond locations used boat electrofishing. Both DNA-P3, and DNA-P5 were most effectively sampled by electrofishing boat, which occurred April/May, June, August, and October.

A 12-ft. jon-boat equipped with a Smith-Root 1.5 KVA pulse box electrofisher was used to sample fish inhabiting these ponds. In general, boat electrofishing protocols were consistent with those used by the USFWS (USFWS 2010) and the American Fisheries Society (AFS 2008). Boat electrofishing occurred in and along littoral habitats, targeting structure and beds of submerged aquatic vegetation. Stunned fish were captured and stored in a livewell until they were processed at the end of the survey.

At the end of each survey (for each method), fish were identified and counted. A subsample of up to 25 specimens of each species were measured (TL to the nearest mm), prior to being released back into the pond. All individuals were observed for any deformities, erosion, lesions, or tumors (DELT anomalies). All individuals were identified to lowest practicable taxonomic level in the field using the same resources as described for streams in Section 2.2.3.

2.4 DATA ANALYSIS

Field data were transferred from field data sheets to a Microsoft Excel spreadsheet. Metrics calculated from the data included catch per unit effort (CPUE) and a species diversity index. CPUE allows for a standardization of the fishing effort across streams, which enables comparisons where effort was not consistent. CPUE was calculated by dividing the total number of fishes collected at each stream by the total electrofishing time (in seconds) of each stream. Species richness, commonly denoted as R , is simply the number of different species present in the dataset. A diversity index allows for comparisons of species diversity among multiple locations (streams in this case). The Simpson index (λ) measures the degree of concentration and is calculated by:

$$\lambda = \sum_{i=1}^R p_i^2$$

Where p_i is the proportional abundance of each species within each sampling reach (number of individuals of species i , divided by the total number of individuals [n] in each sampling reach) and R is species richness. Values of λ range from 0 to 1, with lower values representing higher diversity. Another diversity parameter that is often used is the Shannon-Wiener diversity index (H'), which is calculated by using the proportional abundance of each species observed in the sample, as follows:

$$H' = - \sum_{i=1}^R p_i \ln p_i$$

In this equation, p_i is again the proportional abundance of each species and R is species richness. The resulting H' values are the Shannon-Wiener diversity index values for each sampling reach, with higher values corresponding to greater diversity.

3 RESULTS

In general, fish surveys encountered a wide range of species, with 15 taxa captured in the DNA streams and 24 taxa in the DNA ponds. DNA stream surveys captured 130 individual fishes with the most abundant species being eastern mudminnow, bluespotted sunfish, and eastern mosquitofish, respectively. The average time spent electrofishing the DNA streams was 1,473 seconds. DNA ponds yielded a much higher total abundance and species diversity than DNA streams with over 3,000 individual fishes captured during the pond electrofishing efforts. The most abundant species were bluegill, gizzard shad, and pumpkinseed, respectively. The average time spent electrofishing the DNA ponds was 3,740 seconds. All fishes collected from the DNA stream and pond sampling efforts are shown in Table 5.

Table 5: All Fishes Collected from the 2014 DNA Sampling and Lake Christine Sampling

Common Name	Species	DNA		Virginia Army National Guard Camp Pendleton
		2014 Streams	2014 Ponds	2008 & 2013 Lake Christine
American Eel	<i>Anguilla rostrata</i>		•	•
Banded Sunfish	<i>Enneacanthus obesus</i>	•		
Black Crappie	<i>Pomoxis nigromaculatus</i>	•	•	•
Bluegill	<i>Lepomis macrochirus</i>	•	•	•
Bluespotted Sunfish	<i>Enneacanthus gloriosus</i>	•	•	
Bowfin	<i>Amia calva</i>	•	•	
Brown Bullhead	<i>Ameiurus nebulosus</i>		•	
Chain Pickerel	<i>Esox niger</i>		•	•
Common Carp	<i>Cyprinus carpio</i>	•	•	•
Eastern Mosquitofish	<i>Gambusia holbrooki</i>	•	•	
Eastern Mudminnow	<i>Umbra pygmaea</i>	•	•	
Eastern Silvery Minnow	<i>Hybognathus regius</i>	•		
Flier	<i>Centrarchus macropterus</i>	•	•	•
Gizzard Shad	<i>Dorosoma cepedianum</i>		•	•
Golden Shiner	<i>Notemigonus crysoleucas</i>		•	•
Green Sunfish	<i>Lepomis cyanellus</i>	•		
Inland Silverside	<i>Menidia beryllina</i>		•	•
Largemouth Bass	<i>Micropterus salmoides</i>	•	•	•
Longnose Gar	<i>Lepisosteus osseus</i>		•	
Mud Sunfish	<i>Acantharchus pomotis</i>	•		
Pumpkinseed	<i>Lepomis gibbosus</i>		•	•
Redbreast Sunfish	<i>Lepomis auritus</i>		•	
Redear Sunfish	<i>Lepomis microlophus</i>		•	
Redfin Pickerel	<i>Esox americanus</i>	•	•	
Striped mullet	<i>Mugil cephalus</i>			•
Warmouth	<i>Lepomis gulosus</i>		•	•
White Catfish	<i>Ictalurus catus</i>		•	

Common Name	Species	DNA		Virginia Army National Guard Camp Pendleton
		2014 Streams	2014 Ponds	2008 & 2013 Lake Christine
White Perch	<i>Morone americana</i>		•	•
Yellow Bullhead	<i>Ameiurus natalis</i>			•
Yellow Perch	<i>Perca flavescens</i>	•	•	•
Unidentified Juvenile Sunfish	<i>Centrarchidae sp.</i>	•	•	

3.1 STREAMS

3.1.1 HABITAT

Habitat surveys were conducted for both surveyed DNA streams (DNA-S1 and DNA-S2) on 03 June 2014. The reach locations are shown in Figure 2. All of the reaches were 150 m in length. Table 6 highlights some of the physical characteristics of the stream; full results of the habitat survey and RBP assessment are provided in Appendix C.

Overall, the DNA streams were perennial, originating in either storm water drainage or coastal plain swamp. They were most often highly channelized and surrounded by forest and military lands, with trees providing partial to full shade. The DNA streams lacked habitat diversity, and all stream sections were categorized as continuous runs, with very little flow. The substrate was generally fine grained, with nothing larger than sand-sized particles.

The results of the physical habitat surveys of DNA streams showed that they are highly disturbed and do not offer optimal habitat for aquatic organisms (Table 7). Both of the surveyed stream reaches fell within the “marginal” category. Most streams lacked suitable habitat diversity, riffle habitat, and sinuosity throughout the surveyed streams. Channel sinuosity was lacking because of the channelization of each stream section. Generally, DNA streams scored well on bank stability, falling within the “optimal” and “suboptimal” categories. Fish barriers were not encountered in the surveyed streams, therefore no barrier data is presented in this section.

DNA-S1. This reach averaged 5.0 m wide, and ranged from 0.5 to 0.8 m deep and was highly channelized. The intermittent drainage channel was located in a forested area bordered by agricultural fields. The riparian vegetation was comprised of primarily trees and shrubs, dominated by sweet gum (*Liquidambar styraciflua*), wax myrtle (*Morella cerifera*), and bald cypress (*Taxodium distichum*). Aquatic vegetation was primarily rooted submergent and free-floating species, dominated by duckweed (Subfamily Lemnoideae) and hydrilla (*Hydrilla verticillata*). Stream reach DNA-S1 had a very low velocity of 0.02 ft./s and was characterized as a continuous pool, but lacking a hydraulic control. There was minimal erosion with stable banks and channelized throughout. The stream substrate was primarily composed of silt, with a high incidence of detritus and muck-mud. Typical S1 habitat is shown in Appendix A (photo #-20140929_105939)

The DNA-S1 barrier survey began at the confluence with the S1 stream with the connecting channel between DNA P3 and Lake Tecumseh, and continuing upstream into the south outparcel. There were no partial or full barriers to fish passage observed within the surveyed reach.

DNA-S2. This reach averaged 5.0 m wide, and had a depth of 0.7 to 0.9 m. The perennial stream was surrounded by forested area to the east and a fenced-in military training area to the west. The riparian zone was primarily trees and shrubs. Manicured lawn bordered the fence along the western bank and transitioned into mixed pine/hardwoods and shrubs beyond the fence. Aquatic vegetation was primarily rooted submergent and free-floating species, dominated by duckweed and hydrilla. The DNA-S2 reach also had a low velocity of 0.11 ft./s and was characterized as a continuous pool, but lacking a hydraulic control. There was minimal erosion with stable banks and channelized throughout. This reach of stream was also primarily composed of silt, with a high proportion of detritus and muck-mud. Typical S2 habitat is shown in Appendix A (photo #-20140929_142214)

The DNA-S2 barrier survey covered from the southern perimeter fence, continuing upstream to the confluence with the wetland area, south of South Bullpup St. There were no partial or full barriers to fish passage observed within the surveyed reach.

Table 6 : Physical Habitat Assessment Data for Each Stream Reach Surveyed at Dam Neck Annex

Reach	DNA-S1	DNA-S2
Date (2014)	3-Jun	3-Jun
Weather	Clear/sunny	Clear/sunny
Previous 24 hours	Clear sunny. Heavy rain within past 7 days, 27°C air temp	Clear sunny. Heavy rain within past 7 days, 21°C air temp
Watershed features	Forested, field/pasture, and military use surrounding stream	Mixed forest with military use outside of riparian zone
Reach Length	150 m	150 m
Stream width	5.0 m	5.0 m
Stream depth	0.5-0.75 m	0.7-0.9 m
High-water mark	0.25 m	0.50 m
Percent riffle	0%	0%
Percent run	0%	0%
Percent pool	100%	100%
Channelization	high	high
Large woody debris	2 pieces, 5 m ² total area	2 pieces, 10 m ² total area
Dominant vegetation	Rooted submergent	Free floating
Percent of reach with vegetation	90%	90%
Dominant inorganic substrate (%)	Silt (95%)	Silt (90%)
Secondary inorganic substrate (%)	Sand (5%)	Sand (5%)
Tertiary inorganic substrate (%)	None	Clay (5%)

Reach	DNA-S1	DNA-S2
Dominant organic substrate (%)	Muck-mud (90%)	Muck-mud (75%)
Secondary organic substrate (%)	Detritus (90%)	Detritus (50%)

NOTE: Reference photographs are located in Appendix A

Table 7: Physical Habitat Assessment Scores and Condition Categories for Each Surveyed Reach within Dam Neck Annex during the 2014 Survey

Habitat parameter (low-gradient stream)	DNA-S1		DNA-S2		
	Score	Condition category	Score	Condition category	
Epifaunal substrate/available cover	7	Marginal	5	Poor	
Pool substrate characterization	11	Suboptimal	7	Marginal	
Pool variability	7	Marginal	10	Marginal	
Sediment deposition	18	Optimal	18	Optimal	
Channel flow status	17	Optimal	17	Optimal	
Channel alteration	3	Poor	3	Poor	
Channel sinuosity	1	Poor	1	Poor	
Bank stability	Left (east)	9	Optimal	8	Suboptimal
	Right (west)	9	Optimal	8	Suboptimal
Vegetative protection	Left (east)	9	Optimal	1	Poor
	Right (west)	9	Optimal	9	Optimal
Riparian vegetative zone	Left (east)	3	Marginal	2	Poor
	Right (west)	9	Optimal	9	Optimal
TOTAL SCORE and OVERALL CONDITION CATEGORY	112	Marginal	98	Marginal	

3.1.2 FISH

A total of 130 fishes representing 15 species were collected from the two DNA streams during the June, August, and September 2014 collection periods. Streams were not electrofished during April because of high water conditions. All individuals were positively identified to the species level in the field. Total fish sampling effort was 4,903 s within the DNA-S1 reach and 3,933 s within the DNA-S2 reach (Table 8).

Table 8 : Backpack Electrofishing Effort at Naval Air Station Oceana, Dam Neck Annex, by Sampling Period and Stream

Stream ID	Sampling duration (seconds)		
	June	August	September
DNA-S1	2,370	1,528	1,005
DNA-S2	1,365	1,428	1,140

Eastern mudminnow (*Umbra pygmaea*) was the most abundant species, representing 33.8% of the total catch, followed by Bluespotted sunfish (*Enneacanthus gloriosus*) at 22.3%, and eastern mosquitofish (*Gambusia holbrooki*) at 16.9% (Table 9). No deformities, lesions, or abnormalities were observed in any of the specimens collected. Two fish species were found in both surveyed stream reaches; eastern mudminnow, and Bluespotted sunfish. The overall length distributions for most species were comparable among all surveyed streams.

Table 9: Number, Relative Abundance, Frequency of Occurrence, and Length of Fishes Collected from Dam Neck Annex Streams

Common name	Scientific name	Number of individuals	Total relative abundance (%)	Range of total length (mm)	Range of mass (g)
Eastern Mudminnow	<i>Umbra pygmaea</i>	44	33.8%	27–82	0.1–5.1
Bluespotted Sunfish	<i>Enneacanthus gloriosus</i>	29	22.3%	28–74	0.2–8.0
Eastern Mosquitofish	<i>Gambusia holbrooki</i>	22	16.9%	25–42	0.1–1.0
Flier	<i>Centrarchus macropterus</i>	8	6.2%	72–164	7.4–93.0
Banded Sunfish	<i>Enneacanthus obesus</i>	6	4.6%	36–62	1.0–3.7
Yellow Perch	<i>Perca flavescens</i>	5	3.8%	178–229	65.6–134.5
Redfin Pickerel	<i>Esox americanus</i>	4	3.1%	77–141	3.1–17.3
Bluegill	<i>Lepomis macrochirus</i>	3	2.3%	52–70	2.3–5.9
Green Sunfish	<i>Lepomis cyanellus</i>	3	2.3%	23–36	0.5–2.4
Black Crappie	<i>Pomoxis nigromaculatus</i>	1	0.8%	103	11.7
Bowfin	<i>Amia calva</i>	1	0.8%	519	641.9
Common Carp	<i>Cyprinus carpio</i>	1	0.8%	238	199.4
Eastern Silvery Minnow	<i>Hybognathus regius</i>	1	0.8%	70	2.7
Largemouth Bass	<i>Micropterus salmoides</i>	1	0.8%	98	100
Mud Sunfish	<i>Acantharchus pomotis</i>	1	0.8%	192	152.2
TOTAL		130	100%	--	--

DNA-S1. A total of 67 fish, represented by three species, were collected from DNA-S1 on 03 June 2014. Fish sampling was conducted for an electrofishing duration of 2,370 seconds. Eastern mudminnow was the most abundant species, representing 56.7% of the total catch, followed by bluespotted sunfish at 31.3%, and flier at 11.9% (Table 10). During the second sampling event, a total of 3 fish, represented by two species, were collected from DNA-S1 on 11 August 2014. Bluegill was the most abundant species, representing 66.7% of the total catch, followed by bluespotted sunfish at 33.3%, with 1,528 seconds of electrofishing. A total of 4 fish, represented by three species, were collected from DNA-S1 on 29 September 2014 with 1,005 seconds of electrofishing. Eastern mudminnow was the most abundant species, representing 50.0% of the total catch, followed by black crappie and largemouth bass, each at 25.0%.

Table 10: Fish Composition in DNA-S1 by Sampling Period

Common name	Jun		Aug		Sep/Oct		Total
	Number	%	Number	%	Number	%	
Black Crappie	--	--	--	--	1	25.0%	1
Bluegill	--	--	2	66.7%	--	--	2
Bluespotted Sunfish	21	31.3%	1	33.3%	--	--	22
Eastern Mudminnow	38	56.7%	--	--	2	50.0%	40
Flier	8	11.9%	--	--	--	--	8
Largemouth Bass	--	--	--	--	1	25.0%	1
Total individuals	67		3		4		74
Time sampled	2,370		1,528		1,005		4,903
CPUE	0.028		0.002		0.004		0.015
Species richness (R)	3		2		3		7
Simpson Diversity Index (λ)	0.43		0.56		0.38		--
Shannon Diversity Index (H')	0.94		0.64		1.04		--

DNA-S2. A total of 28 fish, represented by seven species, were collected from DNA-S2 on 03 June 2014. Fish sampling was conducted for an electrofishing duration of 1,365 seconds. Eastern mosquitofish was the most abundant species, representing 35.7% of the total catch, followed by bluespotted sunfish at 25.0%, and yellow perch at 17.9% (Table 11). During the second sampling event, a total of 8 fish, represented by four species, were collected from DNA-S2 on 11 August 2014. Green sunfish was the most abundant species, representing 37.5% of the total catch, followed by eastern mosquitofish and eastern mudminnow both at 25.0%, with 1,428 seconds of electrofishing. A total of 20 fish, represented by five species, were collected from DNA-S2 on 29 September 2014 with 1,140 seconds of electrofishing. Eastern mosquitofish was the most abundant species, representing 50.0 % of the total catch, followed by banded sunfish at 30.0% and redfin pickerel at 10.0%.

Table 11: Fish Composition in DNA-S2 by Sampling Period

Common name	Jun		Aug		Sep/Oct		Total
	Number	%	Number	%	Number	%	
Eastern Mosquitofish	10	35.7%	2	25.0%	10	50.0%	22
Bluespotted Sunfish	7	25.0%	--	--	--	--	7
Yellow Perch	5	17.9%	--	--	--	--	5
Eastern Mudminnow	2	7.1%	2	25.0%	--	--	4
Redfin Pickerel	2	7.1%	--	--	2	10.0%	4
Bowfin	1	3.6%	--	--	--	--	1
Common Carp	1	3.6%	--	--	--	--	1
Green Sunfish	--	--	3	37.5%	--	--	3
Mud Sunfish	--	--	1	12.5%	--	--	1
Banded Sunfish	--	--	--	--	6	30.0%	6
Bluegill	--	--	--	--	1	5.0%	1
Eastern Silvery Minnow	--	--	--	--	1	5.0%	1
Total individuals	28		8		20		56
Time sampled	1,365		1,428		1,140		3,933
CPUE	0.021		0.006		0.018		0.014
Species richness (R)	7		4		5		12
Simpson Diversity Index (λ)	0.23		0.28		0.30		--
Shannon Diversity Index (H')	1.64		1.32		1.24		--

3.1.3 WATER QUALITY

Both DNA-S1 and DNA-S2 were slightly turbid, typical for streams originating from forested coastal plain swamps. Temperature, pH, and dissolved oxygen at both stream locations varied marginally throughout the study period. The pH ranged from slightly acidic to neutral (pH 6.1-7.3). Dissolved oxygen remained low after the spring sampling event, becoming hypoxic at S2 during the October collection period. Temperature exhibited only a slight increase throughout the study period. Total suspended solids spiked in June in DNA-S1. Water quality results for streams are presented in Figure 3.

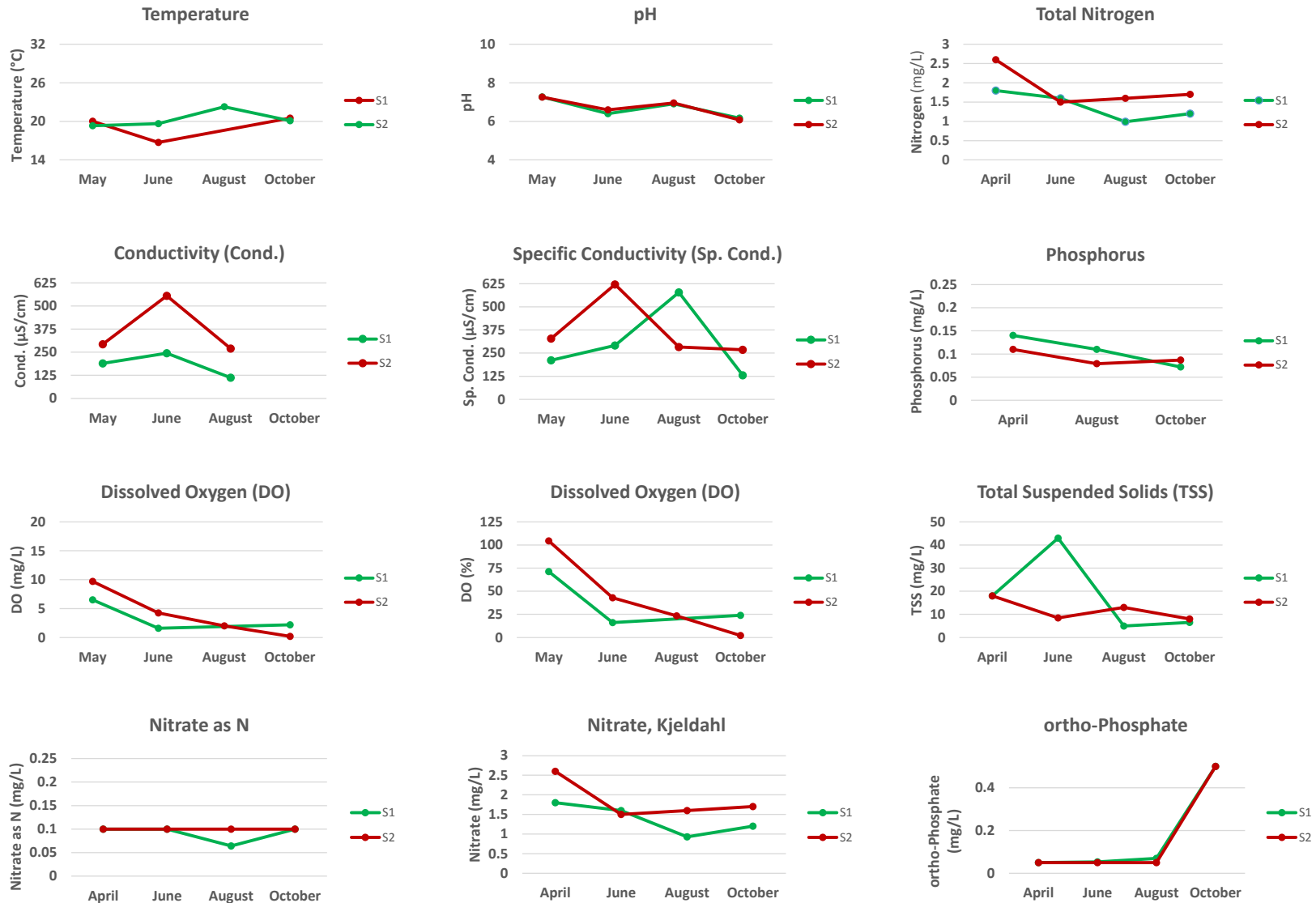


Figure 3: Water Quality Parameters of DNA Streams

Table 12 presents the discharge of water volumes present in both streams during June and August. Both streams underwent increased water discharges as the season continued, due to natural variation in seasonal water levels.

Table 12: Discharge Flow from Dam Neck Annex Streams During 2014 Survey

Stream Name	Date	Discharge (ft. ³ /s)
DNA-S1	6/3/14	0.1152
	8/11/14	0.9324
DNA-S2	6/3/14	0.2907
	8/11/14	4.5620

3.2 PONDS

3.2.1 HABITAT

Habitat surveys were conducted for DNA-P2 and DNA-P5 on 14 August, 2014. A habitat survey was not conducted for DNA-P3 due to security access restrictions at most of the shoreline. Results from habitat survey are listed in Table 13.

DNA-P2. This pond was defined as mesotrophic. The surrounding riparian cover was forested with sparse to moderate grass and shrub communities providing habitat for wildlife. The shoreline was stable with no nearby modifications or development. Dense pockets of hydrilla and pennywort were observed throughout the shoreline. Overhanging trees and ample inundated vegetation provided a variety of habitats for aquatic organisms.

DNA-P5. This pond was defined as mesotrophic. Riparian cover consisted of a thin layer of native trees surrounded by manicured lawn area. The shoreline was stable with no evidence of erosion. The pond is located near the entrance of DNA installation and is surrounded by heavy traffic. The area surrounding the pond was developed as a picnic area. A “Hazardous Conditions” sign prohibits swimming in the pond. Macrophytes were sparse throughout the pond. Some overhanging trees provided minimal refuge for aquatic organisms. A large majority of the pond is heavily exposed to sunlight and wind.

Table 13: Dam Neck Annex Pond Habitat Survey Results

		DNA-P2 (Red Wing Lake)	DNA-P5 (Sadler Pond)
SUMMARY	Date	8/14/2014	8/14/2014
	Time	1130	1230
	Weather Conditions	Sunny, 27°C	Sunny, 27°C
	Pond Surface Conditions	Flat, calm	Calm, slight ripple at surface from breeze
	Observed Approx. Depth	0.2 to 0.5 m	2.5 m, 1 m, surface
SHORELINE CHARACTERISTICS	Forest	Moderate	Moderate
	Grass	Sparse	Sparse
	Shrub	Sparse	Sparse
	Wetland	Moderate	Rare
	Bare Ground	Rare	Absent
	Agriculture	Rare	Absent
	Shoreline Modification	Rare	Absent
	Development	Rare	Sparse
MACRO-PHYTES	Emergent/Floating (%)	Moderate	Sparse
	Submergent (%)	Moderate	Sparse
	Macrophyte	High	Sparse
SHORELINE STABILITY (%)	Stable (%)	100%	100%
	Eroding (%)	0%	0%
LITTORAL BOTTOM SUBSTRATE	Bedrock	Absent	Absent
	Boulder	Absent	Absent
	Cobble	Absent	Absent
	Gravel	Sparse	Absent
	Sand	Sparse	Sparse
	Silt, Clay, Muck	Heavy	Moderate
	Woody Debris	Moderate	Sparse
	Organic	Moderate	Sparse
	Vegetation or Other	Moderate	Heavy
	Substrate Odor/Color	Much with organics, dark brown, sulfur odor	No odor, light brown color

		DNA-P2 (Red Wing Lake)	DNA-P5 (Sadler Pond)
LITTORAL FISH COVER	Aquatic and Inundated Herbaceous Vegetation	Heavy	Moderate
	Woody Debris/ Snags	Moderate	Sparse
	Inundated Live Trees	Moderate	Sparse
	Overhanging Vegetation	Moderate	Moderate
	Sharp Ledges or Drop-offs	Absent	Absent
	Boulders	Absent	Absent
	Human Structures	Sparse	Absent
	Species	mosquitofish, sunfish	aquatic insects
FLORA AND FAUNA OBSERVATIONS	Fish Sampling	Y	Y
	Gear Used	electrofishing	electrofishing
	Trophic State	Mesotrophic	Mesotrophic
	Emergent/ Submerged	abundant hydrilla and pennywort	emergent grasses, inundated shrubs, rushes
	Invasive Species Observed	No Phragmites at time of survey	None
	Wildlife Observed	song birds, frogs, dragonflies	Canada geese, seagulls
	Additional Notes	Flat surface waters with heavy pockets of SAV, shoreline completely covered with SAV, emergent vegetation, small trees.	Pond color was light brown (turbid) water, picnic area located between pond and road. Mowed lawn surrounds pond shorelines are stable. "Hazardous conditions" signs prohibit swimming.

Note: SAV = submerged aquatic vegetation

3.2.2 FISH

A total of 3,198 fishes representing 25 species were collected from the three DNA ponds during the April, June, August, and October 2014 survey periods. No deformities, lesions, or abnormalities were observed in any of the specimens collected. Total electrofishing sampling effort duration was 33,657 seconds across all three ponds (Table 14). Table 15 presents the relative abundance, and range of length for all species collected.

Table 14 : Boat Electrofishing Effort at Naval Air Station Oceana, Dam Neck Annex, by Sampling Event and Pond

Stream ID	Sampling duration (seconds)			
	April	June	August	September
DNA-P2	1,910	2,250	2,613	2,411
DNA-P3	5,815	4,125	4,649	4,441
DNA-P5	3,859	3,336	4,260	3,792

Table 15: Number, Relative Abundance, and Length of Fishes Collected from Dam Neck Annex Ponds

Common name	Scientific name	Number of individuals	Total relative abundance (%)	Range of total length (mm)
Bluegill	<i>Lepomis macrochirus</i>	974	30.5%	20–222
Brown Bullhead	<i>Ameiurus nebulosus</i>	386	12.1%	65–160
Gizzard Shad	<i>Dorosoma cepedianum</i>	300	9.4%	40–395
Pumpkinseed	<i>Lepomis gibbosus</i>	275	8.6%	30–265
Yellow Perch	<i>Perca flavescens</i>	180	5.6%	46–209
Inland Silverside	<i>Menidia beryllina</i>	145	4.5%	20–78
Black Crappie	<i>Pomoxis nigromaculatus</i>	128	4.0%	50–325
Bluespotted Sunfish	<i>Enneacanthus gloriosus</i>	116	3.6%	25–103
Eastern Mudminnow	<i>Umbra pygmaea</i>	116	3.6%	20–97
Golden Shiner	<i>Notemigonus crysoleucas</i>	107	3.3%	35–240
Largemouth Bass	<i>Micropterus salmoides</i>	94	2.9%	45–541
Centrarchids	<i>Centrarchidae</i>	92	2.9%	20–70
American Eel	<i>Anguilla rostrata</i>	66	2.1%	25–450
Flier	<i>Centrarchus macropterus</i>	46	1.4%	55–185
Eastern Mosquitofish	<i>Gambusia holbrooki</i>	45	1.4%	15–50
Chain Pickerel	<i>Esox niger</i>	36	1.1%	71–460
Warmouth	<i>Lepomis gulosus</i>	20	0.6%	40–195
Bowfin	<i>Amia calva</i>	16	0.5%	247–750
White Perch	<i>Morone americana</i>	16	0.5%	95–242
Longnose Gar	<i>Lepisosteus osseus</i>	12	0.4%	87–1070
Redbreast Sunfish	<i>Lepomis auritus</i>	11	0.3%	30–60
Common Carp	<i>Cyprinus carpio</i>	7	0.2%	610
Redfin Pickerel	<i>Esox americanus</i>	4	0.1%	88–155
White Catfish	<i>Ictalurus catus</i>	4	0.1%	210–468
Redear Sunfish	<i>Lepomis microlophus</i>	2	0.1%	155–158
TOTAL		3,198	100%	--

DNA-P2. A total of 358 fishes representing 16 taxa (15 identified to species level) were collected from DNA-P2. Collections were dominated by bluegill (n = 79) and bluespotted sunfish (n = 78). DNA-P2 and DNA-P5 exhibited comparable diversity. Peak abundance and diversity occurred in October. A total of 66 fish, represented by nine species, were collected from DNA-P2 on 01 May 2014. Bluegill was the most abundant species, representing 48.5% of the total catch, followed by flier at 16.7%, and pumpkinseed at 12.1% (Table 16). During the second sampling event, a total of 111 fish, represented by twelve species, were collected from DNA-P2 on 03 June 2014. Bluespotted sunfish was the most abundant species, representing 63.1% of the total catch, followed by warmouth at 9.9%, and both pumpkinseed and eastern mosquitofish at 6.3%. A total of 78 fish, represented by eight species, were collected from DNA-P2 on 14 August 2014. Eastern mosquitofish was the most abundant species, representing 41.0% of the total catch, followed by flier at 19.2% and bluegill at 16.7%. A total of 103 fish, represented by twelve species, were collected from DNA-P2 on 09 October 2014. Bluegill was the most abundant species, representing 30.1% of the total catch, followed by pumpkinseed at 27.2% and flier at 16.5%. Largemouth bass were absent from this pond.

Table 16: Fish Composition in DNA-P2 by Sampling Period

Common name	April		June		Aug		Sep/Oct		Total
	Number	%	Number	%	Number	%	Number	%	
Black Crappie	3	4.5%	1	0.9%	--	--	1	1.0%	5
Bluegill	32	48.5%	3	2.7%	13	16.7%	31	30.1%	79
Bluespotted Sunfish	1	1.5%	70	63.1%	5	6.4%	2	1.9%	78
Bowfin	--	--	2	1.8%	--	--	3	2.9%	5
Brown Bullhead	6	9.1%	2	1.8%	4	5.1%	3	2.9%	15
Centrarchid	--	--	--	--	--	--	8	7.8%	8
Chain Pickerel	3	4.5%	--	--	--	--	1	1.0%	4
Eastern Mosquitofish	1	1.5%	7	6.3%	32	41.0%	--	--	40
Eastern Mudminnow	--	--	3	2.7%	--	--	1	1.0%	4
Flier	11	16.7%	3	2.7%	15	19.2%	17	16.5%	46
Golden Shiner	--	--	--	--	6	7.7%	5	4.9%	11
Longnose Gar	--	--	1	0.9%	--	--	--	--	1
Pumpkinseed	8	12.1%	7	6.3%	2	2.6%	28	27.2%	45
Redfin Pickerel	--	--	1	0.9%	--	--	3	2.9%	4
Warmouth	1	1.5%	11	9.9%	1	1.3%	--	--	13
Total individuals	66		111		78		103		358
Time sampled	1,910		2,250		2,613		2,411		9,148
CPUE	0.03		0.05		0.03		0.04		0.04
Species richness (R)	9		12		8		12		15
Simpson Diversity Index (λ)	0.29		0.20		0.28		0.20		--
Shannon Diversity Index (H')	1.59		1.83		1.32		1.83		--

DNA-P3. A total of 2,346 fishes representing 22 species (21 identified to the species level) were collected from DNA-P3. DNA-P3 exhibited the highest total number of individuals and the highest diversity. Collections were dominated by bluegill (n = 751) and brown bullhead (n = 370). Peak abundance and diversity occurred in August. A total of 239 fish, represented by seventeen species, were collected from DNA-P3 on 30 April 2014. Bluegill was the most abundant species, representing 21.3% of the total catch, followed by pumpkinseed at 20.9%, and yellow perch at 16.3% (Table 17). During the second sampling event, a total of 630 fish, represented by sixteen species, were collected from DNA-P3 on 04 June 2014. Chain pickerel was the most abundant species, representing 58.6%, followed by bluegill at 19.7%. A total of 837 fish, represented by sixteen species, were collected from DNA-P3 on 13 August 2014. Bluegill was the most abundant species, representing 38.4% of the total catch, followed by gizzard shad at 15.3% and inland silverside at 14.2%. A total of 608 fish, represented by thirteen species, were collected from DNA-P3 on 08 October 2014. Bluegill was the most abundant species, representing 41.9% of the total catch, followed by eastern mudminnow at 18.4% and pumpkinseed at 12.7%.

Table 17: Fish Composition in DNA-P3 by Sampling Period

Common name	Apr		Jun		Aug		Sep/Oct		Total
	Number	%	Number	%	Number	%	Number	%	
American Eel	2	0.8%	32	5.1%	2	0.2%	12	2.0%	48
Black Crappie	18	7.5%	1	0.2%	64	7.4%	17	2.8%	100
Bluegill	51	21.3%	124	19.7%	321	36.9%	255	41.9%	751
Bluespotted Sunfish	4	1.7%	16	2.5%	7	0.8%	8	1.3%	35
Bowfin	3	1.3%	1	0.2%	2	0.2%	5	0.8%	11
Brown Bullhead	--	--	369	58.6%	--	--	1	0.2%	370
Centrarchid	--	--	--	--	32	3.7%	52	8.6%	84
Chain Pickerel	6	2.5%	6	1.0%	11	1.3%	9	1.5%	32
Common Carp	6	2.5%	--	--	--	--	--	--	6
Eastern Mosquitofish	--	--	1	0.2%	4	0.5%	--	--	5
Eastern Mudminnow	--	--	--	--	--	--	112	18.4%	112
Gizzard Shad	10	4.2%	1	0.2%	128	14.7%	--	--	139
Golden Shiner	1	0.4%	3	0.5%	54	6.2%	17	2.8%	75
Inland Silverside	23	9.6%	--	--	119	13.7%	--	--	142
Largemouth Bass	10	4.2%	5	0.8%	15	1.7%	3	0.5%	33
Longnose Gar	7	2.9%	1	0.2%	2	0.2%	--	--	10
Pumpkinseed	50	20.9%	38	6.0%	37	4.3%	77	12.7%	202
Redbreast Sunfish	--	--	--	--	11	1.3%	--	--	11
Warmouth	1	0.4%	4	0.6%	2	0.2%	--	--	7
White Catfish	4	1.7%	--	--	--	--	--	--	4
White Perch	4	1.7%	2	0.3%	--	--	1	0.2%	7
Yellow Perch	39	16.3%	26	4.1%	58	6.7%	39	6.4%	162
Total individuals	239		630		869		608		2,346
Time sampled	5,815		4,125		4,649		4,411		19,030
CPUE	0.04		0.15		0.18		0.14		0.12
Species richness (R)	17		16		17		14		22

Common name	Apr		Jun		Aug		Sep/Oct		Total
	Number	%	Number	%	Number	%	Number	%	
Simpson Diversity Index (λ)	0.14		0.39		0.19		0.24		--
Shannon Diversity Index (H')	2.27		1.39		2.02		1.81		--

DNA-P5. A total of 494 fishes representing 15 species were collected from DNA-P5. Collections were dominated by gizzard shad ($n = 161$) and bluegill ($n = 144$). DNA-P2 and P5 exhibited comparable diversity. Peak abundance occurred in October ($n=213$). Peak species richness occurred in April and August ($R=11$). A total of 54 fish, represented by eleven species, were collected from DNA-P5 on 01 May 2014. Bluegill was the most abundant species, representing 25.9% of the total catch, followed by largemouth bass and American eel both at 14.8%, and white perch at 11.1% (Table 18). During the second sampling event, a total of 23 fish, represented by seven species, were collected from DNA-P5 on 04 June 2014. Largemouth bass was the most abundant species, representing 30.4%, followed by bluegill at 26.1%, and American eel at 21.7%. A total of 204 fish, represented by eleven species, were collected from DNA-P5 on 13 August 2014. Gizzard shad was the most abundant species, representing 37.7% of the total catch, followed by bluegill at 27.9% and largemouth bass at 15.7%. A total of 213 fish, represented by ten species, were collected from DNA-P5 on 08 October 2014. Gizzard shad was the most abundant species, representing 37.1% of the total catch, followed by bluegill at 31.5% and golden shiner at 7.5%.

Table 18: Fish Composition in DNA-P5 by Sampling Period

Common name	Apr		Jun		Aug		Sep/Oct		Total
	Number	%	Number	%	Number	%	Number	%	
American Eel	8	14.8%	5	21.7%	3	1.5%	2	0.9%	18
Black Crappie	2	3.7%	1	4.3%	9	4.4%	11	5.2%	23
Bluegill	14	25.9%	6	26.1%	57	27.9%	67	31.5%	144
Bluespotted Sunfish	1	1.9%	--	--	--	--	2	0.9%	3
Brown Bullhead	--	--	--	--	1	0.5%	--	--	1
Common Carp	--	--	--	--	--	--	1	0.5%	1
Gizzard Shad	3	5.6%	2	8.7%	77	37.7%	79	37.1%	161
Golden Shiner	--	--	--	--	5	2.5%	16	7.5%	21
Inland Silverside	3	5.6%	--	--	--	--	--	--	3
Largemouth Bass	8	14.8%	7	30.4%	32	15.7%	14	6.6%	61
Longnose Gar	--	--	--	--	1	0.5%	--	--	1
Pumpkinseed	5	9.3%	1	4.3%	9	4.4%	13	6.1%	28
Redear Sunfish	2	3.7%	--	--	--	--	--	--	2
White Perch	6	11.1%	1	4.3%	2	1.0%	--	--	9
Yellow Perch	2	3.7%	--	--	8	3.9%	8	3.8%	18
Total individuals	54		23		204		213		494
Time sampled	3,859		3,336		4,260		3,792		15,247
CPUE	0.01		0.01		0.05		0.06		0.03

Common name	Apr		Jun		Aug		Sep/Oct		Total
	Number	%	Number	%	Number	%	Number	%	
Species richness (R)	11		7		11		10		15
Simpson Diversity Index (λ)	0.14		0.22		0.25		0.25		--
Shannon Diversity Index (H')	2.14		1.67		1.67		1.66		--

Length frequency data are often used to derive growth estimates, and can also be used to assess population demographics. For the purposes of this project, length frequency graphs were generated for recreationally important and migratory species including: bluegill, largemouth bass, and American eel. Figures 4 through 6 illustrate length frequency data for combined surveys across DNA ponds. DNA-P2 and P3 exhibited similar size class distributions between 20 to 180 mm, with a positive skew to the right. The most common size bin for P3 was 30 to 50 mm. For DNA-P2, 70 to 90 mm was the most frequent size class. DNA-P5 exhibited a very different size class distribution for bluegill compared to P2 and P3, with a more normal distribution. P5 also had lower overall numbers and a higher proportion of fish greater than 90 mm.

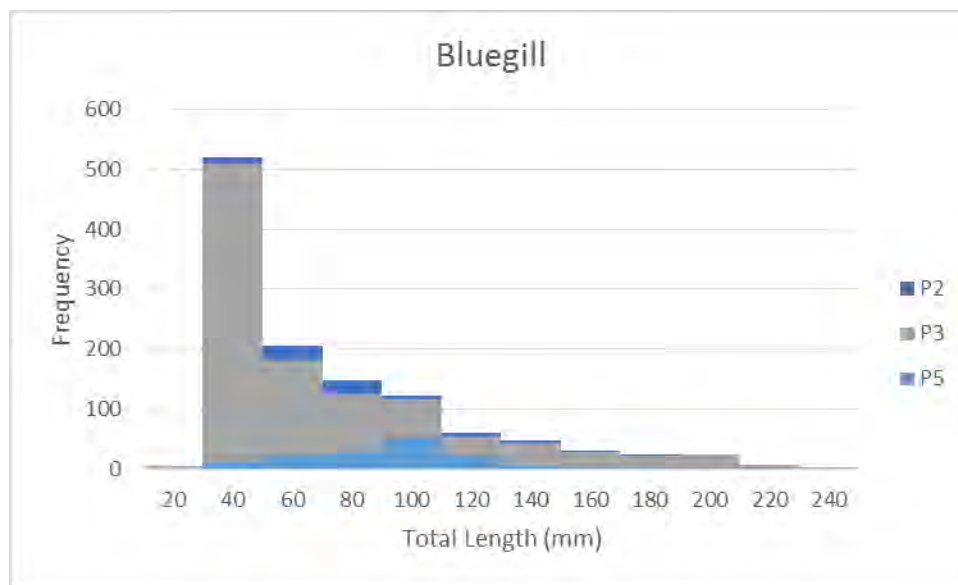


Figure 4: Bluegill Length Frequency for Dam Neck Annex Ponds Surveyed in 2014

Largemouth bass sizes displayed a bimodal distribution across DNA-P3 and DNA-P5, with most individuals falling below 200 mm or between 325 and 525 mm at DNA-P5. DNA-P3 displayed similar size range distribution, but had a higher number of individuals at 400 mm than DNA-P3. Largemouth bass were absent from DNA-P2.

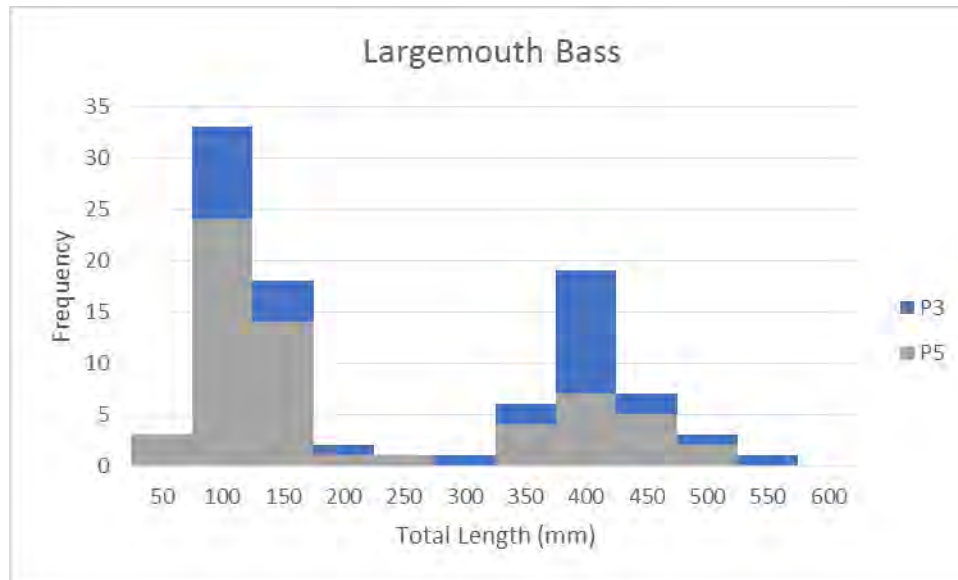


Figure 5: Largemouth Bass Length Frequency for DNA Ponds Surveyed in 2014

American eel sizes were variable for both DNA-P3 and DNA-P5. Although DNA-P3 had a greater size range, both ponds displayed spikes in frequency for individuals around 160 mm and 240 mm.

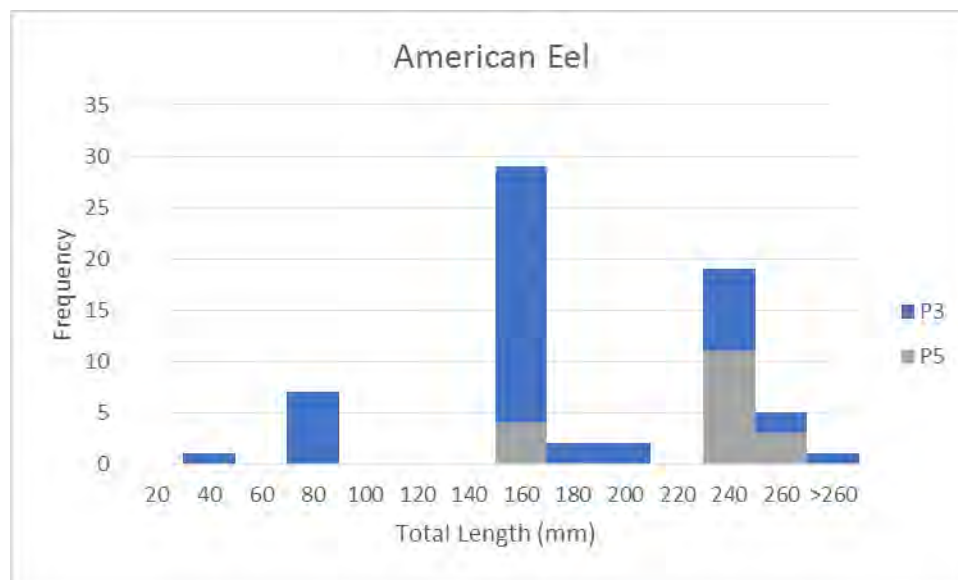


Figure 6: American Eel Length Frequency for DNA Ponds Surveyed in 2014

3.2.3 WATER QUALITY

Water quality results varied by location and depth and are displayed in Figure 7. DNA-P5 showed the widest range of pH between spring and fall. Dissolved oxygen levels remained fairly stable throughout the summer. Temperature patterns were consistent with expected seasonal trends at each pond.

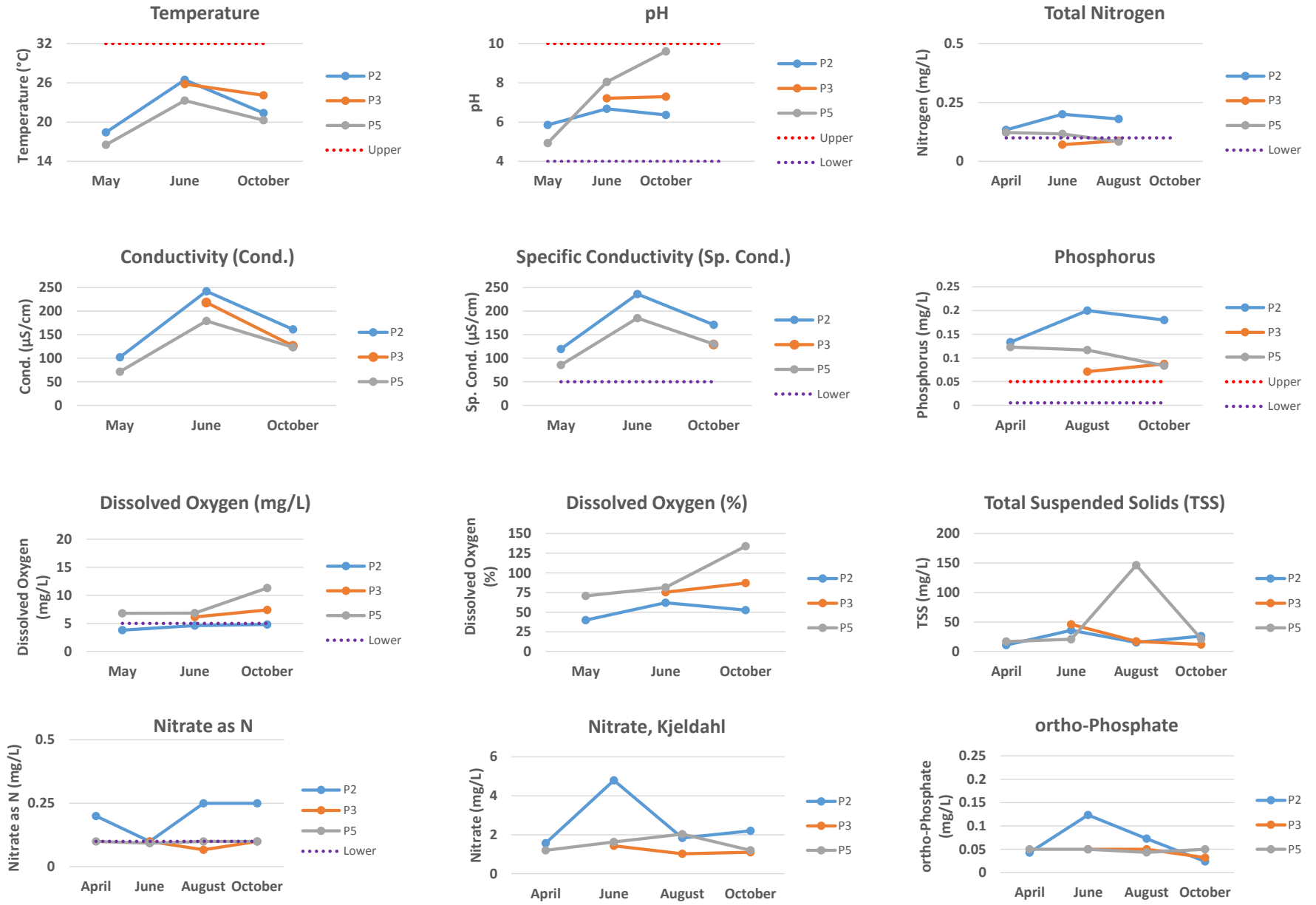


Figure 7: Water Quality Parameters of Dam Neck Annex Ponds

4 DISCUSSION AND MANAGEMENT RECOMMENDATIONS

The discussion and management recommendations in this section include general suggestions, as well as more specific discussion based on the findings from this survey. Prior to implementing any changes to the natural resources management at DNA, a more thorough evaluation of all available options would be necessary to ensure the best possible outcome for the management objectives of the ponds and streams within the context of the DNA military mission.

4.1 RECREATIONAL FISHERIES

Security restrictions at DNA-P3 has limited its use as a recreational fishing pond as determined by this assessment as well as previous assessments (Corning 1968, Galvez and Swihart 2000). Although DNA-P3 supports self-sustaining populations of sport fishes, it has very low recreational fishing development potential because of the existing military mission at Redwing Lake. The fish survey results for the wetland habitat associated with DNA-P2 deem this location unsuitable for maintaining a recreational fishery as well. DNA-P2 is better suited for other recreational activities, such as wildlife viewing from the floating platform access point.

Of the three ponds surveyed in this study, DNA-P5 has the greatest recreational fishing potential and will therefore be the focus of the remaining discussion of recreational fisheries at DNA. DNA-P5 has been managed as a recreational fishing pond since 1961 (Corning 1968). It is conveniently located at the entrance of the DNA installation and has ample access for recreational fishing use. Turbidity and erosion historically have been issues at DNA-P5 due to the colloidal clay base of the pond in which it was constructed on and heavy exposure to wind and wave action. Cationic coagulants were applied as a temporary solution in 1984 (Navy 2014). In 1986, the shoreline was re-graded and covered with a filter cloth. Since then, aquatic vegetation has become established on the shoreline and trees and shrubs have been planted and maintained as a riparian buffer (Navy 2014).

Managing a pond for recreational fisheries is often centered around the bass-bluegill system, and using the relative abundances of these two juvenile species observed in this survey, it is possible to infer any potential imbalances in the pond. Based on Schramm and Willis (2012), the scenarios presented in Table 19 are likely explanations of bass and bluegill abundances and recommended corrective actions to maintain fish populations in the pond. Since largemouth bass can reach 100% maturity at around 229 mm (Laarman and Schneider 1985), the bass population of DNA-P5 contains both juvenile and adults, with abundant juveniles in the range of 100 to 150 mm. The bluegill population of DNA-P5 exhibited a broad size distribution, but with overall low numbers. Approximately 50% of bluegill mature at 100 mm (Peterson et al. 2010), which suggests DNA-P5 contains both juveniles and adults. This may indicate a healthy population of adult largemouth bass, but potentially low spawning or survival of adult bluegill (Table 19; Schramm and Willis 2012).

Table 19: Interpreting the Results of an Annual Juvenile Fish Monitoring Program to Assess the Status of the Largemouth Bass Fishery*

Status of Juvenile Largemouth Bass		Status of Juvenile Bluegill	Status of Fishery	Recommended Action	
Juvenile largemouth bass are absent	AND →	Many small bluegill present, but no intermediate sizes	THEN →	✓ Successful bluegill spawning ✓ Good spawning conditions for largemouth bass are likely ✓ Heavy predation by adult largemouth bass	Reduce adult largemouth bass numbers
		Few small bluegill present, with many intermediate sizes		✓ Either reduced spawning or survival of bluegill ✓ Adult largemouth bass are likely in good condition if present	Reduce intermediate bluegill population
		No small bluegill present, and few intermediate sizes		✓ Habitat may be unsuitable for spawning/rearing, or ✓ Intense predation by largemouth bass may be occurring	Sample adult populations of bluegill and largemouth bass to further diagnose problem
Juvenile largemouth bass are present		No small bluegill present, and many intermediate sizes		✓ Too many bluegill interfere with reproduction of bluegill but not largemouth bass	Reduce intermediate bluegill
		Many small bluegill present, and no intermediate sizes		✓ Bass and bluegill are successfully reproducing, but ✓ Predation by largemouth bass may be excessive	Reduce adult largemouth bass numbers
		Many small bluegill present, and few intermediate sizes		✓ Both bass and bluegill are successfully reproducing, and ✓ Bass are keeping bluegill in control	Balanced fish community, no action required

NOTES: *Results analysis based on Schramm and Willis (2012).

If fish stocking is considered for DNA-P5 , a more targeted pre-stocking survey would be recommended prior to implementation. According to the VDGIF, when stocking a pond using fingerlings, stock numbers should be around 350 bluegill, 150 redear sunfish, 50 largemouth bass, and 50 channel catfish (all numbers per acre) (VDGIF 2013). The recommended stocking program for the 4.5 acre DNA-P5 (without fertilization, and uncorrected for existing fish populations) would be as follows:

- 1,575 bluegill (2.5–5 cm), 675 redear sunfish (2.5–5 cm), and (if desired) 225 channel catfish (5–10 cm), and
- 225 largemouth bass (5–10 cm).

4.2 MIGRATORY FISHERIES

DNA is connected to coastal waters via Lake Tecumseh and the Owl’s Creek/Rudee Inlet, which are connected to Lake Christine via a weir. Lake Tecumseh connects to Back Bay Ashville Bridge Canal which is connected to Currituck Sound, a protected inlet of the Atlantic Ocean located in northeastern North Carolina and southeastern Virginia. Because of this connectivity, there is the potential access for

migratory fishes. Several migratory fish species utilize freshwater stream habitat within the Mid-Atlantic coastal plain (Rhode et al. 1994), including the herrings: alewife, blueback herring, American shad, and hickory shad. River herring are anadromous, meaning that they are born in freshwater and migrate into saltwater to mature. The American eel is also a ubiquitous migratory fish within these stream systems (Rhode et al. 1994). American eel are catadromous, meaning that they are born in saltwater and migrate into freshwater to mature (Jessop et al. 2002). Alewife and blueback herring (collectively, river herring) were recently candidate species for listing as endangered or threatened under the Endangered Species Act (ESA). In July 2013, the National Marine Fisheries Service (NMFS) decided that listing river herring as threatened or endangered under the ESA was not warranted (NMFS 2013). American eel are currently under petition as a candidate for listing under the ESA by the USFWS because they have undergone substantial declines throughout their range (USFWS 2011a).

River herring spawn in a variety of habitats, ranging from swift moving rivers to small tributaries above the tidal zone (NMFS 2009). They migrate during the spring months to spawn in their natal rivers, then return to coastal waters in the summer. Juveniles mature for several years in coastal waters before making their first spawning run (NMFS 2009). River herring abundances are highly variable in Virginia coastal plain streams.

American eel migrate into freshwater streams as juveniles (i.e., elvers) where they mature into the yellow eel phase, remaining in freshwater for up to 30 years. After reaching spawning age (between 2 and 18 years), they migrate back to the ocean (Jessop et al. 2002; USFWS 2011b). Eels are locally common, and often abundant, in Virginia Coastal Plain streams (Rhode et al. 1994). The size distribution observed in this study is likely reflective of recently migrated elvers into the ponds (40 to 80 mm), age-1 yellow-phase residents (160 to 200 mm), and age-1+ yellow-phase residents (>240 mm) (USFWS 2011b; VIMS 2015). The eel's body form and an anguilliform swimming mode is an important aspect of its ability to access freshwater habitats. The eel propels itself in an undulating motion, which they can adapt to surfaces out of the water as well (Helfman et al. 2009). This allows juvenile elver and yellow-eel stages to "climb" under certain conditions (e.g., rough surfaces), enabling them to pass up and over what would otherwise be a barrier to migrating fishes (USFWS 2011a; Ellerby et al. 2001). Elvers have even been documented successfully climbing large vertical concrete structures, such as dams (Devine Tarbell & Associates 2006; Kleinshmidt 2000).

No river herring were observed during this survey, however gizzard shad were observed, which are known to move locally between fresh and brackish waters, and are sometimes included in the river herring category. American eel, as expected, were present within the DNA installation. The size classes observed were consistent with the "elver" and "yellow" eel life stages. Therefore, the elvers present likely migrated into the DNA streams and ponds during spring 2014 and the yellow-phase individuals have been residents since at least the spring 2013 migration period, when they entered the streams and ponds as elvers. Yellow-phase eels reside in freshwater systems for 2 to 6 years (sometimes up to 18 years) until they reach maturity and migrate back to the ocean to spawn as "silver-phase" eels (VIMS 2015).

Additional targeted surveys of migratory fish species utilizing DNA streams to assess evidence of spawning runs of river herring or American eel would provide further evidence of migratory fish use of DNA streams and ponds. This can be done through:

- Periodic electrofishing surveys during migration windows of adult river herring or juvenile American eel, covering late-March through mid-April.

- Periodic electrofishing surveys during mid-summer, to document the presence of young-of-year river herring and juvenile/adult (yellow-phase) American eels

4.3 FISH PASSAGE

No barriers to fish passage were observed at DNA. However, in some cases the perimeter security fence surrounding the installation has the potential to inhibit fish passage, if reinforced fencing across the stream channel exacerbates the formation of debris dams. Such areas should be monitored on a routine basis for security reasons as well, since debris dams could cause flow to be diverted away from the stream channel and undermine the fence entirely, as seen at one of the Oceana streams as part of this project (Tetra Tech 2015). Also any culverts should be kept clear of debris or beaver obstructions to maintain connectivity of fish habitat and to minimize flooding caused by a blocked culvert.

4.4 CHANNELIZED STREAMS

There are very few streams located at DNA and those present are highly channelized and were likely deepened at one time to increase drainage. These changes are likely to have had detrimental impacts on habitat quality. Results from this habitat assessment characterized DNA streams as a low-quality (marginal) stream habitat. Channelization reduces the habitat diversity of a stream and inhibits normal overbank flooding during storm events, reducing the connectivity to adjacent wetlands and waterbodies. The floodwater abatement and water quality protection functions normally provided by the floodplain and any adjacent wetlands are significantly diminished as a result (Navy 2014). This type of channelized system may experience wide changes in water levels over a short time period, which can limit the diversity and sustainability of the resident fish populations.

4.5 WATER QUALITY

Water quality parameters such as pH, alkalinity, dissolved oxygen, and turbidity should all be considered in a pond management strategy to promote biological success. The continual assessment and monitoring of these indicators can help identify preventative management actions for issues such as eutrophication, sedimentation, and non-point source contamination. Regular water quality monitoring provides the baseline data necessary to inform a proactive pond management approach. Highlighted below are summaries for the water quality conditions at DNA and their implications for aquatic habitat quality.

- The pH levels remained within levels of survival as described in Boyd and Boyd (2012) (4.0-10.0), ranging from 4.4 to 9.4. Levels in DNA-P5 steadily increased throughout the study period while remaining consistent over time at DNA-P2 and DNA-P3. The lack of fluctuation in the DNA-P2 and DNA-P3 is likely due to the lack of depth stratification as compared to DNA-P5. Although ranges are within the bounds of survival, a pH of less than 6.0 may result in stunted growth. The pH levels were below this in May at DNA-P5 and were borderline throughout the study period in DNA-P2.
- Dissolved oxygen was within the recommended levels as described in Boyd and Boyd (2012) (>5.0 mg/L) for DNA-P3 and DNA-P5. Dissolved oxygen at DNA-P2 remained below the recommended threshold for the entire study period. The lack of oxygen in DNA-P2 is most likely a result of lack of depth stratification and large amounts of organic decay from heavy amounts of aquatic vegetation in this wetland habitat.
- Specific conductance ranged from 84.0 to 187.0 $\mu\text{S}/\text{cm}$. This equates to 40 to 400 mg/L of total dissolved solids, an acceptable range for fish growth (Boyd and Boyd 2012).

- All ponds were within the optimal to intermediate range for fish growth throughout the study period except for DNA-P5 in August. Total suspended solids (TSS) are any particles larger than 2 µm suspended in the water (Kemker 2014). Buck (1956) determined that ponds with TSS of 5 to 25 mg/L are optimal for growth of bass and sunfish species, while TSS levels between 25 to 100 resulted in intermediate growth and greater than 100 mg/L resulted in the lowest growth potential for bass. Although the greatest growth potential occur in clear ponds, low levels of TSS result in low environmental productivity.
- Nutrient levels were consistently high for phosphorus and were within recommended bounds for nitrogen in all ponds (Boyd and Boyd 2012). High levels of nitrogen and phosphorus typically result from pollution from agricultural runoff. Nutrient loading may result in eutrophic conditions. Although phosphorus levels were recorded as being high, there is no evidence of eutrophication. In fact, the low levels of mineralization and TSS observed here suggest low levels of productivity.

DNA-P5 is vulnerable to non-point source (NPS) pollution from the surrounding manicured lawn areas and roadways that may distribute nutrient waste directly into the pond. Currently, the pond has a thin border of natural vegetation that may help maintain the water quality by filtering sediment from runoff and providing bank stabilization (Austin et al. 1996). The buffer also has the ability to capture sediments transported during rain events. High sedimentation rates can hinder the respiratory and feeding capacity of largemouth bass, bluegills, and redear sunfish, and even slow their growth (Austin et al. 1996).

Currently, dissolved oxygen, pH, TSS, and nutrient levels recorded in DNA-P5 are considered sufficient to sustain native fish populations and promote productivity, without the need for supplemental fertilization. Water quality should continue to be monitored to determine any management actions. Poor water quality can be detrimental to both the physical and biological pond environment, therefore it should be monitored on a routine basis.

4.6 INVASIVE SPECIES

Invasive species that may affect ponds in the area include various types of aquatic algae, as well as free floating, submergent, and emergent species. Fish kills can occur when high volumes of vegetation die and decay, depleting oxygen in the process. Eutrophication is typically not an issue for well-constructed ponds that provide vegetation densities of less than 30% of the pond area (Boyd and Boyd 2012).

The common reed (*Phragmites australis*) is an invasive species that could potentially affect DNA-P5. It was observed at the DNA installation during this survey, but not in the area DNA-P5. This plant can be invasive in streams and ponds, and can tolerate both fresh and salt water. Since 2006, a herbicide spraying program has been in place as an effort to control the common reed (Navy 2014). Alligator weed (*Alternanthera philoxeroides*), Asian spiderwort (*Murdannia keisak*), and Eurasian milfoil (*Myriophyllum spicatum*), and narrowleaf cattail (*Typha angustifolia*) have potential to become invasive species on the Installation and should be monitored for. Other invasive species to monitor include red-eared slider (*Chrysemys scripta elegans*) and Asian carp species.

The nutria (*Myocastor coypus*), a relative to the native muskrat (*Ondatra zibethicus*), is a semi-aquatic invasive species capable of negatively impacting environment. Although, no evidence of nutria was observed during the surveys, monitoring for them should continue. Nutria may feed on vegetation and outcompete native species, stunting growth of the aquatic ecosystem. The most effective method of

controlling nutria populations is shooting or trapping. Other management actions include using hardware cloth tubes and plastic seed protectors (USGS 2007). Natural resource managers should respond with appropriate control measures in nutria are encountered on the Installation.

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APPENDIX A - PHOTOGRAPHIC LOG

Site: NASO Dam Neck Annex, Virginia Beach, VA

Project: Task Order WE85 NASO-DNA Stream and Pond Assessment

Photo No.: DSCF0117

Date: 03 June 2014

Photographer: B. Dresser

Comments: Typical section of DNA-S1.



Site: NASO Dam Neck Annex, Virginia Beach, VA

Project: Task Order WE85 NASO-DNA Stream and Pond Assessment

Photo No.: 20140929_105939

Date: 29 September 2014

Photographer: E. Foster

Comments: Typical section of DNA-S1, with floating vegetation in the stream channel.



Site: NASO Dam Neck Annex, Virginia Beach, VA

Project: Task Order WE85 NASO-DNA Stream and Pond Assessment

Photo No.: DSCF0118

Date: 03 June 2014

Photographer: B. Dresser

Comments: : End of surveyed reach at DNA-S1.



Site: NASO Dam Neck Annex, Virginia Beach, VA

Project: Task Order WE85 NASO-DNA Stream and Pond Assessment

Photo No.: 20140929_142214

Date: 29 September 2014

Photographer: B. Dresser

Comments: : Typical section of DNA-S2, with dense floating vegetation in the stream channel, overhanging riparian vegetation on right (east) bank and developed left (west) bank.



APPENDIX B - BLANK DATA SHEETS

Project: _____ Date and Time (Start-End): _____ Investigators: _____

 Stream: _____ Reach: _____ Partial Debris Dam Tally for Reach: _____ GPS @ Start Point: Y N Photo #'s: _____

 Start of Reach located at: Confluence with _____ Installation-Specific _____ Arbitrary location _____

	Barrier Type		Barrier Type		Barrier Type		Barrier Type	
	<input type="checkbox"/> Debris Dam # _____ <input type="checkbox"/> Bridge # _____ Name of Road _____ <input type="checkbox"/> Culvert # _____ Name of Road _____ GPS Point? Y / N	<input type="checkbox"/> Debris Dam # _____ <input type="checkbox"/> Bridge # _____ Name of Road _____ <input type="checkbox"/> Culvert # _____ Name of Road _____ GPS Point? Y / N	<input type="checkbox"/> Debris Dam # _____ <input type="checkbox"/> Bridge # _____ Name of Road _____ <input type="checkbox"/> Culvert # _____ Name of Road _____ GPS Point? Y / N	<input type="checkbox"/> Debris Dam # _____ <input type="checkbox"/> Bridge # _____ Name of Road _____ <input type="checkbox"/> Culvert # _____ Name of Road _____ GPS Point? Y / N	<input type="checkbox"/> Debris Dam # _____ <input type="checkbox"/> Bridge # _____ Name of Road _____ <input type="checkbox"/> Culvert # _____ Name of Road _____ GPS Point? Y / N	<input type="checkbox"/> Debris Dam # _____ <input type="checkbox"/> Bridge # _____ Name of Road _____ <input type="checkbox"/> Culvert # _____ Name of Road _____ GPS Point? Y / N		
Potential for Fish Passage	<input type="checkbox"/> HIGH <input type="checkbox"/> MED <input type="checkbox"/> LOW <input type="checkbox"/> NONE	<input type="checkbox"/> HIGH <input type="checkbox"/> MED <input type="checkbox"/> LOW <input type="checkbox"/> NONE	<input type="checkbox"/> HIGH <input type="checkbox"/> MED <input type="checkbox"/> LOW <input type="checkbox"/> NONE	<input type="checkbox"/> HIGH <input type="checkbox"/> MED <input type="checkbox"/> LOW <input type="checkbox"/> NONE	<input type="checkbox"/> HIGH <input type="checkbox"/> MED <input type="checkbox"/> LOW <input type="checkbox"/> NONE	<input type="checkbox"/> HIGH <input type="checkbox"/> MED <input type="checkbox"/> LOW <input type="checkbox"/> NONE	<input type="checkbox"/> HIGH <input type="checkbox"/> MED <input type="checkbox"/> LOW <input type="checkbox"/> NONE	<input type="checkbox"/> HIGH <input type="checkbox"/> MED <input type="checkbox"/> LOW <input type="checkbox"/> NONE
Barrier Height								
Vertical Water Drop								
Pool Immediately Below?	<input type="checkbox"/> Y Depth _____ <input type="checkbox"/> N	<input type="checkbox"/> Y Depth _____ <input type="checkbox"/> N	<input type="checkbox"/> Y Depth _____ <input type="checkbox"/> N	<input type="checkbox"/> Y Depth _____ <input type="checkbox"/> N	<input type="checkbox"/> Y Depth _____ <input type="checkbox"/> N	<input type="checkbox"/> Y Depth _____ <input type="checkbox"/> N	<input type="checkbox"/> Y Depth _____ <input type="checkbox"/> N	
Wetted Channel Width								
Structure Width (length, for culverts)								
Stream Channel	Upstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural Downstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural	Upstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural Downstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural	Upstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural Downstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural	Upstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural Downstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural	Upstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural Downstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural	Upstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural Downstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural	Upstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural Downstream: <input type="checkbox"/> channelized <input type="checkbox"/> natural	
Bank Erosion?	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	
Scouring or undercutting of structure?	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	
Structure Span/Diameter								
Beaver Activity?	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	
DEBRIS DAMS	Debris Dam Composition	<input type="checkbox"/> woody debris <input type="checkbox"/> leaf litter <input type="checkbox"/> sediment <input type="checkbox"/> other _____	<input type="checkbox"/> woody debris <input type="checkbox"/> leaf litter <input type="checkbox"/> sediment <input type="checkbox"/> other _____	<input type="checkbox"/> woody debris <input type="checkbox"/> leaf litter <input type="checkbox"/> sediment <input type="checkbox"/> other _____	<input type="checkbox"/> woody debris <input type="checkbox"/> leaf litter <input type="checkbox"/> sediment <input type="checkbox"/> other _____	<input type="checkbox"/> woody debris <input type="checkbox"/> leaf litter <input type="checkbox"/> sediment <input type="checkbox"/> other _____	<input type="checkbox"/> woody debris <input type="checkbox"/> leaf litter <input type="checkbox"/> sediment <input type="checkbox"/> other _____	
	Is this a Beaver Dam?	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	
Alternate Channel Formation/Braiding?	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	
BRIDGE/CULVERT	Clearance							
	Bridge Material	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> timber <input type="checkbox"/> other _____	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> timber <input type="checkbox"/> other _____	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> timber <input type="checkbox"/> other _____	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> timber <input type="checkbox"/> other _____	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> timber <input type="checkbox"/> other _____	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> timber <input type="checkbox"/> other _____	
	Culvert Material	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> plastic <input type="checkbox"/> other _____	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> plastic <input type="checkbox"/> other _____	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> plastic <input type="checkbox"/> other _____	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> plastic <input type="checkbox"/> other _____	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> plastic <input type="checkbox"/> other _____	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> plastic <input type="checkbox"/> other _____	<input type="checkbox"/> concrete <input type="checkbox"/> steel <input type="checkbox"/> plastic <input type="checkbox"/> other _____
	Corrugated?	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
	# of Arches/Culverts							
	Opening Obscured Up/Downstream	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
	Depth Inside Structure							
	Armoring?	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N	Left: <input type="checkbox"/> Y <input type="checkbox"/> N Right: <input type="checkbox"/> Y <input type="checkbox"/> N
	Overflow Pipe?	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
	Substrate inside structure							
Structure outlet is:	<input type="checkbox"/> partially backwatered <input type="checkbox"/> at grade <input type="checkbox"/> cascade/free fall	<input type="checkbox"/> partially backwatered <input type="checkbox"/> at grade <input type="checkbox"/> cascade/free fall	<input type="checkbox"/> partially backwatered <input type="checkbox"/> at grade <input type="checkbox"/> cascade/free fall	<input type="checkbox"/> partially backwatered <input type="checkbox"/> at grade <input type="checkbox"/> cascade/free fall	<input type="checkbox"/> partially backwatered <input type="checkbox"/> at grade <input type="checkbox"/> cascade/free fall	<input type="checkbox"/> partially backwatered <input type="checkbox"/> at grade <input type="checkbox"/> cascade/free fall	<input type="checkbox"/> partially backwatered <input type="checkbox"/> at grade <input type="checkbox"/> cascade/free fall	
cross sectional schematic (draw)								

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____	
INSTREAM FEATURES	Estimated Reach Length _____m Estimated Stream Width _____m Sampling Reach Area _____m ² Area in km ² (m ² x1000) _____km ² Estimated Stream Depth _____m Surface Velocity _____m/sec (at thalweg)	Canopy Cover <input type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle _____% <input type="checkbox"/> Run _____% <input type="checkbox"/> Pool _____% Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input type="checkbox"/> No
LARGE WOODY DEBRIS	LWD _____m ² Density of LWD _____m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation _____%	
WATER QUALITY	Temperature _____° C Specific Conductance _____ Dissolved Oxygen _____ pH _____ Turbidity _____ WQ Instrument Used _____	Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____	Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY	DATE _____ TIME _____ AM PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach	Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor	
	1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category				
	Optimal	Suboptimal	Marginal	Poor	
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.	
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.	
	SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
	SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.	
	SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Parameters to be evaluated broader than sampling reach

Total Score _____

FISH SAMPLING FIELD DATA SHEET (FRONT)

page ____ of ____

STREAM NAME	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
GEAR	INVESTIGATORS	
FORM COMPLETED BY	DATE _____ TIME _____ AM PM	REASON FOR SURVEY

SAMPLE COLLECTION	<p>How were the fish captured? <input type="checkbox"/> back pack <input type="checkbox"/> tote barge <input type="checkbox"/> other _____</p> <p>Block nets used? <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Sampling Duration Start time _____ End time _____ Duration _____</p> <p>Stream width (in meters) Max _____ Mean _____</p>
HABITAT TYPES	<p>Indicate the percentage of each habitat type present</p> <p><input type="checkbox"/> Riffles _____% <input type="checkbox"/> Pools _____% <input type="checkbox"/> Runs _____% <input type="checkbox"/> Snags _____%</p> <p><input type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other (_____) _____%</p>
GENERAL COMMENTS	

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)	ANOMALIES*							
			D	E	F	L	M	S	T	Z

DISCHARGE FORM - WADEABLE

Reviewed by (Initials): _____

SITE ID: FW08 DATE: / / 20

<input type="radio"/> Velocity Area			
Distance Units	Depth Units	Velocity Units	
<input type="radio"/> ft <input type="radio"/> cm	<input type="radio"/> ft <input type="radio"/> cm	<input type="radio"/> ft/s XX.X <input type="radio"/> m/s X.XX	
Dist. from Bank	Depth	Velocity	Flag
1	0		
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

<input type="radio"/> Timed Filling			
Repeat	Volume (L)	Time (s)	Flag
1			
2			
3			
4			
5			

<input type="radio"/> Neutral Bouyant Object			
	Float 1	Float 2	Float 3
Float Dist. <input type="radio"/> ft <input type="radio"/> m			
Float Time (s)			
Flag			

Cross Sections on Float Reach			
	Upper Section	Middle Section	Lower Section
Width <input type="radio"/> ft <input type="radio"/> m			
Depth 1 <input type="radio"/> ft <input type="radio"/> cm			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

Q Value If discharge is determined directly in field, record value here: Q = _____ cfs m³/s FLAG

Flag	Comments

Flag Codes: K = No measurement or observation made; U = Suspect measurement or observation; Q = Unacceptable QC check associated with measurement; Z = Last station measured (if not Station 20); F1, F2, etc. = Miscellaneous flags assigned by each field crew. Explain all flags in comments section.



Project: _____ **Site:** _____ **Meter:** _____

Investigators: _____ **Remarks:** _____

Stream Reach	Location	Date/Time	In-situ Measurements					Grab Samples			Remarks
			pH	Dissolved Oxygen (mg/L)	Oxygen Saturation (%)	Sp. Cond. °25C (µS/cm)	Temperature (C°)	Total Nitrogen (TN)	Total Phos. ortho-Phos. (SRP)	Total Suspended Solids (TSS)	
								<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
								<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
								<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
								<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
								<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
								<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
								<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
								<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
								<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
								<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	



Project: _____

Site: _____ Date and Time (Start-End): _____

Investigators: _____

Weather Conditions (current and past 24 hrs): _____

Pond Surface Conditions: _____

Index GPS Coordinates: LAT: _____ LONG: _____

Observed Approx. Depth Range: _____

SITE LOCATION MAP (Include locations sampled by gear type, water quality index location, inlet/outlet streams, cover, vegetation, and high water mark):

A large, empty rectangular box with a black border, intended for drawing a site location map. The box is currently blank.

Water Quality (Recorded at Index Location)	In-situ Measurements				Grab Samples			
	Depth = _____ m	pH	Dissolved Oxygen (mg/L)	Oxygen Saturation (%)	Conductivity (µS/cm)	Temperature (C°)	Total Nitrogen (TN)	Total Phosphorus & ortho-phosphate (SRP)	Total Suspended Solids (TSS)
Upper (Surface)						<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled
Middle						<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled
Lower						<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled
Remarks:								

Shoreline Characteristics				
	Rare (<5%)	Sparse (5 to 25%)	Moderate (26 to 75%)	Extensive (76 to 100%)
Forest				
Grass				
Shrub				
Wetland				
Bare Ground				
Agriculture				
Shoreline Modifications (concrete, rip rap, etc.)				
Development (residential/industrial)				
Shoreline Qualitative Macrophyte Survey				
Emergent/Floating				
Submergent				
Macrophyte Density (circle one)	Absent	Sparse	Moderate	High
Shoreline Stability (%)			Stable %	Eroding %

Littoral Bottom Substrate (shoreline out to 10 m)					
	Absent (0%)	Sparse (<10%)	Moderate (11-40%)	Heavy (41 to 70%)	Very Heavy (71 to 100%)
Bedrock					
Boulder					
Cobble					
Gravel					
Sand					
Silt, Clay, Muck					
Woody Debris					
Organic (leaf pack, detritus)					
Vegetation or other					
<i>Substrate Odor/Color:</i>					
<i>Remarks:</i>					
Littoral Fish Cover (shoreline out to 10 m)					
Aquatic and Inundated Herbaceous Vegetation					
Woody Debris/Snags					
Inundated Live trees					
Overhanging Vegetation					
Sharp Ledges or Dropoffs					
Boulders					
Human Structures (docks, barges, tires, car bodies, etc.)					
<i>Species Observed:</i>					
<i>Remarks:</i>					

Fish Sampling: yes no **Gear Used:** electrofishing exp. gill net seine minnow trap hook & line

Trophic State: Oligotrophic Mesotrophic Eutrophic Hypereutrophic

Emergent/Submerged Vegetation Observed: _____

Invasive Species Observed: _____

Wildlife Observed: _____

Additional Notes: _____

APPENDIX C - FIELD DATA SHEETS

Location: DWA - P-3 (PI)	Gear	Boat e-fishing	Button Time (sec): 3898
Date: 4/30/2014	Gill net	Effort:	Deployed (time):
Time: 6900	Seine	Net Dimensions:	Length (m)
Personnel: CM, CLK	Minnow trap	Effort:	Deployed (time):
			Retrieved (time)
			Height (m)
			Retrieved (time)

Species	Length (max. 25 specimens)	Tally	Total
Gizzard shad	345, 344, 350, 330	|||| (4)	
Bowfin	578, 655, 670	|||| (3)	
Black crappie	207, 287, 220, 192, 228, 320, 265, 213, 317, 417, 290, 258	|||| (12)	
Yellow perch	123, 113, 115, 115, 114, 122, 122, 104, 177, 110, 123, 108, 123, 114, 110, 115, 127, 130, 114, 110, 118, 197, 110, 105, 123, 129, 114	|||| (28)	
Pumpkinseed	114, 123, 137, 115, 142, 70, 77, 118, 148, 73, 52, 88, 72, 121, 130, 139, 85, 132, 142, 123, 117, 66, 72, 83, 135, 127, 171, 123, 113, 119, 62, 73, 127, 127, 119, 157, 122, 132, 74, 107, 149, 142, 151, 117, 69	|||| (45)	
Bluegill	104, 80, 150, 100, 169, 127, 42, 56, 113, 63, 183, 160, 178, 170, 32, 46, 40, 46, 52, 37, 175, 66, 156, 126, 37, 34, 30, 214, 160, 45, 204, 120, 89, 40, 35, 165, 69, 33	|||| (38)	

655, 670 Bowfin
 1070 Gar
 2 common Crap

30FS

Location: PWA-PS (P2) P2
 Date: 4/30/2014
 Time: 1200
 Personnel: CM, CW

Gear: Boat e-fishing
 Gill net
 Seine
 Minnow trap

Button Time (sec): 1917
 Effort:
 Net Dimensions:
 Effort:

Deployed (time):
 Length (m):
 Deployed (time):

Retrieved (time):
 Height (m):
 Retrieved (time):

Species	Length (max. 25 specimens)	Tally	Total
Gizzard shad	319, 366, 395, 342, 339, 339,	14# 1 (6)	
Black crappie	310, 325, 280, 230, 309, 142	14# 1 (6)	
Yellow perch	125, 117, 122, 111, 110, 120, 113, 135, 114, 126, 209	14# 14# 1 (11)	
largemouth bass	498, 541, 495, 392, 386	14# (5)	WEIGHT 3100, 2720 1500, 994 794
Bluegill	72, 76, 88, 78, 64, 70, 118, 88, 165, 162, 55, 59, 65	4# 14# 11# (13)	
White perch	124, 242	11 (2)	

DWA - P3 (cont)
4/30/2014

40FS

Species	Length (max. 25 specimens)	Tally	Total
Golden shiner	93,	①	
Pumpkinseed	88,150,120,101,125	JHT ⑤	
Common carp		" ②	
American eel	<150 1	1 ①	

1052

Location: DNA-PS	Gear	Boat e-fishing	Button Time (sec): 3859
Date: 5/1/2014	Gill net	Effort:	Deployed (time):
Time: 9:00 am	Seine	Net Dimensions:	Length (m)
Personnel: CM, CW	Minnow trap	Effort:	Deployed (time):
			Retrieved (time)
			Height (m)
			Retrieved (time)

Species	Length (max. 25 specimens)	Tally	Total
Bluespotted sunfish	63,	I ①	
Gizzard shad	373, 361, 324	III ③	
Largemouth bass	440, 479, 374, 397, 359, 350, 108, 160	IIII III ⑧	WEIGHT 1228, 1589 661, 772 524, 548 16, 38
Bluegill	179, 58, 73, 125, 93, 141, 84, 73, 192, 73, 121, 73 218, 75	IIII III III ⑭	
Pumpkinseed	138, 147, 126, 118, 141	IIII ⑤	
White perch	107, 107, 95, 113, 103, 98	IIII I ⑥	

DWA-5 (cont)
5/1/2014

2 of 2

Species	Length (max. 25 specimens)				Tally	Total
Yellow perch	145, 167				" (2)	
American eel	<150	150-300	300-450	>450	||||| (8)	
	"					
Silverside	74, 78, 78				||||| (3)	
Black crappie	217, 231				" (2)	
Redear sunfish	155, 158				" (2)	

DNA-P2

1 of 2

Wetzel

Location:	Gear	Boat e-fishing	Button Time (sec): 2250	282 volts (~7amps)
Date: 6/3/14	Gill net	Effort:	Deployed (time):	Retrieved (time)
Time:	Seine	Net Dimensions:	Length (m)	Height (m)
Personnel: CM, PFS	Minnow trap	Effort:	Deployed (time):	Retrieved (time)

Species	Length (max. 25 specimens)	Fally Dead	Total
Bluesill	40, 61, 53		
Pumpkinseed	77, 87, 96, 103, 110, 112, 115		
Bluespotted Sunfish	72, 103, 58, 43, 38, 60, 44, 40, 42, 38, 46, 43, 42, 64, 71, 40, 72, 46, 43, 42, 40, 43, 37, 35, 38, 37, 45, 38, 40, 43, 65, 65, 48, 59, 47, 41, 43	1 fish has eroded fins (alive) THH	
Longnose Gars	Over 750		
Bowfin	349, 493		
Black Crappie	195	1 fish has eroded fins (alive)	

DNA-P2
06/03/2014

Species	Length (max. 25 specimens)	Tally Dead	Total
Brown Bullhead	105, 103		
Flier	163, 146, 78,		
Wormouth	53, 43, 51, 55, 45, 48, 58, 159, 42, 50, 45		
Mosquitofish (Eastern)	44, 39, 43, 43, 33, 45, 29,	111 (retained)	
Redfin Pickerel	88.		
Blue spotted Sunfish (Continued)	45, 46, 43, 44, 39, 42, 42, 38, 39, 41, 43, 52, 42, 43, 42, 38, 33, 46, 40, 32, 49, 40, 42, 50, 37, 50, 52, 38, 73, 42, 43, 39.	1111 (retained)	
Eastern mud Minnow	31, 68, 58,	(retained)	

DWA-03

Location: <u>Redway</u>	Gear	Boat e-fishing	Button Time (sec): 4125	282 volts (~700PS)
Date: <u>6/4/14</u>	Gill net		Effort:	Retrieved (time)
Time:	Seine		Net Dimensions: Length (m)	Height (m)
Personnel: <u>CM, OTS</u>	Minnow trap		Effort:	Retrieved (time)

Species	Length (max. 25 specimens)		Tally	Total
Chain Pickerel	240, 242, 72, 279, 71, 75		(retained) 1	
Bluegill	131, 141, 72, 125, 65, 49, 82, 109, 125, 95, 55, 57, 141, 93, 43, 77, 54, 125, 85, 47, 66, 155, 140, 122, 118, 86, 140, 67, 54, 67, 44, 53, 47, 77, 136, 67, 62, 73, 88, 83, 68, 73, 52, 53, 222, 40, 87, 82, 81		High incidence of anchor worms, 1 with eroded fins, 1 with bile mark	
Blue Spotted Sunfish	602, 42, 47, 58, 66, 54, 74, 44, 55, 43, 52, 58, 53, 65, 54, 49, 1		(retained) 1	
Brown Bullhead	< 30 mm		(retained) 111	
Black Croppie	270 _n			
Longnose with Bass	195 (14), 291 (34), 109 (17), 366 (758), 398 (908)	stressed/die		

Redwin LK
DWA-P3 06/04/2014

3-A-3

Species	Length (max. 25 specimens)	Tally	Total
White Perch	191, 204,		
Gizzard Shad	323		
Bluegill (continued)	193, 142, 167, 193, 197, 103, 124, 116, 77, 69, 53, 45, 69, 151, 84, 102, 75, 62, 62, 51, 43	11	
Bowfin	396		
Common Carp	# 1 also, not netted # seen, not netted		

DWA-PS

10+2

Location: Saddle	Gear	Boat e-fishing	Button Time (sec):	3336	(3540) 6-7 samp
Date: 6/2/14	Gill net		Effort:		Retrieved (time)
Time:	Seine		Net Dimensions:	Length (m)	Height (m)
Personnel: CM, PS	Minnow trap		Effort:	Deployed (time):	Retrieved (time)

Species	Length (max. 25 specimens)	Faily Dead	Total
Largemouth Bass	360(636), 410(990) 433(1097), 324(413), 316(416) 45(1), 47(1)	1	
Bluegill	93, 80, 56, 104, 185, 88	1	
Black Croppie	175,	1	
Gizzard shad	376, 361		
American Eel	150-300 THH USOR 300-450 below 150		
White Perch	120,	1	

DNA-PS
06/14/2014

Species	Length (max. 25 specimens)	Tally	Total
Pumpkinseed	142		
Percid larvae observed but not captured			

FISH SAMPLING FIELD DATA SHEET (FRONT)

page 1 of 1

STREAM NAME DNA-51 DNA-51	LOCATION OCEANA DAM NECK
STATION # _____ RIVERMILE _____	STREAM CLASS _____
LAT _____ LONG _____	RIVER BASIN _____
STORET # _____	AGENCY _____
GEAR UR-24	INVESTIGATORS _____
FORM COMPLETED BY Lamontagne	DATE 6/3/14 TIME 2:30 AM (PM) REASON FOR SURVEY Fish survey

SAMPLE COLLECTION	How were the fish captured? <input checked="" type="checkbox"/> back pack <input type="checkbox"/> tote barge <input type="checkbox"/> other _____
	Block nets used? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
	Sampling Duration Start time 12:30 End time _____ Duration 23:70
	Stream width (in meters) Max 5m Mean 5m
HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Riffles _____% <input checked="" type="checkbox"/> Pools 100% <input type="checkbox"/> Runs _____% <input type="checkbox"/> Snags _____% <input checked="" type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other () _____%
GENERAL COMMENTS	

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)						ANOMALIES*								
		TL	W	TL	W	TL	W	D	E	F	L	M	S	T	Z	
Blue Coat Sunfish	15	47	1.8	74	8.0	50	2.2									
		45	1.8	44	1.4	38	1.1									
		62	4.1	36	0.9	45	1.4									
		37	0.7	44	1.3	38	0.8									
		42	1.2	44	1.5	41	1.1									
Mud Minnow	15	80	5.0	51	1.6	55	2.1									
		80	5.0	52	1.5	82	6.1									
		65	2.6	32	0.3	74	4.8									
		58	1.9	57	1.9	64	2.5									
		27	0.1	57	2.2	56	1.7									
Eliet	8	125	35*	108	22.8											
		92	74	75	7.4											
		164	93.0	92	14.8											
		89	13													
		93	13.8													
Blue Soot	6	47	1.8	42	1.4											
		45	1.5													
		54	2.4													
		46	1.7													
		36	0.7													

DISCHARGE FORM - WADEABLE

Reviewed by (Initials): _____

SITE ID: FW08

DNASI

DATE: 06/03/20

5.00m
wide

Velocity Area

Distance Units: ft cm
Depth Units: ft cm
Velocity Units: ft/s XX.X m/s X.XX

	Dist. from Bank	Depth	Velocity	Flag
1	0	1.0	0.00	
2	50	1.4	0.00	
3	100	1.7	0.01	
4	150	1.8	0.01	
5	200	1.7	0.01	
6	250	2.0	0.01	
7	300	2.2	0.00	
8	350	2.1	0.00	
9	400	1.7	0.00	
10	450	1.4	0.00	
11	500	0.9	0.00	
12				
13				
14				
15				
16				
17				
18				
19				
20				

Timed Filling

Repeat	Volume (L)	Time (s)	Flag
1			
2			
3			
4			
5			

Neutral Bouyant Object

	Float 1	Float 2	Float 3
Float Dist. <input type="radio"/> ft <input type="radio"/> m			
Float Time (s)			
Flag			

Cross Sections on Float Reach

	Upper Section	Middle Section	Lower Section
Width <input type="radio"/> ft <input type="radio"/> m			
Depth 1 <input type="radio"/> ft <input type="radio"/> cm			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

Q Value If discharge is determined directly in field, record value here: Q = _____ cfs m³/s FLAG

Flag	Comments

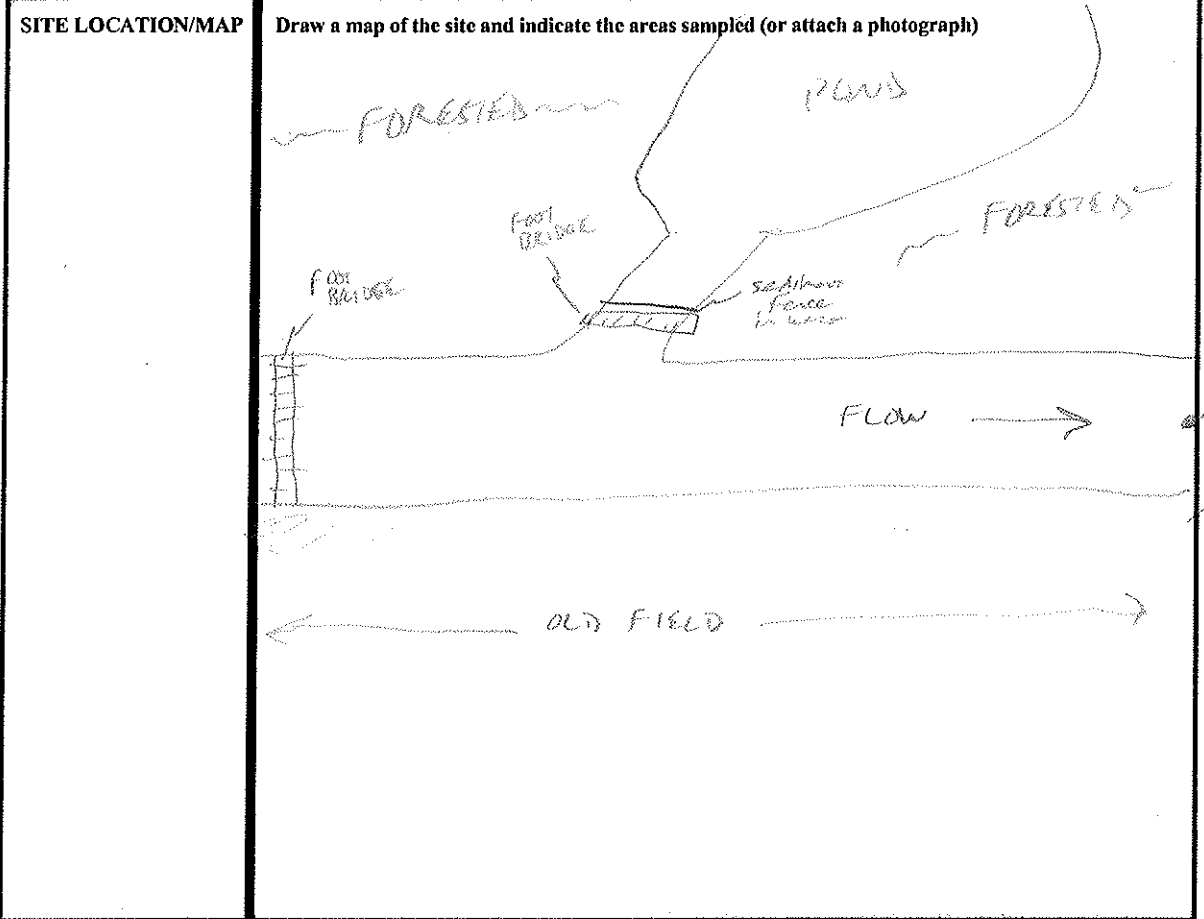
Flag Codes: K = No measurement or observation made; U = Suspect measurement or observation; Q = Unacceptable QC check associated with measurement; Z = Last station measured (if not Station 20); F 1, F2, etc. = Miscellaneous flags assigned by each field crew. Explain all flags in comments section.



**PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(FRONT)**

STREAM NAME <u>DNA - 51</u>	LOCATION <u>OCEANA / DAM NECK</u>	
STATION # _____ RIVERMILE _____	STREAM CLASS _____	
LAT _____ LONG _____	RIVER BASIN _____	
STORET # _____	AGENCY _____	
INVESTIGATORS <u>DRESSER / FOSTER</u>		
FORM COMPLETED BY <u>DRESSER</u>	DATE <u>6/3/2014</u> TIME <u>1030</u> AM <input checked="" type="radio"/> PM	REASON FOR SURVEY <u>Fish survey</u>

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover _____ % <input checked="" type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % _____ % <input checked="" type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <u>7 storms</u> Air Temperature <u>80</u> °F Other _____
--------------------	---	---	--



STREAM CHARACTERIZATION	Stream Subsystem <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal	Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater
	Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input checked="" type="checkbox"/> Other <u>DITCH</u>	Catchment Area _____ km ²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input checked="" type="checkbox"/> Other <u>MILITARY</u> <input type="checkbox"/> Residential		Local Watershed NPS Pollution <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources	
			Local Watershed Erosion <input checked="" type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy	
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>Sweet Gum, Norella, Pine, Cypress</u>			
INSTREAM FEATURES	Estimated Reach Length <u>150</u> m Estimated Stream Width <u>5</u> m Sampling Reach Area _____ m ² Area in km ² (m ² x1000) _____ km ² Estimated Stream Depth <u>0.50-0.75</u> m Surface Velocity _____ m/sec (at thalweg)		Canopy Cover <input type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark <u>0.25</u> m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle _____% <input type="checkbox"/> Run _____% <input type="checkbox"/> Pool _____% <u>ONE LONG POOL</u> Channelized <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)		<u>two pieces LWD 5m long</u>	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input checked="" type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input checked="" type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input checked="" type="checkbox"/> Attached Algae dominant species present <u>Duckweeds + Hydrilla</u> Portion of the reach with aquatic vegetation <u>90%</u>			
WATER QUALITY	Temperature _____ °C Specific Conductance _____ Dissolved Oxygen _____ pH _____ Turbidity _____ WQ Instrument Used _____		Water Odors <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____	
SEDIMENT/SUBSTRATE	Odors <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____		Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____	
	Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse		Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	<u>> 90%</u>
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	<u>> 90%</u>
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)	<u>65%</u>	Marl	grey, shell fragments	∅
Silt	0.004-0.06 mm	<u>95%</u>			
Clay	< 0.004 mm (slick)				

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>DNA-51</u>	LOCATION <u>OCEANA/DAM NECK</u>
STATION # _____ RIVERMILE _____	STREAM CLASS _____
LAT _____ LONG _____	RIVER BASIN _____
STORET # _____	AGENCY _____
INVESTIGATORS <u>DRESSER / FOSTER</u>	
FORM COMPLETED BY <u>DRESSER</u>	DATE <u>6/3/2014</u> TIME <u>1230</u> AM <input checked="" type="checkbox"/> PM
	REASON FOR SURVEY <u>Fish Survey</u>

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover 7	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
2. Pool Substrate Characterization 11	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE 11	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability 7	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
4. Sediment Deposition 18	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE 18	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6
5. Channel Flow Status 17	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE 17	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration Channelization or dredging absent or minimal; stream with normal pattern. SCORE <u>3</u>		Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 <u>3</u> 2 1 0
7. Channel Sinuosity The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) SCORE <u>1</u>		The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 <u>1</u> 0
8. Bank Stability (score each bank) Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. SCORE <u>9</u> (LB) SCORE <u>9</u> (RB)		Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
	Right Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. SCORE <u>9</u> (LB) SCORE <u>9</u> (RB)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
	Right Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) SCORE <u>3</u> (LB) SCORE <u>9</u> (RB)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
	Left Bank 10 9	8 7 6	5 4 <u>3</u>	2 1 0
	Right Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0

Parameters to be evaluated broader than sampling reach

Total Score 112

FISH SAMPLING FIELD DATA SHEET (FRONT)

page 1 of 1

STREAM NAME <u>DNA-52</u>	LOCATION <u>OCEANA / DAM NECK</u>	
STATION # _____ RIVERMILE _____	STREAM CLASS _____	
LAT _____ LONG _____	RIVER BASIN _____	
STORET # _____	AGENCY _____	
GEAR <u>LR-24</u>	INVESTIGATORS _____	
FORM COMPLETED BY <u>DRESSEL</u>	DATE <u>6/3/2014</u> TIME <u>0900</u> AM PM	REASON FOR SURVEY <u>Fish Survey</u>

SAMPLE COLLECTION	How were the fish captured? <input checked="" type="checkbox"/> back pack <input type="checkbox"/> tote barge <input type="checkbox"/> other _____ Block nets used? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Sampling Duration Start time <u>0900</u> End time _____ Duration <u>1365s</u> Stream width (in meters) Max <u>10m</u> Mean <u>6m</u>
HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Riffles _____% <input checked="" type="checkbox"/> Pools <u>100</u> % <input type="checkbox"/> Runs _____% <input type="checkbox"/> Snags _____% <input type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other () _____%
GENERAL COMMENTS	

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)				ANOMALIES*							
		TL	W	TL	W	D	E	F	L	M	S	T	Z
Bowfin		519	641.9										
Yellow Perch		209	134.5										
		208	107										
		204	101.3										
		191	78.7										
		178	65.6										
Carp (Common)		238	199.4										
Redfin Pickerel		88	3.1										
		77	3.4										

FISH SAMPLING FIELD DATA SHEET (BACK)

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)				ANOMALIES*							
		TL	W	TL	W	D	E	F	L	M	S	T	Z
Mud Minnow		13	4.2										
		52	1.3										
E. Mosquitofish		40	0.6	35	0.6								
		35	0.6	34	0.4								
		34	0.7	30	0.1								
		26	0.2	31	0.1								
		34	0.3	28	0.1								
Bluespot Sunfish		28	0.4	38	0.9								
		35	0.2	31	0.4								
		36	0.6										
		42	0.9										
		41	0.8										

* ANOMALY CODES: D = deformities; E = eroded fins; F = fungus; L = lesions; M = multiple DELT anomalies; S = emaciated; Z = other

DISCHARGE FORM - WADEABLE

Reviewed by (Initials): _____

SITE ID: FW08 DNA-SZ

DATE: 06/03/2014

580 cm width

○ Velocity Area				
Distance Units <input type="radio"/> ft <input checked="" type="radio"/> cm		Depth Units <input checked="" type="radio"/> ft <input type="radio"/> cm		Velocity Units <input checked="" type="radio"/> ft/s XX.X <input type="radio"/> m/s X.XX
	Dist. from Bank	Depth	Velocity	Flag
1	0	0.3	0.0	
2	58	1.3	0.0	
3	116	1.8	0.01	
4	174	2.0	0.01	
5	232	1.9	0.02	
6	290	2.0	0.01	
7	348	2.0	0.01	
8	406	1.9	0.01	
9	464	1.8	0.01	
10	522	1.6	0.00	
11	580	0.3	0.0	
12				
13				
14				
15				
16				
17				
18				
19				
20				

○ Timed Filling			
Repeat	Volume (L)	Time (s)	Flag
1			
2			
3			
4			
5			

○ Neutral Bouyant Object			
	Float 1	Float 2	Float 3
Float Dist. <input type="radio"/> ft <input type="radio"/> m			
Float Time (s)			
Flag			

Cross Sections on Float Reach			
	Upper Section	Middle Section	Lower Section
Width <input type="radio"/> ft <input type="radio"/> m			
Depth 1 <input type="radio"/> ft <input type="radio"/> cm			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

○ Q Value If discharge is determined directly in field, record value here: Q = _____ cfs m³/s FLAG

Flag	Comments

Flag Codes: K = No measurement or observation made; U = Suspect measurement or observation; Q = Unacceptable QC check associated with measurement; Z = Last station measured (if not Station 20); F 1, F2, etc. = Miscellaneous flags assigned by each field crew. Explain all flags in comments section.



**PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(FRONT)**

STREAM NAME <u>DNA-SL</u>	LOCATION <u>OCEANA/DAM NECK</u>	
STATION # _____ RIVERMILE _____	STREAM CLASS _____	
LAT _____ LONG _____	RIVER BASIN _____	
STORET # _____	AGENCY _____	
INVESTIGATORS <u>DRESSER / COOK</u>		
FORM COMPLETED BY <u>DRESSER</u>	DATE <u>6/3/2014</u> TIME <u>0900</u> AM PM	REASON FOR SURVEY <u>Fish Survey</u>

WEATHER CONDITIONS	<p>Now</p> <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input checked="" type="checkbox"/> %cloud cover _____ <input checked="" type="checkbox"/> clear/sunny	<p>Past 24 hours</p> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % _____	<p>Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <i>T-Storms</i></p> <p>Air Temperature <u>70°F</u></p> <p>Other _____</p>
SITE LOCATION/MAP	<p>Draw a map of the site and indicate the areas sampled (or attach a photograph)</p>		
STREAM CHARACTERIZATION	<p>Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal</p> <p>Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input checked="" type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____</p> <p>Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater</p> <p>Catchment Area _____ km²</p>		

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input checked="" type="checkbox"/> Other <u>MILITARY</u> <input type="checkbox"/> Residential		Local Watershed NPS Pollution <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy	
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____			
INSTREAM FEATURES	Estimated Reach Length _____ m Estimated Stream Width _____ m Sampling Reach Area _____ m ² Area in km ² (m ² x1000) _____ km ² Estimated Stream Depth _____ m Surface Velocity (at thalweg) _____ m/sec		Canopy Cover <input type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle _____% <input type="checkbox"/> Run _____% <input type="checkbox"/> Pool _____% Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input type="checkbox"/> No	
LARGE WOODY DEBRIS	LWD <u>1.2</u> m ² <u>2</u> pieces <u>11</u> Density of LWD _____ m ² /km ² (LWD/ reach area)			
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input checked="" type="checkbox"/> Free floating <u>Duckweed</u> <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present <u>DUCKWEED</u> Portion of the reach with aquatic vegetation <u>90</u> %			
WATER QUALITY	Temperature _____ °C Specific Conductance _____ Dissolved Oxygen _____ pH _____ Turbidity _____ WQ Instrument Used _____		Water Odors <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input checked="" type="checkbox"/> Stained <input type="checkbox"/> Other _____	
SEDIMENT/SUBSTRATE	Odors <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse		Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	50
Boulder	> 256 mm (10")		Muck-Mud	black, very fine organic (FPOM)	75
Cobble	64-256 mm (2.5"-10")		Marl	grey, shell fragments	Ø
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)	5			
Silt	0.004-0.06 mm	90			
Clay	< 0.004 mm (slick)	5			

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>DNA-52</u>	LOCATION <u>OCEANA / DAM NECK</u>
STATION # _____ RIVERMILE	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS <u>DRESSER, COOK</u>	
FORM COMPLETED BY <u>DRESSER</u>	DATE <u>6/3/2014</u> TIME <u>0904</u> <u>AM</u> PM
REASON FOR SURVEY	

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover SCORE <u>5</u>	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	<u>5</u> 4 3 2 1 0
2. Pool Substrate Characterization SCORE <u>7</u>	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	20 19 18 17 16	15 14 13 12 11	10 9 8 <u>7</u> 6	5 4 3 2 1 0
3. Pool Variability <u>one large pool</u> SCORE <u>10</u>	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition SCORE <u>18</u>	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 <u>18</u> 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status SCORE <u>17</u>	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 <u>17</u> 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category				
	Optimal	Suboptimal	Marginal	Poor	
6. Channel Alteration Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
	SCORE <u>8</u> 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 <u>3</u> 2 1 0				
7. Channel Sinuosity The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.	
	SCORE <u>1</u> 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 <u>1</u> 0				
8. Bank Stability (score each bank) Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.	
	SCORE <u>8</u> (LB) Left Bank 10 9 <u>8</u> 7 6 5 4 3 2 1 0				
	SCORE <u>8</u> (RB) Right Bank 10 9 <u>8</u> 7 6 5 4 3 2 1 0				
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
	SCORE <u>1</u> (LB) Left Bank 10 9 8 7 6 5 4 3 2 <u>1</u> 0				
	SCORE <u>9</u> (RB) Right Bank 10 <u>9</u> 8 7 6 5 4 3 2 1 0				
10. Riparian Vegetative Zone Width (score each bank riparian zone) Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.	
	SCORE <u>2</u> (LB) Left Bank 10 9 8 7 6 5 4 3 <u>2</u> 1 0				
SCORE <u>9</u> (RB) Right Bank 10 <u>9</u> 8 7 6 5 4 3 2 1 0					

Total Score 98

0357
Sand exposed

Location: DNA - 85	Gear: Boat e-fishing	Button Time (sec): 4260 / 354 DC VOLTS
Date: 08-13-14	Gill net	Effort:
Time: 1530	Seine	Net Dimensions: Length (m)
Personnel: ch. ps	Minnow trap	Effort: Deployed (time): Retrieved (time)

Species	Length (max. 25 specimens)	Tally	Dead or Taken as Voucher	Total
Gizzard Shad	36, 35, 37, 38, 39, 7, 10, 8, 10, 5, 9, 5, 7, 5, 8, 7 4, 5, 8, 6, 5, 8, 8, 7, 8, 7, 10, 5, 10, 8, 12, 5, 10, 7, 5, 10, 5, 4, 4 4, 5, 7, 5, 10, 5, 9, 11, 10, 6, 7, 8, 8, 6, 10, 8, 10, 6, 5, 4, 5, 9, 7, 9, 5, 7 6, 5, 5	||||| ||||| |||||	||||| ||||| |||||	
Longnose Gar	64			
Longemouth Bass	14 (40), 11 (22), 5, 3, 9, 9, 8, 8, 5, 8, 34, 5 (5), 43 (115) 13 (28), 14 (38), 22, 5 (14), 14 (41), 14 (39), 12 (20), 10 (9) 12, 7, 8, 6, 1, 7, 8, 13 (24), 8, 8, 11, 5 (26), 6, 5, 8, 7 12, 5 (30)	||||| ||||| |||||	||||| ||||| |||||	
Black Crappie	31, 8.5, 6, 14, 5, 14, 15, 7, 5, 6, 14	|||||		
Pumpkinseed	23.5, 18, 10.5, 12.5, 13, 10, 12.5, 11, 10	|||||		
Bluegill	21.5, 11.5, 8, 10, 10, 11, 7.5, 4, 9, 15, 10, 7.5, 10, 8, 6, 7, 8 10, 10, 11, 5, 10, 10.5, 11.5, 9, 7.5, 7, 10.5, 10.5, 11, 9, 8.5, 7, 5, 9 6, 4, 4, 4.5, 5, 8.5, 9, 8, 10, 8.5, 8.5, 10, 4.5, 9, 10, 8, 8, 8.5, 11, 9	||||| ||||| |||||	|||||	

10-5 (cont'd)
1111

DNA-P5 08-13-14 1530

Species	Length (max. 25 specimens)	Jally Dead or Taken or Voucher	Total
Unknown Snod / Herring QC = GIZZARD SNAD	7, 7, 7, 7, 9, 7.5, 8.5, 12, 13, 16, 17, 17	|||||	
Yellow perch QC = GIZZARD SNAD	7.5, 14, 17, 18, 13, 14	||||	
White Perch	14, 15	||	
Common Shiner	7.5, 7.5, 16, 8, 15, 7.5	||||	
QC = GOLDEN SHINER American Eel	0-50 cm |||		
Unknown Catfish QC = BROWN BULLHEAD	6.5	|	

Location: REDWING LAGOON
Date: 08-13-14
Tin: 0830
Personnel: cb, ps

Gear: Boat e-fishing
Gill net:
Seine:
Minnnow trap:

Button Time (sec): 4649 @ 354 m/s
Effort:
Net Dimensions:
Effort:

Deployed (time):
Length (m):
Deployed (time):
Retrieved (time):
Height (m):
Retrieved (time):

Species	Length (max. 25 specimens)	Tally	Total
L. GAR <i>21-24 20-24 20-24</i>	78, 20,		
BOWFIN	41, 42,		
L.M. BASS	38(800) 34(67) 6.5, 11, 7.5, 8, 39(838), 19() 13 (1, 4, 7, 8.5, 3 (408), 9, 7, released 3: 20-24, 20-24, 20-24	|||||	
Chain Pickerel	Under 10cm not weighed	|	
Black Crappie	14, 23, 15, 8, 5, 5.5, 5, 28, 25, 5.5, 6.5, 6, 8.5, 2.5, 6.5, 8, 7.5, 8, 6, 16, 30, 6, 7.5, 14, 5, 7.5, 30, 5, 13, 2.5, 6, 14, 8, 5, 5.5, 6, 6.5, 2.8, 26, 26.5, 27, 13, 15, 9, 15, 7.5, 13, 13, 8.5, 16.5, 16, 15, 10, 8, 18, 4.5, 5, 13, 9, 6.5, 8,	|||||	
Gizzard shad <i>many</i>	9, 9, 11.5, 10, 10.5, 11, 9, 9, 15, 10, 11, 4.5, 15, 8.5, 8, 13.5, 9, 6, 4.5, 14, 13.5	|||||	

Un-named:

Location: DNA-P2	Gear: Boat e-fishing	Button Time (sec): 4260:354	Retrieved (time): 26130334 DC V&V
Date: 09-14-14	Gill net	Effort:	Height (m)
Time: 0900	Seine	Net Dimensions:	Retrieved (time)
Personnel: cb, ps	Minnow trap	Effort:	Retrieved (time)

Species	Length (max. 25 specimens)	Tally	Dead or Taken as Voucher	Total
Brown Bullhead (possibly) Cattfish	15, 6.5, 8, 16,	11		
Blue-spotted sunfish	5, 5.5, 2.5,	11		
Flier	16.5, 9.5, 10, 11, 4.5, 10.5, 8.5, 5.5, 10, 13, 10.5, 11.5,	11		
Bluegill	10.5, 3.5, 9.5, 3.5, 3.5, 4.5, 3.5, 9, 3.5, 4, 4.5	11		
Common Shiner	8.5, 9, 6.5, M, 6.5	11		
Golden Shiner				
Warmouth	4.5,	1		

Handwritten scribble or signature.

FISH SAMPLING FIELD DATA SHEET (FRONT)

page _____ of _____

STREAM NAME <u>VNA SI</u>	LOCATION	
STATION # _____ RIVERMILE# _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET # _____	AGENCY	
GEAR	INVESTIGATORS <u>TC MC KL</u>	
FORM COMPLETED BY <u>TC</u>	DATE <u>2:45</u> <u>8/11/14</u> TIME _____ AM (PM)	REASON FOR SURVEY

SAMPLE COLLECTION	How were the fish captured? <input checked="" type="checkbox"/> back pack <input type="checkbox"/> tote barge <input type="checkbox"/> other _____ Block nets used? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <u>natural barrier</u> Sampling Duration Start time <u>2:55 PM</u> End time _____ Duration <u>1528 sec.</u> Stream width (in meters) Max <u>6.3</u> Mean <u>5.6</u>
HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Riffles _____% <input type="checkbox"/> Pools _____% <input checked="" type="checkbox"/> Runs <u>85</u> % <input type="checkbox"/> Snags <u>15</u> % <input type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other (_____) _____%
GENERAL COMMENTS	<u>Stream + low locked gate</u> <u>Surface covered in duck weed, full of milfoil</u>

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)				ANOMALIES*								
						D	E	F	L	M	S	T	Z	
<u>Blue gill</u>	<u>2</u>	<u>59/22</u>	<u>70/59</u>											
<u>Blue spotted sunfish</u>	<u>1</u>	<u>51/19</u>												

PH = 6.91
 DO = 9.2-9.3 mg/L
 DO = 206.4 %
 Cond = .578 mS/cm
 Cond = .112 mS/cm
 Temp = -9.99°C ← Prob is malfunctioning

Velocity	Distance	Depth	Vel 1/Sec
	0	0	0
	1	2.2	0.03
	2	2.6	0.03
	3	2.7	0.01
	4	2.8	.01
	5	2.9	.03
	6	2.9	0.01
	7	2.8	0.01
	8	2.7	.03 →

FISH SAMPLING FIELD DATA SHEET (FRONT)

page _____ of _____

STREAM NAME <u>DNA-52</u>		LOCATION
STATION # _____ RIVERMILE# _____		STREAM CLASS
LAT _____	LONG _____	RIVER BASIN
STORET # _____		AGENCY <u>TG KL MC</u>
GEAR		INVESTIGATORS <u>↓</u>
FORM COMPLETED BY <u>TG</u>		DATE <u>5/11/14</u> TIME <u>12:30</u> AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>
		REASON FOR SURVEY <u>fil</u>

SAMPLE COLLECTION	How were the fish captured? <input checked="" type="checkbox"/> back pack <input type="checkbox"/> tote barge <input type="checkbox"/> other _____
	Block nets used? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
	Sampling Duration Start time <u>12:40</u> End time <u>1:45</u> Duration <u>1428 sec</u>
	Stream width (in meters) Max _____ Mean <u>7.2</u>
HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Riffles _____% <input type="checkbox"/> Pools _____% <input checked="" type="checkbox"/> Runs <u>40</u> % <input checked="" type="checkbox"/> Snags <u>20</u> % <input type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other (_____) _____%
GENERAL COMMENTS	<u>Terrorist training camp. Surface totally covered in duckweed</u>

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)				ANOMALIES*								
						D	E	F	L	M	S	T	Z	
<u>Rock Bass</u>	<u>1</u>	<u>190/22</u>												
<u>Mud minnow</u>	<u>2</u>	<u>35/1.3</u>	<u>31/1.0</u>											
<u>Green sunfish</u>	<u>3</u>	<u>23/0.5</u>	<u>30/1.0</u>	<u>26/2.5</u>										
<u>Mosquitofish</u>	<u>2</u>	<u>26/1.0</u>	<u>33/1.0</u>											

mud sort SL

Temp = 22.28
 Cond = .283 nS/cm
 Cond = .270
 PH = 6.95
 DO = 23.4%
 DO = 2.02

velocity	depth	velocity	depth
<u>0.1</u>	<u>1.0</u>	<u>432-0.06</u>	<u>2.0</u>
<u>0.32</u>	<u>1.5</u>	<u>504-0.01</u>	<u>2.0</u>
<u>0.5</u>	<u>1.6</u>	<u>576-0.03</u>	<u>1.9</u>
<u>0.01</u>	<u>1.9</u>	<u>648-0.02</u>	<u>1.9</u>
<u>0.12</u>	<u>2.0</u>	<u>720-0.01</u>	<u>0.9</u>
<u>0.1</u>	<u>2.0</u>		

DM-83 4.1.4

Location:		Button Time (sec):
Date:	10-08-14	
Time:	1700	
Personnel:	C.P.S	

Species	Length	Dead or Vouchered	Total
Bluegill (continued)	52, 67, 48, 45, 136, 48, 29, 32, 41, 43, 33, 78, 65, 67, 33, 117, 51, 65, 42, 29, 28, 95, 107, 65, 51, 45, 48, 50, 83, 35, 35, 32, 36, 58, 35, 25, 45, 47, 47, 173, 150, 45, 131, 48, 33, 35, 72, 125, 113, 113, 20, 75, 51, 45, 68, 35, 46, 42, 27, 25, 185, 17, 68	+++ 1	
Bluegill (continued)	52, 82, 125, 47, 150, 98, 61, 45, 42, 40, 63, 43, 108, 115, 58, 58, 45, 62, 48, 57, 52, 30, 37, 41, 47, 48, 32, 38, 30, 30, 30, 57, 62, 45, 40, 40, 38, 205, 141, 30, 36, 35, 10, 52, 61, 68, 46, 42, 43, 38, 38, 38, 40, 43, 63, 42, 76, 186, 42, 42, 37, 51, 38, 40, 38, 61	Dead +++ H++ 11	

10F3

Location: DNA-PS	Gear: <i>esthinking</i>	Button Time (sec): 3792 @ 354 volts <i>X</i>
Date: 10/8/14		
Time: 1700		
Personnel: CB PD		

Species	Length	Dead or Vouchered	Total
	610 (PH 70).		
L.M. Bass	462 (1007) 401 (820), 390 (700) 352 (461) 85, 84, 89, 84, 85, 115, 89, 102 371 (683), 91,	<u>Vouchered 1 (85), 1 (84)</u>	
Black Croppie	162, 155, 140, 105, 82, 79, 57, 215 162, 155, 87,	<u>Vouchered 1 (140), 1 (82)</u>	
Yellow Perch	161, 115, 135, 74, 94, 81, 122, 121	<u>Vouchered 1 (161), 1 (115), 1 (94)</u>	
Bluegill	95, 95, 130, 147, 12, 36, 96, 105, 108, 97, 97, 91, 119, 96, 89, 81, 76, 87, 39, 81, 41, 112, 58, 55, 61, 56, 47, 73, 66, 36, 60, 162, 92, 119, 51, 87, 89, 60, 95, 60, 115, 78, 60, 81, 82, 63, 52, 36, 41, 61, 60, 114, 86, 111, 65, 52, 36, 41, 61, 60, 106, 124, 46,	<u>Vouchered 1 (95), 1 (95)</u> Dead HHT 111	

WA @ 1700

Temp 20.3°C DO 11.32 mg/L
 9/ Cond 128.7 µS/cm
 Cond 122.8 µS/cm
 pH 9.6

W.M. do not may be reading incorrectly

Location: DNA PS	Gear: e-fishing	Button Time (sec): 3792 @ 354 volb DC
Date: 10/8/14		
Time: 1700		
Personnel: ITJ CD		

Species	Length	Dead or Vouchered	Total
Gizzard shad	132, 110, 85, 88, 102, 81, 88, 94, 113, 93, 82, 81, 87, 95, 91, 96, 10, 114, 95, 90, 118, 101, 102, 82, 99, 102, 88, 96, 83, 93, 108, 99, 132, 110, 84, 84, 106, 96, 70, 88, 120, 97, 102, 131, 98, 80, 114, 120, 109, 101, 120, 104, 107, 110, 116, 97, 91	Vouchered 1 (132), 1 (10)	
Goldfish	77, 100, 82, 154, 97, 140, 109, 106, 113, 95, 96, 95, 98, 88, 82, 97	Vouchered 1 (100), 1 (77)	← E. S. WORTH M3M3W
Pumpkinseed	120, 114, 128, 212, 74, 152, 73, 257, 75, 68, 72, 75, 122	Vouchered 1 (114), 1 (52)	← BLUGWELL
Bluegated Sunfish	69, 48	Vouchered 1 (69), 1 (48)	
Gizzard shad (continued)	92, 88, 83, 84, 98, 99, 96, 90, 92, 150, 98, 113, 101, 132, 93, 125, 92, 93, 96, 116		

Location: DNA PS	Gear: a - fishing	Button Time (sec): 3742 @ 354 volts DC
Date: 10/8/14		
Time: 1700		
Personnel: C B, MB		

Species	Length	M _W	Dead or Vouchered	Total
American eel	6-50 100-150	50-100 150+	Vouchered 1 (150+)	
Bluegill	112, 102, 118, 52, 54, 125, 32, 97, 86,	11		

Location: DNA-P2
 Date: 10/9/14
 Time: 1540
 Personnel: CB

Location: DNA-P2	Gear: <i>o-fishing</i>	Button Time (sec): 2911 or 3540 or 3 DC
Date: 10/9/14		
Time: 1540		
Personnel: CB		

Species	Length	Dead or Vouchered	Total
Flier	112, 175, 119, 129, 109, 925 118, 118, 115, 116, 101, 115, 121, 125, 102, 114, 119,	Vouchered 1(112), 1(128)	1(112), 1(128)
Bluespotted Sunfish	47, 63	Vouchered 1(47), 1(63)	
Pumpkinseed	94, 81, 82, 64, 82, 75, 78, 61, 64, 61, 68, 57, 53, 65, 56, 63, 57, 49, 54, 60, 66, 77, 82, 56, 51, 78, 66, 77	Vouchered 1(54), 1(81)	
Bass Bullhead	94, 121, 90	Vouchered 1(94), 1(90)	
Golden Shiner	105, 106, 127, 101, 81,	Vouchered 1(105), 1(106)	

Temp 21.4°C
 DO 90%
 SA Cond 170.0
 4.8 mg/L
 17.1°C
 11.00

✓ 2 @ 1630

Location: DNA-P2	Gear: E-FISH	Button Time (sec):
Date: 10-01-14		
Time: 1540		
Personnel: CB, PS		

Species	Length	Dead or Vouchered	Total
Bluegill	72, 60, 59, 61, 46, 69, 74, 68 73, 37, 46, 46, 55, 58, 47, 87, 66 48, 50, 40, 57, 67, 52, 64, 68, 68 52, 46, 51, 69, 54	Vouchered 1 (77), 1 (60)	
Redfin Picarel	151, 155, 150	Vouchered 1 (151)	
Rock Bass Juvenile bluegill?	63, 59, 51, 68, 62, 62, 59	Vouchered 1 (63), 1 (59)	BUDGET SURF
Boutin	264, 254, 247	Photo Voucher	
Chain Picarel	165	Vouchered 1 (165)	

Location: DWA-P2	Gear:	Button Time (sec):
Date: 10-09-14		
Time: 1540		
Personnel: CB, PS		

Species	Length	Dead or Vouchered	Total
Eastern Meadowlark	97	Vouchered (177)	
Black Coppie ?	CB, 96	Vouchered (177)	
Black Coppie	96	Vouchered (177)	

FISH SAMPLING FIELD DATA SHEET (FRONT)

page _____ of _____

STREAM NAME <u>DVA 51</u>	LOCATION <u>DVA</u>
STATION # _____ RIVERMILE _____	STREAM CLASS _____
LAT _____ LONG _____	RIVER BASIN _____
STORET # _____	AGENCY _____
GEAR _____	INVESTIGATORS <u>KOL, BPO, JC, EF</u>
FORM COMPLETED BY <u>KOL</u>	DATE <u>7/24/14</u> TIME <u>1600</u> AM <input type="checkbox"/> PM <input checked="" type="checkbox"/>
REASON FOR SURVEY _____	

SAMPLE COLLECTION	How were the fish captured? <input checked="" type="checkbox"/> back pack <input type="checkbox"/> tote barge <input type="checkbox"/> other _____ Block nets used? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Sampling Duration Start time _____ End time _____ Duration <u>1005</u> Stream width (in meters) Max _____ Mean _____
HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Riffles _____ % <input type="checkbox"/> Pools _____ % <input checked="" type="checkbox"/> Runs 100 % <input checked="" type="checkbox"/> Snags 50 % <input checked="" type="checkbox"/> Submerged Macrophytes 50 % <input type="checkbox"/> Other (_____) _____ %
GENERAL COMMENTS	<u>Ø Flow ; hydrocotyle (weeds), duckweed, coontail.</u>

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)	ANOMALIES*							
			D	E	F	L	M	S	T	Z
<u>Amelano</u>		<u>56/18</u>								
		<u>93/06</u>								
<u>Bik Crippie</u>		<u>103/117</u>								
<u>Lynx bass</u>		<u>70/100</u>								

FISH SAMPLING FIELD DATA SHEET (FRONT)

page of

STREAM NAME <u>DNA S2</u>	LOCATION <u>Don Neck</u>
STATION # _____ RIVERMILE _____	STREAM CLASS _____
LAT _____ LONG _____	RIVER BASIN _____
STORET # _____	AGENCY _____
GEAR <u>Electro fishing</u>	INVESTIGATORS <u>KOL, BKD, JC, EF</u>
FORM COMPLETED BY <u>KOL</u>	DATE <u>9/29/14</u> TIME <u>1300</u> AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>
	REASON FOR SURVEY _____

SAMPLE COLLECTION	How were the fish captured? <input checked="" type="checkbox"/> back pack <input type="checkbox"/> tote barge <input type="checkbox"/> other _____
	Block nets used? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
	Sampling Duration Start time <u>1300</u> End time <u>1430</u> Duration <u>140</u>
	Stream width (in meters) - Max _____ Mean _____
HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Riffles _____ % <input type="checkbox"/> Pools _____ % <input type="checkbox"/> Runs <u>100</u> % <input type="checkbox"/> Snags <u>0</u> % <input checked="" type="checkbox"/> Submerged Macrophytes <u>75</u> % <input type="checkbox"/> Other (_____) _____ %
GENERAL COMMENTS	

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)				ANOMALIES*							
		D	E	F	L	M	S	T	Z				
<u>Em. Mos. Fish</u>		42/0.4	31/2.1										
		40/1.0	25/2.1										
		29/2.1	26/2.1										
		29/2.1	28/2.1										
		30/2.1	26/2.1										
<u>Redfin Pickerel</u>		14/10.3											
		116/9.9											
<u>Blue gill</u>		60/4.1											
<u>Banded Sunfish</u>		59/2.9	48/1.7										
		56/2.8											
		62/5.7											
		36/1.0											
		46/1.3											

37 E 3/10-7

FISH SAMPLING FIELD DATA SHEET (BACK)

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)				ANOMALIES*								
						D	E	F	L	M	S	T	Z	
<i>Eastern silvers</i>		20/27												

* ANOMALY CODES: D = deformities; E = eroded fins; F = fungus; L = lesions; M = multiple DELT anomalies; S = emaciated; Z = other

Project: NASO/DNA fish habitat

Site: DNA-P2 Date and Time (Start-End): 8/14/14 11:30am

Investigators: TG KL

Weather Conditions (current and past 24 hrs): _____

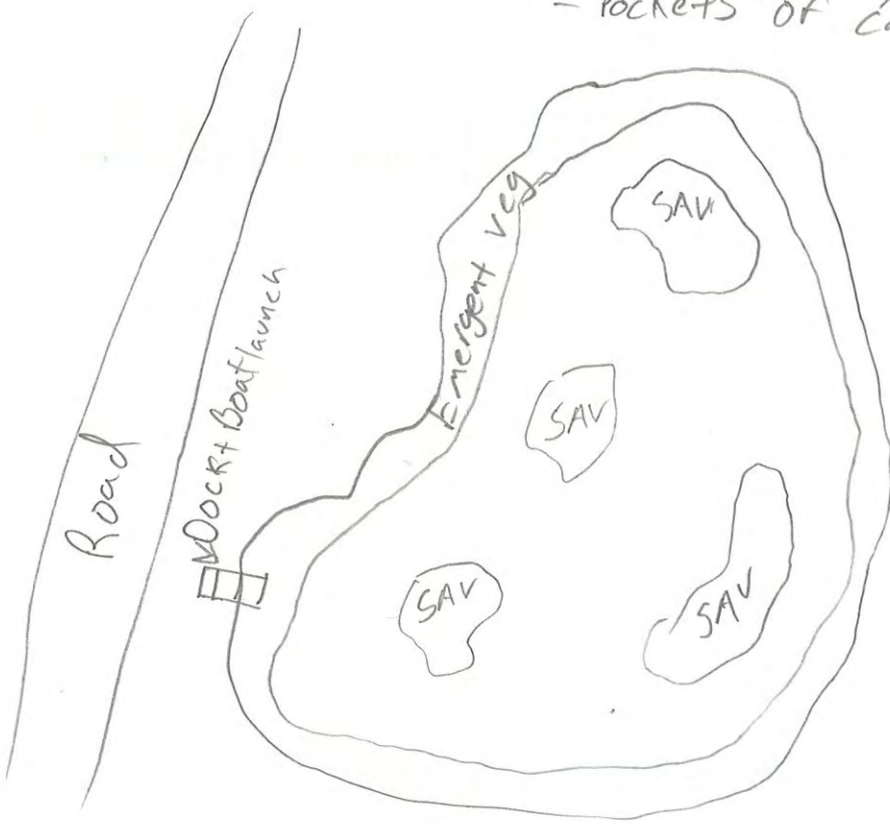
Pond Surface Conditions: flat calm

Index GPS Coordinates: LAT: _____ LONG: _____

Observed Approx. Depth Range: .5 to 1.5 ft

SITE LOCATION MAP (Include locations sampled by gear type, water quality index location, inlet/outlet streams, cover, vegetation, and high water mark):

- Shoreline consists of shrubs, emergent grasses and small trees
- pockets of cattails throughout



Water Quality (Recorded at Index Location)	In-situ Measurements				Grab Samples				
	Depth = _____ m	pH	Dissolved Oxygen (mg/L)	Oxygen Saturation (%)	Conductivity (µS/cm)	Temperature (C°)	Total Nitrogen (TN)	Total Phosphorus & ortho-phosphate (SRP)	Total Suspended Solids (TSS)
Upper (Surface)						<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
Middle						<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
Lower						<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
Remarks: YSI malfunction - wa not recorded									

Shoreline Characteristics

	Rare (<5%)	Sparse (5 to 25%)	Moderate (26 to 75%)	Extensive (76 to 100%)
Forest			X	
Grass		X		
Shrub		X		
Wetland		X	X	
Bare Ground	X			
Agriculture	X			
Shoreline Modifications (concrete, rip rap, etc.)	X			
Development (residential/industrial)	X			

Shoreline Qualitative Macrophyte Survey

Emergent/Floating			X	
Submergent			X	
Macrophyte Density (circle one)	Absent	Sparse	Moderate	High
Shoreline Stability (%)			Stable % 100	Eroding %

Littoral Bottom Substrate (shoreline out to 10 m)

	Absent (0%)	Sparse (<10%)	Moderate (11-40%)	Heavy (41 to 70%)	Very Heavy (71 to 100%)
Bedrock	X				
Boulder	X				
Cobble	X				
Gravel		X			
Sand		X			
Silt, Clay, Muck				X	
Woody Debris			X		
Organic (leaf pack, detritus)			X		
Vegetation or other			X		

Substrate Odor/Color:

MUCK with organics, dark Brown, sulfur odor

Remarks:

Littoral Fish Cover (shoreline out to 10 m)

Aquatic and Inundated Herbaceous Vegetation				X	
Woody Debris/Snags			X		
Inundated Live trees			X		
Overhanging Vegetation			X		
Sharp Ledges or Dropoffs	X				
Boulders	X				
Human Structures (docks, barges, tires, car bodies, etc.)		X			

Species Observed:

mosquitofish, sunfish

Remarks:

1 knee deep water (~18 inches) @ shoreline

Fish Sampling: yes no Gear Used: electrofishing exp. gill net seine minnow trap hook & line

Trophic State: Oligotrophic Mesotrophic Eutrophic Hypereutrophic

Emergent/Submerged Vegetation Observed: SAV chokes the pond. Hydrilla and Pennywort

Invasive Species Observed: no Phragmites @ time of survey

Wildlife Observed: song birds, frogs, dragonflies

Additional Notes: Flat surface waters with heavy packets of SAV. Shoreline completely covered with SAV, emergent veg, small trees. a large fish (unidentified) rose to surface during survey.

Project: NASO / DNA fish and Habitat

Site: DNA-P5 : _____ Date and Time (Start-End): _____

Investigators: JG, KL :

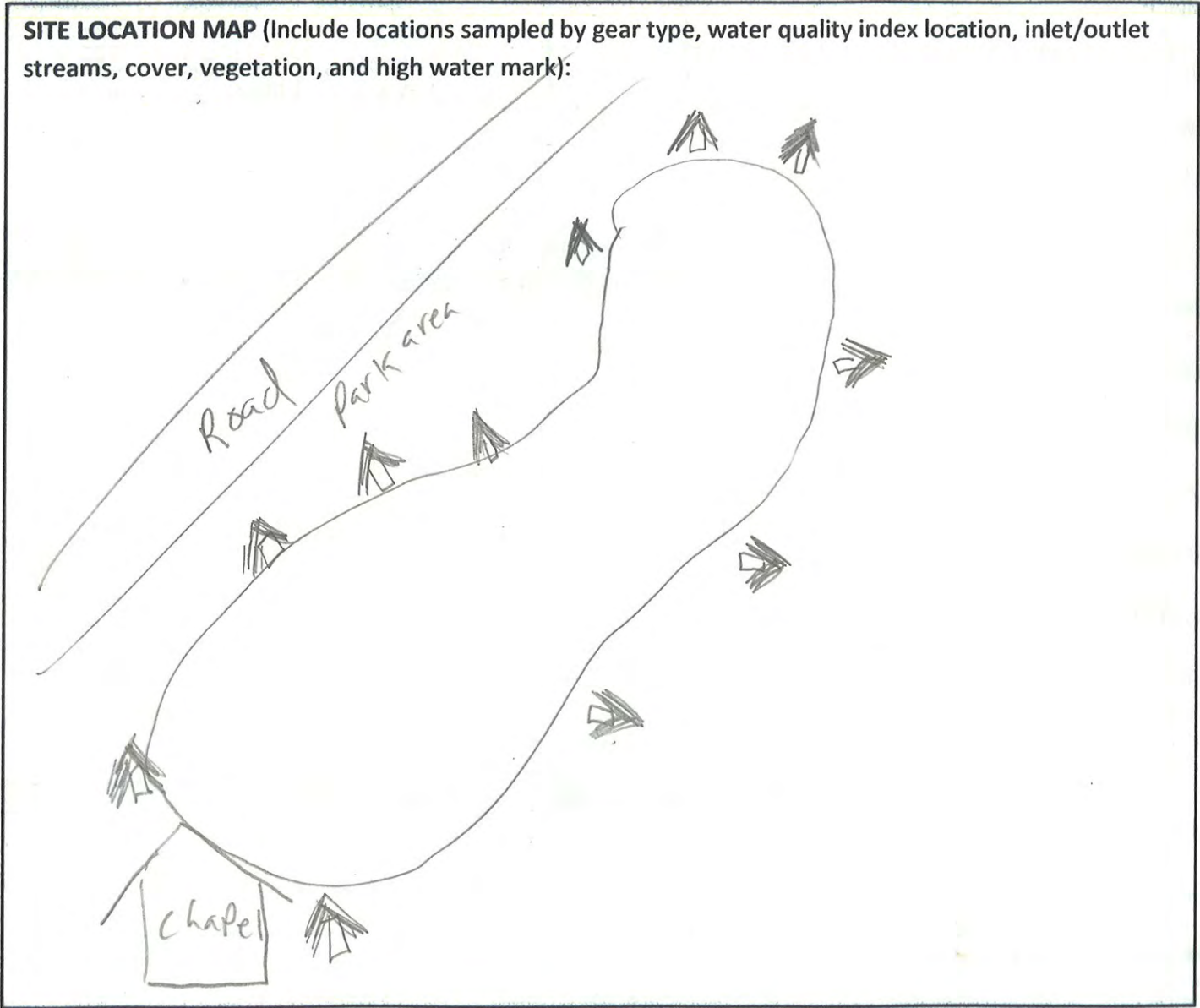
Weather Conditions (current and past 24 hrs): sunny, 80's °F

Pond Surface Conditions: calm, slight ripple @ surface from breeze

Index GPS Coordinates: LAT: _____ LONG: _____

Observed Approx. Depth Range: 2.5m, 1m, surface

SITE LOCATION MAP (Include locations sampled by gear type, water quality index location, inlet/outlet streams, cover, vegetation, and high water mark):



Water Quality (Recorded at Index Location)	In-situ Measurements				Grab Samples				
	Depth = 2.5 m	pH	Dissolved Oxygen (mg/L)	Oxygen Saturation (%)	Conductivity (µS/cm)	Temperature (C°)	Total Nitrogen (TN)	Total Phosphorus & ortho-phosphate (SRP)	Total Suspended Solids (TSS)
Upper (Surface)						<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
Middle						<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
Lower						<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	<input type="checkbox"/> bottle(s) filled	
Remarks: YSI malfunction - NO WQ recorded									

Shoreline Characteristics				
	Rare (<5%)	Sparse (5 to 25%)	Moderate (26 to 75%)	Extensive (76 to 100%)
Forest			X	
Grass		X		
Shrub		X		
Wetland	X			
Bare Ground	X absent			
Agriculture	absent			
Shoreline Modifications (concrete, rip rap, etc.)	absent			
Development (residential/industrial)		X chapel		
Shoreline Qualitative Macrophyte Survey				
Emergent/Floating		X		
Submergent		X		
Macrophyte Density (circle one)	Absent	<u>Sparse</u>	Moderate	High
Shoreline Stability (%)			Stable % 100	Eroding %

Littoral Bottom Substrate (shoreline out to 10 m)

	Absent (0%)	Sparse (<10%)	Moderate (11-40%)	Heavy (41 to 70%)	Very Heavy (71 to 100%)
Bedrock	X				
Boulder	X				
Cobble	X				
Gravel	X				
Sand		X			
Silt, Clay, Muck			X		
Woody Debris		X			
Organic (leaf pack, detritus)		X			
Vegetation or other				X	

Substrate Odor/Color:

No odor, light brown color

Remarks:

Littoral Fish Cover (shoreline out to 10 m)

Aquatic and Inundated Herbaceous Vegetation			X		
Woody Debris/Snags		X			
Inundated Live trees		X			
Overhanging Vegetation			X		
Sharp Ledges or Dropoffs	X				
Boulders	X				
Human Structures (docks, barges, tires, car bodies, etc.)	X				

Species Observed:

aquatic insects, No fish observed @ time of survey

Remarks:

Fish Sampling: yes no Gear Used: electrofishing exp. gill net seine minnow trap hook & line

Trophic State: Oligotrophic Mesotrophic Eutrophic Hypereutrophic

Emergent/Submerged Vegetation Observed: emergent grasses, inundated shrubs, rushes

Invasive Species Observed: None

Wildlife Observed: Canada Geese, seagulls

Additional Notes: Pond color was light brown (turbid) water, picnic area located between pond and road, mowed lawn surrounds pond
Shorelines are stable. "Hazardous conditions" sign prohibits swimming.

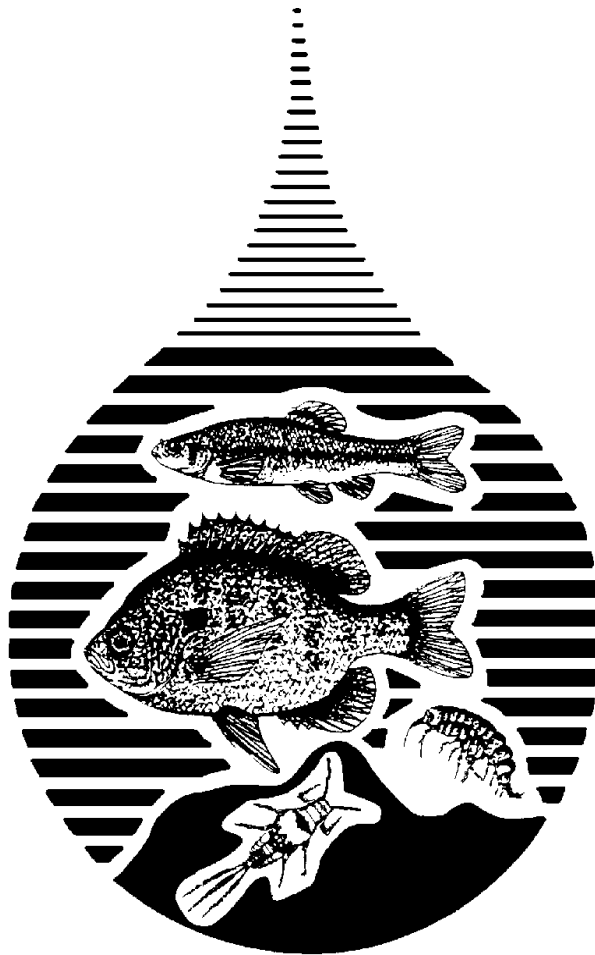
APPENDIX D - THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S (EPA) RAPID BIOASSESSMENT PROTOCOLS (RBP)



EPA 841-B-99-002

Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers:

Periphyton, Benthic Macroinvertebrates, and Fish Second Edition



<http://www.epa.gov/OWOW/monitoring/techmon.html>

By:

**Michael T. Barbour
Jeroen Gerritsen
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James B. Stribling**

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5 HABITAT ASSESSMENT AND PHYSICOCHEMICAL PARAMETERS

An evaluation of habitat quality is critical to any assessment of ecological integrity and should be performed at each site at the time of the biological sampling. In general, habitat and biological diversity in rivers are closely linked (Raven et al. 1998). In the truest sense, “habitat” incorporates all aspects of physical and chemical constituents along with the biotic interactions. In these protocols, the definition of “habitat” is narrowed to the quality of the instream and riparian habitat that influences the structure and function of the aquatic community in a stream. The presence of an altered habitat structure is considered one of the major stressors of aquatic systems (Karr et al. 1986). The presence of a degraded habitat can sometimes obscure investigations on the effects of toxicity and/or pollution. The assessments performed by many water resource agencies include a general description of the site, a physical characterization and water quality assessment, and a visual assessment of instream and riparian habitat quality. Some states (e.g., Idaho DEQ and Illinois EPA) include quantitative measurements of physical parameters in their habitat assessment. Together these data provide an integrated picture of several of the factors influencing the biological condition of a stream system. These assessments are not as comprehensive as needed to adequately identify all causes of impact. However, additional investigation into hydrological modification of water courses and drainage patterns can be conducted, once impairment is noted.

The habitat quality evaluation can be accomplished by characterizing selected physicochemical parameters in conjunction with a systematic assessment of physical structure. Through this approach, key features can be rated or scored to provide a useful assessment of habitat quality.

5.1 PHYSICAL CHARACTERISTICS AND WATER QUALITY

Both physical characteristics and water quality parameters are pertinent to characterization of the stream habitat. An example of the data sheet used to characterize the physical characteristics and water quality of a site is shown in Appendix A. The information required includes measurements of physical characterization and water quality made routinely to supplement biological surveys.

Physical characterization includes documentation of general land use, description of the stream origin and type, summary of the riparian vegetation features, and measurements of instream parameters such as width, depth, flow, and substrate. The water quality discussed in these protocols are *in situ* measurements of standard parameters that can be taken with a water quality instrument. These are generally instantaneous measurements taken at the time of the survey. Measurements of certain parameters, such as temperature, dissolved oxygen, and turbidity, can be taken over a diurnal cycle and will require instrumentation that can be left in place for extended periods or collects water samples at periodic intervals for measurement. In addition, water samples may be desired to be collected for selected chemical analysis. These chemical samples are transported to an analytical laboratory for processing. The combination of this information (physical characterization and water quality) will provide insight as to the ability of the stream to support a healthy aquatic community, and to the presence of chemical and non-chemical stressors to the stream ecosystem. Information requested in this section (Appendix A-1, Form 1) is standard

to many aquatic studies and allows for some comparison among sites. Additionally, conditions that may significantly affect aquatic biota are documented.

5.1.1 Header Information (Station Identifier)

The header information is identical on all data sheets and requires sufficient information to identify the station and location where the survey was conducted, date and time of survey, and the investigators responsible for the quality and integrity of the data. The stream name and river basin identify the watershed and tributary; the location of the station is described in the narrative to help identify access to the station for repeat visits. The rivermile (if applicable) and latitude/longitude are specific locational data for the station. The station number is a code assigned by the agency that will associate the sample and survey data with the station. The STORET number is assigned to each datapoint for inclusion in USEPA's STORET system. The stream class is a designation of the grouping of homogeneous characteristics from which assessments will be made. For instance, Ohio EPA uses ecoregions and size of stream, Florida DEP uses bioregions (aggregations of subcoregions), and Arizona DEQ uses elevation as a means to identify stream classes. Listing the agency and investigators assigns responsibility to the data collected from the station at a specific date and time. The reason for the survey is sometimes useful to an agency that conducts surveys for various programs and purposes.

5.1.2 Weather Conditions

Note the present weather conditions on the day of the survey and those immediately preceding the day of the survey. This information is important to interpret the effects of storm events on the sampling effort.

5.1.3 Site Location/Map

To complete this phase of the bioassessment, a photograph may be helpful in identifying station location and documenting habitat conditions. Any observations or data not requested but deemed important by the field observer should be recorded. A hand-drawn map is useful to illustrate major landmarks or features of the channel morphology or orientation, vegetative zones, buildings, etc. that might be used to aid in data interpretation.

5.1.4 Stream Characterization

Stream Subsystem: In regions where the perennial nature of streams is important, or where the tidal influence of streams will alter the structure and function of communities, this parameter should be noted.

Stream Type: Communities inhabiting coldwater streams are markedly different from those in warmwater streams, many states have established temperature criteria that differentiate these 2 stream types.

Stream Origin: Note the origination of the stream under study, if it is known. Examples are glacial, montane, swamp, and bog. As the size of the stream or river increases, a mixture of origins of tributaries is likely.

5.1.5 Watershed Features

Collecting this information usually requires some effort initially for a station. However, subsequent surveys will most likely not require an in-depth research of this information.

Predominant Surrounding Land Use Type: Document the prevalent land-use type in the catchment of the station (noting any other land uses in the area which, although not predominant, may potentially affect water quality). Land use maps should be consulted to accurately document this information.

Local Watershed Nonpoint Source Pollution: This item refers to problems and potential problems in the watershed. Nonpoint source pollution is defined as diffuse agricultural and urban runoff. Other compromising factors in a watershed that may affect water quality include feedlots, constructed wetlands, septic systems, dams and impoundments, mine seepage, etc.

Local Watershed Erosion: The existing or potential detachment of soil within the local watershed (the portion of the watershed or catchment that directly affects the stream reach or station under study) and its movement into the stream is noted. Erosion can be rated through visual observation of watershed and stream characteristics (note any turbidity observed during water quality assessment below).

5.1.6 Riparian Vegetation

An acceptable riparian zone includes a buffer strip of a minimum of 18 m (Barton et al. 1985) from the stream on either side. The acceptable width of the riparian zone may also be variable depending on the size of the stream. Streams over 4 m in width may require larger riparian zones. The vegetation within the riparian zone is documented here as the dominant type and species, if known.

5.1.7 Instream Features

Instream features are measured or evaluated in the sampling reach and catchment as appropriate.

Estimated Reach Length: Measure or estimate the length of the sampling reach. This information is important if reaches of variable length are surveyed and assessed.

Estimated Stream Width (in meters, m): Estimate the distance from bank to bank at a transect representative of the stream width in the reach. If variable widths, use an average to find that which is representative for the given reach.

Sampling Reach Area (m²): Multiply the sampling reach length by the stream width to obtain a calculated surface area.

Estimated Stream Depth (m): Estimate the vertical distance from water surface to stream bottom at a representative depth (use instream habitat feature that is most common in reach) to obtain average depth.

Velocity: Measure the surface velocity in the thalweg of a representative run area. If measurement is not done, estimate the velocity as slow, moderate, or fast.

Canopy Cover: Note the general proportion of open to shaded area which best describes the amount of cover at the sampling reach or station. A densiometer may be used in place of visual estimation.

High Water Mark (m): Estimate the vertical distance from the bankfull margin of the stream bank to the peak overflow level, as indicated by debris hanging in riparian or floodplain vegetation, and deposition of silt or soil. In instances where bank overflow is rare, a high water mark may not be evident.

Proportion of Reach Represented by Stream Morphological Types: The proportion represented by riffles, runs, and pools should be noted to describe the morphological heterogeneity of the reach.

Channelized: Indicate whether or not the area around the sampling reach or station is channelized (e.g., straightening of stream, bridge abutments and road crossings, diversions, etc.).

Dam Present: Indicate the presence or absence of a dam upstream in the catchment or downstream of the sampling reach or station. If a dam is present, include specific information relating to alteration of flow.

5.1.8 Large Woody Debris

Large Woody Debris (LWD) density, defined and measured as described below, has been used in regional surveys (Shields et al. 1995) and intensive studies of degraded and restored streams (Shields et al. 1998). The method was developed for sand or sand-and-gravel bed streams in the Southeastern U.S. that are wadeable at baseflow, with water widths between 1 and 30 m (Cooper and Testa 1999).

Cooper and Testa's (1999) procedure involves measurements based on visual estimates taken by a wading observer. Only woody debris actually in contact with stream water is counted. Each woody debris formation with a surface area in the plane of the water surface $>0.25 \text{ m}^2$ is recorded. The estimated length and width of each formation is recorded on a form or marked directly onto a stream reach drawing. Estimates are made to the nearest 0.5 m, and formations with length or width less than 0.5 m are not counted. Recorded length is maximum width in the direction perpendicular to the length. Maximum actual length and width of a limb, log, or accumulation are not considered.

If only a portion of the log/limb is in contact with the water, only that portion in contact is measured. Root wads and logs/limbs in the water margin are counted if they contact the water, and are arbitrarily given a width of 0.5 m. Lone individual limbs and logs are included in the determination if their diameter is 10 cm or larger (Keller and Swanson 1979, Ward and Aumen 1986). Accumulations of smaller limbs and logs are included if the formation total length or width is 0.5 m or larger. Standing trees and stumps within the stream are also recorded if their length and width exceed 0.5 m.

The length and width of each LWD formation are then multiplied, and the resulting products are summed to give the aquatic habitat area directly influenced. This area is then divided by the water

surface area (km²) within the sampled reach (obtained by multiplying the average water surface width by reach length) to obtain LWD density. Density values of 10³ to 10⁴ m²/km² have been reported for channelized and incised streams and on the order of 10⁵ m²/km² for non-incised streams (Shields et al. 1995 and 1998). This density is not an expression of the volume of LWD, but rather a measure of LWD influence on velocity, depth, and cover.

5.1.9 Aquatic Vegetation

The general type and relative dominance of aquatic plants are documented in this section. Only an estimation of the extent of aquatic vegetation is made. Besides being an ecological assemblage that responds to perturbation, aquatic vegetation provides refugia and food for aquatic fauna. List the species of aquatic vegetation, if known.

5.1.10 Water Quality

Temperature (°C), Conductivity or “Specific Conductance” (µohms), Dissolved Oxygen (µg/L), pH, Turbidity: Measure and record values for each of the water quality parameters indicated, using the appropriate calibrated water quality instrument(s). Note the type of instrument and unit number used.

Water Odors: Note those odors described (or include any other odors not listed) that are associated with the water in the sampling area.

Water Surface Oils: Note the term that best describes the relative amount of any oils present on the water surface.

Turbidity: If turbidity is not measured directly, note the term which, based upon visual observation, best describes the amount of material suspended in the water column.

5.1.11 Sediment/Substrate

Sediment Odors: Disturb sediment in pool or other depositional areas and note any odors described (or include any other odors not listed) which are associated with sediment in the sampling reach.

Sediment Oils: Note the term which best describes the relative amount of any sediment oils observed in the sampling area.

Sediment Deposits: Note those deposits described (or include any other deposits not listed) that are present in the sampling reach. Also indicate whether the undersides of rocks not deeply embedded are black (which generally indicates low dissolved oxygen or anaerobic conditions).

Inorganic Substrate Components: Visually estimate the relative proportion of each of the 7 substrate/particle types listed that are present over the sampling reach.

Organic Substrate Components: Indicate relative abundance of each of the 3 substrate types listed.

5.2 A VISUAL-BASED HABITAT ASSESSMENT

Biological potential is limited by the quality of the physical habitat, forming the template within which biological communities develop (Southwood 1977). Thus, habitat assessment is defined as the evaluation of the structure of the surrounding physical habitat that influences the quality of the water resource and the condition of the resident aquatic community (Barbour et al. 1996a). For streams, an encompassing approach to assessing structure of the habitat includes an evaluation of the variety and quality of the substrate, channel morphology, bank structure, and riparian vegetation. Habitat parameters pertinent to the assessment of habitat quality include those that characterize the stream "micro scale" habitat (e.g., estimation of embeddedness), the "macro scale" features (e.g., channel morphology), and the riparian and bank structure features that are most often influential in affecting the other parameters.

Rosgen (1985, 1994) presented a stream and river classification system that is founded on the premise that dynamically-stable stream channels have a morphology that provides appropriate distribution of flow energy during storm events. Further, he identifies 8 major variables that affect the stability of channel morphology, but are not mutually independent: channel width, channel depth, flow velocity, discharge, channel slope, roughness of channel materials, sediment load and sediment particle size distribution. When streams have one of these characteristics altered, some of their capability to dissipate energy properly is lost (Leopold et al. 1964, Rosgen 1985) and will result in accelerated rates of channel erosion. Some of the habitat structural components that function to dissipate flow energy are:

- ! sinuosity
- ! roughness of bed and bank materials
- ! presence of point bars (slope is an important characteristic)
- ! vegetative conditions of stream banks and the riparian zone
- ! condition of the floodplain (accessibility from bank, overflow, and size are important characteristics).

EQUIPMENT/SUPPLIES NEEDED FOR HABITAT ASSESSMENT AND PHYSICAL/WATER QUALITY CHARACTERIZATION

- Physical Characterization and Water Quality Field Data Sheet*
- Habitat Assessment Field Data Sheet*
- clipboard
- pencils or waterproof pens
- 35 mm camera (may be digital)
- video camera (optional)
- upstream/downstream "arrows" or signs for photographing and documenting sampling reaches
- Flow or velocity meter
- *In situ* water quality meters
- Global Positioning System (GPS) Unit

* It is helpful to copy field sheets onto water-resistant paper for use in wet weather conditions

Measurement of these parameters or characteristics serve to stratify and place streams into distinct classifications. However, none of these habitat classification techniques attempt to differentiate the quality of the habitat and the ability of the habitat to support the optimal biological condition of the

region. Much of our understanding of habitat relationships in streams has emerged from comparative studies that describe statistical relationships between habitat variables and abundance of biota (Hawkins et al. 1993). However, in response to the need to incorporate broader scale habitat assessments in water resource programs, 2 types of approaches for evaluating habitat structure have been developed. In the first, the Environmental Monitoring and Assessment Program (EMAP) of the USEPA and the National Water-Quality Assessment Program (NAWQA) of the USGS developed techniques that incorporate measurements of various features of the instream, channel, and bank morphology (Meader et al. 1993, Klemm and Lazorchak 1994). These techniques provide a relatively comprehensive characterization of the physical structure of the stream sampling reach and its surrounding floodplain. The second type was a more rapid and qualitative habitat assessment approach that was developed to describe the overall quality of the physical habitat (Ball 1982, Ohio EPA 1987, Plafkin et al. 1989, Barbour and Stribling 1991, 1994, Rankin 1991, 1995). In this document, the more rapid visual-based approach is described. A cursory overview of the more quantitative approaches to characterizing the physical structure of the habitat is provided.

The habitat assessment matrix developed for the Rapid Bioassessment Protocols (RBPs) in Plafkin et al. (1989) were originally based on the Stream Classification Guidelines for Wisconsin developed by Ball (1982) and “*Methods of Evaluating Stream, Riparian, and Biotic Conditions*” developed by Platts et al. (1983). Barbour and Stribling (1991, 1994) modified the habitat assessment approach originally developed for the RBPs to include additional assessment parameters for high gradient streams and a more appropriate parameter set for low gradient streams (Appendix A-1, Forms 2,3). All parameters are evaluated and rated on a numerical scale of 0 to 20 (highest) for each sampling reach. The ratings are then totaled and compared to a reference condition to provide a final habitat ranking. Scores increase as habitat quality increases. To ensure consistency in the evaluation procedure, descriptions of the physical parameters and relative criteria are included in the rating form.

The Environmental Agency of Great Britain (Environment Agency of England and Wales, Scottish Environment Protection Agency, and Environment and Heritage Service of Northern Ireland) have developed a River Habitat Survey (RHS) for characterizing the quality of their streams and rivers (Raven et al. 1998). The approach used in Great Britain is similar to the visual-based habitat assessment used in the US in that scores are assigned to ranges of conditions of various habitat parameters.

A biologist who is well versed in the ecology and zoogeography of the region can generally recognize optimal habitat structure as it relates to the biological community. The ability to accurately assess the quality of the physical habitat structure using a visual-based approach depends on several factors:

- ! the parameters selected to represent the various features of habitat structure need to be relevant and clearly defined
- ! a continuum of conditions for each parameter must exist that can be characterized from the optimum for the region or stream type under study to the poorest situation reflecting substantial alteration due to anthropogenic activities

- ! the judgement criteria for the attributes of each parameter should minimize subjectivity through either quantitative measurements or specific categorical choices
- ! the investigators are experienced in or adequately trained for stream assessments in the region under study (Hannaford et al. 1997)
- ! adequate documentation and ongoing training is maintained to evaluate and correct errors resulting in outliers and aberrant assessments.

Habitat evaluations are first made on instream habitat, followed by channel morphology, bank structural features, and riparian vegetation. Generally, a single, comprehensive assessment is made that incorporates features of the entire sampling reach as well as selected features of the catchment. Additional assessments may be made on neighboring reaches to provide a broader evaluation of habitat quality for the stream ecosystem. The actual habitat assessment process involves rating the 10 parameters as optimal, suboptimal, marginal, or poor based on the criteria included on the Habitat Assessment Field Data Sheets (Appendix A-1, Forms 2,3). Some state programs, such as Florida Department of Environmental Protection (DEP) (1996) and Mid-Atlantic Coastal Streams Workgroup (MACS) (1996) have adapted this approach using somewhat fewer and different parameters.

Reference conditions are used to scale the assessment to the "best attainable" situation. This approach is critical to the assessment because stream characteristics will vary dramatically across different regions (Barbour and Stribling 1991). The ratio between the score for the test station and the score for the reference condition provides a percent comparability measure for each station. The station of interest is then classified on the basis of its similarity to expected conditions (reference condition), and its apparent potential to support an acceptable level of biological health. Use of a percent comparability evaluation allows for regional and stream-size differences which affect flow or velocity, substrate, and channel morphology. Some regions are characterized by streams having a low channel gradient, such as coastal plains or prairie regions.

Other habitat assessment approaches or a more rigorously quantitative approach to measuring the habitat parameters may be used (See Klemm and Lazorchak 1994, Kaufmann and Robison 1997, Meader et al. 1993). However, holistic and rapid assessment of a wide variety of habitat attributes along with other types of data is critical if physical measurements are to be used to best advantage in interpreting biological data. A more detailed discussion of the relationship between habitat quality and biological condition is presented in Chapter 10.

A generic habitat assessment approach based on visual observation can be separated into 2 basic approaches—one designed for high-gradient streams and one designed for low-gradient streams. High-gradient or riffle/run prevalent streams are those in moderate to high gradient landscapes. Natural high-gradient streams have substrates primarily composed of coarse sediment particles (i.e., gravel or larger) or frequent coarse particulate aggregations along stream reaches. Low-gradient or glide/pool prevalent streams are those in low to moderate gradient landscapes. Natural low-gradient streams have substrates of fine sediment or infrequent aggregations of more coarse (gravel or larger) sediment particles along stream reaches. The entire sampling reach is evaluated for each parameter. Descriptions of each parameter and its relevance to instream biota are presented in the following discussion. Parameters that are used only for high-gradient prevalent streams are marked with an "a"; those for low-gradient dominant streams, a "b". If a parameter is used for both stream types, it is not marked with a letter. A brief set of decision criteria is given

for each parameter corresponding to each of the 4 categories reflecting a continuum of conditions on the field sheet (optimal, suboptimal, marginal, and poor). Refer to Appendix A-1, Forms 2 and 3, for a complete field assessment guide.

PROCEDURE FOR PERFORMING HABITAT ASSESSMENT

1. Select the reach to be assessed. The habitat assessment is performed on the same 100 m reach (or other reach designation [e.g., 40 x stream wetted width]) from which the biological sampling is conducted. Some parameters require an observation of a broader section of the catchment than just the sampling reach.
2. Complete the station identification section of each field data sheet and habitat assessment form.
3. It is best for the investigators to obtain a close look at the habitat features to make an adequate assessment. If the physical and water quality characterization and habitat assessment are done before the biological sampling, care must be taken to avoid disturbing the sampling habitat.
4. Complete the **Physical Characterization and Water Quality Field Data Sheet**. Sketch a map of the sampling reach on the back of this form.
5. Complete the **Habitat Assessment Field Data Sheet**, in a team of 2 or more biologists, if possible, to come to a consensus on determination of quality. Those parameters to be evaluated on a scale greater than a sampling reach require traversing the stream corridor to the extent deemed necessary to assess the habitat feature. As a general rule-of-thumb, use 2 lengths of the sampling reach to assess these parameters.

QUALITY ASSURANCE PROCEDURES

1. Each biologist is to be trained in the visual-based habitat assessment technique for the applicable region or state.
2. The judgment criteria for each habitat parameter are calibrated for the stream classes under study. Some text modifications may be needed on a regional basis.
3. Periodic checks of assessment results are completed using pictures of the sampling reach and discussions among the biologists in the agency.

Parameters to be evaluated in sampling reach:

1 EPIFAUNAL SUBSTRATE/AVAILABLE COVER

high and low gradient streams

Includes the relative quantity and variety of natural structures in the stream, such as cobble (riffles), large rocks, fallen trees, logs and branches, and undercut banks, available as refugia, feeding, or sites for spawning and nursery functions of aquatic macrofauna. A wide variety and/or abundance of submerged structures in the stream provides macroinvertebrates and fish with a large number of niches, thus increasing habitat diversity. As variety and abundance of cover decreases, habitat structure becomes monotonous, diversity decreases, and the potential for recovery following disturbance decreases. Riffles and runs are critical for maintaining a variety and abundance of insects in most high-gradient streams and serving as spawning and feeding refugia for certain fish. The extent and quality of the riffle is an important factor in the support of a healthy biological condition in high-gradient streams. Riffles and runs offer a diversity of habitat through variety of particle size, and, in many small high-gradient streams, will provide the most stable habitat. Snags and submerged logs are among the most productive habitat structure for macroinvertebrate colonization and fish refugia in low-gradient streams. However, “new fall” will not yet be suitable for colonization.

Selected References

Wesche et al. 1985, Pearsons et al. 1992, Gorman 1988, Rankin 1991, Barbour and Stribling 1991, Plafkin et al. 1989, Platts et al. 1983, Osborne et al. 1991, Benke et al. 1984, Wallace et al. 1996, Ball 1982, MacDonald et al. 1991, Reice 1980, Clements 1987, Hawkins et al. 1982, Beechie and Sibley 1997.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover (high and low gradient)	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

1a. Epifaunal Substrate/Available Cover—High Gradient



Optimal Range



Poor Range

1b. Epifaunal Substrate/Available Cover—Low Gradient



Optimal Range

(Mary Kay Corazalla, U. of Minn.)



Poor Range

2a EMBEDDEDNESS

high gradient streams

Refers to the extent to which rocks (gravel, cobble, and boulders) and snags are covered or sunken into the silt, sand, or mud of the stream bottom. Generally, as rocks become embedded, the surface area available to macroinvertebrates and fish (shelter, spawning, and egg incubation) is decreased. Embeddedness is a result of large-scale sediment movement and deposition, and is a parameter evaluated in the riffles and runs of high-gradient streams. The rating of this parameter may be variable depending on where the observations are taken. To avoid confusion with sediment deposition (another habitat parameter), observations of embeddedness should be taken in the upstream and central portions of riffles and cobble substrate areas.

Selected References

Ball 1982, Osborne et al. 1991, Barbour and Stribling 1991, Platts et al. 1983, MacDonald et al. 1991, Rankin 1991, Reice 1980, Clements 1987, Benke et al. 1984, Hawkins et al. 1982, Burton and Harvey 1990.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
2.a Embeddedness (high gradient)	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

2a. Embeddedness—High Gradient



Optimal Range

(William Taft, MI DNR)



Poor Range

(William Taft, MI DNR)

2b POOL SUBSTRATE CHARACTERIZATION

low gradient streams Evaluates the type and condition of bottom substrates found in pools. Firmer sediment types (e.g., gravel, sand) and rooted aquatic plants support a wider variety of organisms than a pool substrate dominated by mud or bedrock and no plants. In addition, a stream that has a uniform substrate in its pools will support far fewer types of organisms than a stream that has a variety of substrate types.

Selected References Beschta and Platts 1986, U.S. EPA 1983.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
2b. Pool Substrate Characterization (low gradient)	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or submerged vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

2b. Pool Substrate Characterization—Low Gradient



Optimal Range
(Mary Kay Corazalla, U. of Minn.)



Poor Range

3a VELOCITY/DEPTH COMBINATIONS

high gradient streams

Patterns of velocity and depth are included for high-gradient streams under this parameter as an important feature of habitat diversity. The best streams in most high-gradient regions will have all 4 patterns present: (1) slow-deep, (2) slow-shallow, (3) fast-deep, and (4) fast-shallow. The general guidelines are 0.5 m depth to separate shallow from deep, and 0.3 m/sec to separate fast from slow. The occurrence of these 4 patterns relates to the stream's ability to provide and maintain a stable aquatic environment.

Selected References Ball 1982, Brown and Brussock 1991, Gore and Judy 1981, Oswood and Barber 1982.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
3a. Velocity/ Depth Regimes (high gradient)	All 4 velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (slow is <0.3 m/s, deep is >0.5 m)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

3a. Velocity/Depth Regimes—High Gradient



Optimal Range (Mary Kay Corazalla, U. of Minn.)
(arrows emphasize different velocity/depth regimes)



Poor Range (William Taft, MI DNR)

3b POOL VARIABILITY

low gradient streams

Rates the overall mixture of pool types found in streams, according to size and depth. The 4 basic types of pools are large-shallow, large-deep, small-shallow, and small-deep. A stream with many pool types will support a wide variety of aquatic species. Rivers with low sinuosity (few bends) and monotonous pool characteristics do not have sufficient quantities and types of habitat to support a diverse aquatic community. General guidelines are any pool dimension (i.e., length, width, oblique) greater than half the cross-section of the stream for separating large from small and 1 m depth separating shallow and deep.

Selected References Beschta and Platts 1986, USEPA 1983.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
3b. Pool Variability (low gradient)	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

3b. Pool Variability—Low Gradient



Optimal Range

(Peggy Morgan, FL DEP)



Poor Range

(William Taft, MI DNR)

4 SEDIMENT DEPOSITION

high and low gradient streams

Measures the amount of sediment that has accumulated in pools and the changes that have occurred to the stream bottom as a result of deposition. Deposition occurs from large-scale movement of sediment. Sediment deposition may cause the formation of islands, point bars (areas of increased deposition usually at the beginning of a meander that increase in size as the channel is diverted toward the outer bank) or shoals, or result in the filling of runs and pools. Usually deposition is evident in areas that are obstructed by natural or manmade debris and areas where the stream flow decreases, such as bends. High levels of sediment deposition are symptoms of an unstable and continually changing environment that becomes unsuitable for many organisms.

Selected References MacDonald et al. 1991, Platts et al. 1983, Ball 1982, Armour et al. 1991, Barbour and Stribling 1991, Rosgen 1985.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
4. Sediment Deposition (high and low gradient)	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4a. Sediment Deposition—High Gradient



Optimal Range



Poor Range
(arrow pointing to sediment deposition)

4b. Sediment Deposition—Low Gradient



Optimal Range



Poor Range
(arrows pointing to sediment deposition)

5 CHANNEL FLOW STATUS

high and low gradient streams

The degree to which the channel is filled with water. The flow status will change as the channel enlarges (e.g., aggrading stream beds with actively widening channels) or as flow decreases as a result of dams and other obstructions, diversions for irrigation, or drought. When water does not cover much of the streambed, the amount of suitable substrate for aquatic organisms is limited. In high-gradient streams, riffles and cobble substrate are exposed; in low-gradient streams, the decrease in water level exposes logs and snags, thereby reducing the areas of good habitat. Channel flow is especially useful for interpreting biological condition under abnormal or lowered flow conditions. This parameter becomes important when more than one biological index period is used for surveys or the timing of sampling is inconsistent among sites or annual periodicity.

Selected References Rankin 1991, Rosgen 1985, Hupp and Simon 1986, MacDonald et al. 1991, Ball 1982, Hicks et al. 1991.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
5. Channel Flow Status (high and low gradient)	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

5a. Channel Flow Status—High Gradient



Optimal Range



Poor Range
(arrow showing that water is not reaching both banks; leaving much of channel uncovered)

5b. Channel Flow Status—Low Gradient



Optimal Range



Poor Range

(James Stahl, IN DEM)

Parameters to be evaluated broader than sampling reach:

6 CHANNEL ALTERATION

high and low gradient streams

Is a measure of large-scale changes in the shape of the stream channel. Many streams in urban and agricultural areas have been straightened, deepened, or diverted into concrete channels, often for flood control or irrigation purposes. Such streams have far fewer natural habitats for fish, macroinvertebrates, and plants than do naturally meandering streams. Channel alteration is present when artificial embankments, riprap, and other forms of artificial bank stabilization or structures are present; when the stream is very straight for significant distances; when dams and bridges are present; and when other such changes have occurred. Scouring is often associated with channel alteration.

Selected References Barbour and Stribling 1991, Simon 1989a, b, Simon and Hupp 1987, Hupp and Simon 1986, Hupp 1992, Rosgen 1985, Rankin 1991, MacDonald et al. 1991.

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration (high and low gradient)	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

6a. Channel Alteration—High Gradient



Optimal Range



Poor Range
(arrows emphasizing large-scale channel alterations)

6b. Channel Alteration—Low Gradient



Optimal Range



Poor Range
(John Maxted, DE DNREC)

7a FREQUENCY OF RIFFLES (OR BENDS)

high gradient streams

Is a way to measure the sequence of riffles and thus the heterogeneity occurring in a stream. Riffles are a source of high-quality habitat and diverse fauna, therefore, an increased frequency of occurrence greatly enhances the diversity of the stream community. For high gradient streams where distinct riffles are uncommon, a run/bend ratio can be used as a measure of meandering or sinuosity (see 7b). A high degree of sinuosity provides for diverse habitat and fauna, and the stream is better able to handle surges when the stream fluctuates as a result of storms. The absorption of this energy by bends protects the stream from excessive erosion and flooding and provides refugia for benthic invertebrates and fish during storm events. To gain an appreciation of this parameter in some streams, a longer segment or reach than that designated for sampling should be incorporated into the evaluation. In some situations, this parameter may be rated from viewing accurate topographical maps. The “sequencing” pattern of the stream morphology is important in rating this parameter. In headwaters, riffles are usually continuous and the presence of cascades or boulders provides a form of sinuosity and enhances the structure of the stream. A stable channel is one that does not exhibit progressive changes in slope, shape, or dimensions, although short-term variations may occur during floods (Gordon et al. 1992).

Selected References

Hupp and Simon 1991, Brussock and Brown 1991, Platts et al. 1983, Rankin 1991, Rosgen 1985, 1994, 1996, Osborne and Hendricks 1983, Hughes and Omernik 1983, Cushman 1985, Bain and Boltz 1989, Gislason 1985, Hawkins et al. 1982, Statzner et al. 1988.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
7a. Frequency of Riffles (or bends) (high gradient)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

7a. Frequency of Riffles (or bends)—High Gradient



Optimal Range
(arrows showing frequency of riffles and bends)



Poor Range

7b CHANNEL SINUOSITY

low gradient streams

Evaluates the meandering or sinuosity of the stream. A high degree of sinuosity provides for diverse habitat and fauna, and the stream is better able to handle surges when the stream fluctuates as a result of storms. The absorption of this energy by bends protects the stream from excessive erosion and flooding and provides refugia for benthic invertebrates and fish during storm events. To gain an appreciation of this parameter in low gradient streams, a longer segment or reach than that designated for sampling may be incorporated into the evaluation. In some situations, this parameter may be rated from viewing accurate topographical maps. The “sequencing” pattern of the stream morphology is important in rating this parameter. In “oxbow” streams of coastal areas and deltas, meanders are highly exaggerated and transient. Natural conditions in these streams are shifting channels and bends, and alteration is usually in the form of flow regulation and diversion. A stable channel is one that does not exhibit progressive changes in slope, shape, or dimensions, although short-term variations may occur during floods (Gordon et al. 1992).

Selected References

Hupp and Simon 1991, Brussock and Brown 1991, Platts et al. 1983, Rankin 1991, Rosgen 1985, 1994, 1996, Osborne and Hendricks 1983, Hughes and Omernik 1983, Cushman 1985, Bain and Boltz 1989, Gislason 1985, Hawkins et al. 1982, Statzner et al. 1988.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
7b. Channel Sinuosity (low gradient)	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

7b. Channel Sinuosity—Low Gradient



Optimal Range



Poor Range

8 BANK STABILITY (condition of banks)

high and low gradient streams

Measures whether the stream banks are eroded (or have the potential for erosion). Steep banks are more likely to collapse and suffer from erosion than are gently sloping banks, and are therefore considered to be unstable. Signs of erosion include crumbling, unvegetated banks, exposed tree roots, and exposed soil. Eroded banks indicate a problem of sediment movement and deposition, and suggest a scarcity of cover and organic input to streams. Each bank is evaluated separately and the cumulative score (right and left) is used for this parameter.

Selected References Ball 1982, MacDonald et al. 1991, Armour et al. 1991, Barbour and Stribling 1991, Hupp and Simon 1986, 1991, Simon 1989a, Hupp 1992, Hicks et al. 1991, Osborne et al. 1991, Rosgen 1994, 1996.

Habitat Parameter	Condition Category											
	Optimal			Suboptimal			Marginal			Poor		
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream (high and low gradient)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.			Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.			Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.			Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.		
SCORE ___ (LB)	Left Bank	10	9	8	7	6	5	4	3	2	1	0
SCORE ___ (RB)	Right Bank	10	9	8	7	6	5	4	3	2	1	0

8a. Bank Stability (condition of banks)—High Gradient



Optimal Range
(arrow pointing to stable streambanks)



Poor Range (MD Save Our Streams)
(arrow highlighting unstable streambanks)

8b. Bank Stability (condition of banks)—Low Gradient



Optimal Range (Peggy Morgan, FL DEP)



Poor Range
(arrow highlighting unstable streambanks)

9 BANK VEGETATIVE PROTECTION

*high and low
gradient streams*

Measures the amount of vegetative protection afforded to the stream bank and the near-stream portion of the riparian zone. The root systems of plants growing on stream banks help hold soil in place, thereby reducing the amount of erosion that is likely to occur. This parameter supplies information on the ability of the bank to resist erosion as well as some additional information on the uptake of nutrients by the plants, the control of instream scouring, and stream shading. Banks that have full, natural plant growth are better for fish and macroinvertebrates than are banks without vegetative protection or those shored up with concrete or riprap. This parameter is made more effective by defining the native vegetation for the region and stream type (i.e., shrubs, trees, etc.). In some regions, the introduction of exotics has virtually replaced all native vegetation. The value of exotic vegetation to the quality of the habitat structure and contribution to the stream ecosystem must be considered in this parameter. In areas of high grazing pressure from livestock or where residential and urban development activities disrupt the riparian zone, the growth of a natural plant community is impeded and can extend to the bank vegetative protection zone. Each bank is evaluated separately and the cumulative score (right and left) is used for this parameter.

*Selected
References* Platts et al. 1983, Hupp and Simon 1986, 1991, Simon and Hupp 1987, Ball 1982, Osborne et al. 1991, Rankin 1991, Barbour and Stribling 1991, MacDonald et al. 1991, Armour et al. 1991, Myers and Swanson 1991, Bauer and Burton 1993.

Habitat Parameter	Condition Category											
	Optimal			Suboptimal			Marginal			Poor		
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. (high and low gradient)	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.			70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.			50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.			Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
SCORE ___ (LB)	Left Bank	10	9	8	7	6	5	4	3	2	1	0
SCORE ___ (RB)	Right Bank	10	9	8	7	6	5	4	3	2	1	0

9a. Bank Vegetative Protection—High Gradient



Optimal Range
(arrow pointing to streambank with high level of vegetative cover)



Poor Range
(arrow pointing to streambank with almost no vegetative cover)

9b. Bank Vegetative Protection—Low Gradient



Optimal Range
(Peggy Morgan, FL DEP)



Poor Range
(arrow pointing to channelized streambank with no vegetative cover)
(MD Save Our Streams)

10 RIPARIAN VEGETATIVE ZONE WIDTH

high and low gradient streams

Measures the width of natural vegetation from the edge of the stream bank out through the riparian zone. The vegetative zone serves as a buffer to pollutants entering a stream from runoff, controls erosion, and provides habitat and nutrient input into the stream. A relatively undisturbed riparian zone supports a robust stream system; narrow riparian zones occur when roads, parking lots, fields, lawns, bare soil, rocks, or buildings are near the stream bank. Residential developments, urban centers, golf courses, and rangeland are the common causes of anthropogenic degradation of the riparian zone. Conversely, the presence of "old field" (i.e., a previously developed field not currently in use), paths, and walkways in an otherwise undisturbed riparian zone may be judged to be inconsequential to altering the riparian zone and may be given relatively high scores. For variable size streams, the specified width of a desirable riparian zone may also be variable and may be best determined by some multiple of stream width (e.g., 4 x wetted stream width). Each bank is evaluated separately and the cumulative score (right and left) is used for this parameter.

Selected References Barton et al. 1985, Naiman et al. 1993, Hupp 1992, Gregory et al. 1991, Platts et al. 1983, Rankin 1991, Barbour and Stribling 1991, Bauer and Burton 1993.

Habitat Parameter	Condition Category											
	Optimal			Suboptimal			Marginal			Poor		
10. Riparian Vegetative Zone Width (score each bank riparian zone) (high and low gradient)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.			Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.			Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.			Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.		
SCORE ___ (LB)	Left Bank	10	9	8	7	6	5	4	3	2	1	0
SCORE ___ (RB)	Right Bank	10	9	8	7	6	5	4	3	2	1	0

10a. Riparian Vegetative Zone Width—High Gradient



Optimal Range
(arrow pointing out an undisturbed riparian zone)



Poor Range
(arrow pointing out lack of riparian zone)

10b. Riparian Vegetative Zone Width—Low Gradient



Optimal Range
(arrow emphasizing an undisturbed riparian zone)



Poor Range (MD Save Our Streams)
(arrow emphasizing lack of riparian zone)

5.3 ADDITIONS OF QUANTITATIVE MEASURES TO THE HABITAT ASSESSMENT

Kaufmann (1993) identified 7 general physical habitat attributes important in influencing stream ecology. These include:

- ! channel dimensions
- ! channel gradient
- ! channel substrate size and type
- ! habitat complexity and cover
- ! riparian vegetation cover and structure
- ! anthropogenic alterations
- ! channel-riparian interaction.

All of these attributes vary naturally, as do biological characteristics; thus expectations differ even in the absence of anthropogenic disturbances. Within a given physiographic-climatic region, stream drainage area and overall stream gradient are likely to be strong natural determinants of many aspects of stream habitat, because of their influence on discharge, flood stage, and stream power (the product of discharge times gradient). In addition, all of these attributes may be directly or indirectly altered by anthropogenic activities.

In Section 5.2, an approach is described whereby habitat quality is interpreted directly in the field by biologists while sampling the stream reach. This Level 1 approach is observational and requires only one person (although a team approach is recommended) and takes about 15 to 20 minutes per stream reach. This approach more quickly yields a habitat quality assessment. However, it depends upon the knowledge and experience of the field biologist to make the proper interpretation of observed of both the natural expectations (potentials) and the biological consequences (quality) that can be attributed to the observed physical attributes. Hannaford et al. (1997) found that training in habitat assessment was necessary to reduce the subjectivity in a visual-based approach. The authors also stated that training on different types of streams may be necessary to adequately prepare investigators.

The second conceptual approach described here confines observations to habitat characteristics themselves (whether they are quantitative or qualitative), then later ascribing quality scoring to these measurements as part of the data analysis process. Typically, this second type of habitat assessment approach employs more quantitative data collection, as exemplified by field methods described by Kaufmann and Robison (1997) for EMAP, Simonson et al. (1994), Meador et al. (1993) for NAWQA, and others cited by Gurtz and Muir (1994). These field approaches typically define a reach length proportional to stream width and employ transect measurements that are systematically spaced (Simonson et al. 1994, Kaufmann and Robison 1997) or spaced by judgement to be representative (Meador et al. 1993). They usually include measurement of substrate, channel and bank dimensions, riparian canopy cover, discharge, gradient, sinuosity, in-channel cover features, and counts of large woody debris and riparian human disturbances. They may employ systematic visual estimates of substrate embeddedness, fish cover features, habitat

types, and riparian vegetation structure. The time commitment in the field to these more quantitative habitat assessment methods is usually 1.5 to 3 hours with a crew of two people. Because of the greater amount of data collected, they also require more time for data summarization, analysis, and interpretation. On the other hand, the more quantitative methods and less ambiguous field parameters result in considerably greater precision. The USEPA applied both quantitative and visual-based (RBPs) methods in a stream survey undertaken over 4 years in the mid-Atlantic region of the Appalachian Mountains. An earlier version of the RBP techniques were applied on 301 streams with repeat visits to 29 streams; signal-to-noise ratios varied from 0.1 to 3.0 for the twelve RBP metrics and averaged (1.1 for the RBP total habitat quality score). The quantitative methods produced a higher level of precision; signal-to-noise ratios were typically between 10 and 50, and sometimes in excess of 100 for quantitative measurements of channel morphology, substrate, and canopy densiometer measurements made on a random subset of 186 streams with 27 repeat visits in the same survey. Similarly, semi-quantitative estimates of fish cover and riparian human disturbance estimates obtained from multiple, systematic visual observations of otherwise measurable features had signal:noise ratios from 5 to 50. Many riparian vegetation cover and structure metrics were moderately precise (signal:noise ranging from 2 to 30). Commonly used flow dependent measures (e.g., riffle/pool and width/depth ratios), and some visual riparian cover estimates were less precise, with signal:noise ratios more in the range of those observed for metrics of the EPA's RBP habitat score (<2).

The USEPA's EMAP habitat assessment field methods are presented as an option for a second level (II) of habitat assessment. These methods have been applied in numerous streams throughout the Mid-Atlantic region, the Midwest, Colorado, California, and the Pacific Northwest. Table 5-1 is a summary of these field methods; more detail is presented in the field manual by Kaufmann and Robison (1997).

Table 5-1. Components of EMAP physical habitat protocol.

Component	Description
1. Thalweg Profile	Measure maximum depth, classify habitat, determine presence of soft/small sediment at 10-15 equally spaced intervals between each of 11 channel cross-sections (100-150 along entire reach). Measure wetted width at 11 channel cross-sections and mid-way between cross-sections (21 measurements).
2. Woody Debris	Between each of the channel cross sections, tally large woody debris numbers within and above the bankfull channel according to size classes.
3. Channel and Riparian Cross-Sections	At 11 cross-section stations placed at equal intervals along reach length: <ul style="list-style-type: none"> • Measure: channel cross section dimensions, bank height, undercut, angle (with rod and clinometer); gradient (clinometer), sinuosity (compass backsite), riparian canopy cover (densiometer). • Visually Estimate*: substrate size class and embeddedness; areal cover class and type (e.g., woody) of riparian vegetation in Canopy, Mid-Layer and Ground Cover; areal cover class of fish concealment features, aquatic macrophytes and filamentous algae. • Observe & Record*: human disturbances and their proximity to the channel.
4. Discharge	In medium and large streams (defines later) measure water depth and velocity @ 0.6 depth (with electromagnetic or impeller-type flow meter) at 15 to 20 equally spaced intervals across one carefully chosen channel cross-section. In very small streams, measure discharge with a portable weir or time the filling of a bucket.

* Substrate size class and embeddedness are estimated, and depth is measured for 55 particles taken at 5 equally-spaced points on each of 11 cross-sections. The cross-section is defined by laying the surveyor's rod or tape to span the wetted channel. Woody

debris is tallied over the distance between each cross-section and the next cross-section upstream. Riparian vegetation and human disturbances are observed 5 m upstream and 5 m downstream from the cross section station. They extend shoreward 10 m from left and right banks. Fish cover types, aquatic macrophytes, and algae are observed within channel 5 m upstream and 5 m downstream from the cross section stations. These boundaries for visual observations are estimated by eye.

Table 5-2 lists the physical habitat metrics that can be derived from applying these field methods. Once these habitat metrics are calculated from the available physical habitat data, an assessment would be obtained from comparing these metric values to those of known reference sites. A strong deviation from the reference expectations would indicate a habitat alteration of the particular parameter. The close connectivity of the various attributes would most likely result in an impact on multiple metrics if habitat alteration was occurring. The actual process for interpreting a habitat assessment using this approach is still under development.

Table 5-2. Example of habitat metrics that can be calculated from the EMAP physical habitat data.

Channel mean width and depth
Channel volume and Residual Pool volume
Mean channel slope and sinuosity
Channel incision, bankfull dimensions, and bank characteristics
Substrate mean diameter, % fines, % embeddedness
Substrate stability
Fish concealment features (areal cover of various types, e.g., undercut banks, brush)
Large woody debris (volume and number of pieces per 100 m)
Channel habitat types (e.g., % of reach composed of pools, riffles, etc.)
Canopy cover
Riparian vegetation structure and complexity
Riparian disturbance measure (proximity-weighted tally of human disturbances)

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8 FISH PROTOCOLS

Monitoring of the fish assemblage is an integral component of many water quality management programs, and its importance is reflected in the aquatic life use-support designations of many states. Narrative expressions such as “maintaining coldwater fisheries”, “fishable” or “fish propagation” are prevalent in state standards. Assessments of the fish assemblage must measure the overall structure and function of the ichthyofaunal community to adequately evaluate biological integrity and protect surface water resource quality. Fish bioassessment data quality and comparability are assured through the utilization of qualified fisheries professionals and consistent methods.

The Rapid Bioassessment Protocol (RBP) for fish presented in this document, is directly comparable to RBP V in Plafkin et al. (1989). The principal evaluation mechanism utilizes the technical framework of the Index of Biotic Integrity (IBI) — a fish assemblage assessment approach developed by Karr (1981). The IBI incorporates the zoogeographic, ecosystem, community and population aspects of the fish assemblage into a single ecologically-based index. Calculation and interpretation of the IBI involves a sequence of activities including: fish sample collection; data tabulation; and regional modification and calibration of metrics and expectation values. This concept has provided the overall multimetric index framework for rapid bioassessment in this document. A more detailed description of this approach for fish is presented in Karr et al. (1986) and Ohio EPA (1987). Regional modification and applications are described in Leonard and Orth (1986), Moyle et al. (1986), Hughes and Gammon (1987), Wade and Stalcup (1987), Miller et al. (1988), Steedman (1988), Simon (1991), Lyons (1992a), Simon and Lyons (1995), Lyons et al. (1996), and Simon (1999).

The RBP for fish involves careful, standardized field collection, species identification and enumeration, and analyses using aggregated biological attributes or quantification of the numbers (and in some cases biomass, see Section 8.3.3, Metric 13) of key species. The role of experienced fisheries scientists in the adaptation and application of the RBP and the taxonomic identification of fishes cannot be overemphasized. The fish RBP survey yields an objective discrete measure of the condition of the fish assemblage. Although the fish survey can usually be completed in the field by qualified fish biologists, difficult species identifications will require laboratory confirmation. Data provided by the fish RBP can serve to assess use attainment, develop biological criteria, prioritize sites for further evaluation, provide a reproducible impact assessment, and evaluate status and trends of the fish assemblage.

Fish collection procedures must focus on a multihabitat approach — sampling habitats in relative proportion to their local representation (as determined during site reconnaissance). Each sample reach should contain riffle, run and pool habitat, when available. Whenever possible, the reach should be sampled sufficiently upstream of any bridge or road crossing to minimize the hydrological effects on overall habitat quality. Wadeability and accessibility may ultimately govern the exact placement of the sample reach. A habitat assessment is performed and physical/chemical parameters measured concurrently with fish sampling to document and characterize available habitat specifics within the sample reach (see Chapter 5: Habitat Assessment and Physicochemical Characterization).

8.1 FISH COLLECTION PROCEDURES: ELECTROFISHING

All fish sampling gear types are generally considered selective to some degree; however, electrofishing has proven to be the most comprehensive and effective *single* method for collecting stream fishes. Pulsed DC (direct current) electrofishing is the method of choice to obtain a representative sample of the fish assemblage at each sampling station. However, electrofishing in any form has been banned from certain salmonid spawning streams in the northwest. As with any fish sampling method, the proper scientific collection permit(s) must be obtained before commencement of any electrofishing activities. The accurate identification of each fish collected is essential, and species-level identification is required (including hybrids in some cases, see Section 8.3.3, Metric 11). Field identifications are acceptable; however, voucher specimens must be retained for laboratory verification, particularly if there is any doubt about the correct identity of the specimen (see Section 8.2). Because the collection methods used are not consistently effective for young-of-the-year fish and because their inclusion may seasonally skew bioassessment results, fish less than 20 millimeters total length will not be identified or included in standard samples.

ELECTROFISHING CONFIGURATION AND FIELD TEAM ORGANIZATION

All field team members must be trained in electrofishing safety precautions and unit operation procedures identified by the electrofishing unit manufacturer. Each team member must be insulated from the water and the electrodes; therefore, chest waders and rubber gloves are required. Electrode and dip net handles must be constructed of insulating materials (e.g., woods, fiberglass). Electrofishers/electrodes must be equipped with functional safety switches (as installed by virtually all electrofisher manufacturers). Field team members must not reach into the water unless the electrodes have been removed from the water or the electrofisher has been disengaged.

It is recommended that at least 2 fish collection team members be certified in CPR (cardiopulmonary resuscitation). *Many* options exist for electrofisher configuration and field team organization; however, procedures will always involve pulsed DC electrofishing and a minimum 2-person team for sampling streams and wadeable rivers. Examples include:

- Backpack electrofisher with 2 hand-held electrodes mounted on fiberglass poles, one positive (anode) and one negative (cathode). One crew member, identified as the electrofisher unit operator, carries the backpack unit and manipulates both the anode and cathode poles. The anode may be fitted with a net ring (and shallow net) to allow the unit operator to net specimens. The remaining 1 or 2 team members net fish with dip nets and are responsible for specimen transport and care in buckets or livewells.
- Backpack electrofisher with 1 hand-held anode pole and a trailing or floating cathode. The electrofisher unit operator manipulates the anode with one hand, and has a second hand free for use of a dip net. The remaining 1 or 2 team members also aid in the netting of specimens, and in addition are responsible for specimen transport in buckets or livewells.
- Tote barge (pramunit) electrofisher with 2 hand-held anode poles and a trailing/floating cathode (recommended for large streams and wadeable rivers). Two team members are each equipped with an anode pole and a dip net. Each is responsible for electrofishing and the netting of specimens. The remaining team member will follow, pushing or pulling the barge through the sample reach. A livewell is maintained within the barge and/or within the sampling reach but outside the area of electric current.

The safety of all personnel and the quality of the data is assured through the adequate education, training, and experience of all members of the fish collection team. At least 1 biologist with training and experience in electrofishing techniques and fish taxonomy *must* be involved in each sampling event. Laboratory analyses are conducted and/or supervised by a fisheries professional trained in fish taxonomy. Quality assurance and quality control must be a continuous process in fisheries monitoring and assessment, and must include all program aspects (i.e., field sampling, habitat measurement, laboratory processing, and data recording).



Tote barge (pram unit) Electrofishing



8.1.1 Field Sampling Procedures

1. A representative stream reach (see Alternatives for Stream Reach Designation, next page) is selected and measured such that primary physical habitat characteristics of the stream are included within the reach (e.g., riffle, run and pool habitats, when available). The sample reach should be located away from the influences of major tributaries and

FIELD EQUIPMENT/SUPPLIES NEEDED FOR FISH SAMPLING—ELECTROFISHING

- appropriate scientific collection permit(s)
- backpack or tote barge-mounted electrofisher
- dip nets
- block nets (i.e., seines)
- elbow-length insulated waterproof gloves
- chest waders (equipped with wading cleats, when necessary)
- polarized sunglasses
- buckets/livewells
- jars for voucher/reference specimens
- waterproof jar labels
- 10% buffered formalin (formaldehyde solution)
- measuring board (500 mm minimum, with 1 mm increments)^a
- balance (gram scale)^b
- tape measure (100 m minimum)
- fish Sampling Field Data Sheet^c
- applicable topographic maps
- copies of field protocols
- pencils, clipboard
- first aid kit
- Global Positioning System (GPS) Unit

^a Needed only if program/study requires length frequency information

^b Needed only if total biomass and/or the Index of Well-Being are included in the assessment process (see Section 8.3.3, Metric 13).

^c It is helpful to copy fieldsheets onto water-resistant paper for use in wet weather conditions.

bridge/road crossings (e.g., sufficiently upstream to decrease influences on overall habitat quality). The exact location (i.e., latitude and longitude) of the downstream limit of the reach must be recorded on each field data sheet. (If a Global Positioning System unit is used to provide location information, the accuracy or design confidence of the unit should be noted.) A habitat assessment and physical/chemical characterization of water quality should be performed within the same sampling reach (see Chapter 5: Habitat Assessment and Physicochemical Characterization).

2. Collection via electrofishing begins at a shallow riffle, or other physical barrier at the downstream limit of the sample reach, and terminates at a similar barrier at the upstream end of the reach. In the absence of physical barriers, block nets should be set at the upstream and downstream ends of the reach prior to the initiation of any sampling activities.
3. Fish collection procedures commence at the downstream barrier. A minimum 2-person fisheries crew proceeds to electrofish in an upstream direction using a side-to-side or bank-to-bank sweeping technique to maximize area coverage. All wadeable habitats within the reach are sampled via a single pass, which terminates at the upstream barrier. Fish are held in livewells (or buckets) for subsequent identification and enumeration.
4. Sampling efficiency is dependent, at least in part, on water clarity and the field team's ability to see and net the stunned fish. Therefore, each team member should wear polarized sunglasses, and sampling is conducted only during periods of optimal water clarity and flow.
5. All fish (greater than 20 millimeters total length) collected within the sample reach must be identified to species (or subspecies). Specimens that cannot be identified with certainty in the field are preserved in a 10% formalin solution and stored in labeled jars for subsequent laboratory identification (see Section 8.2). A representative voucher collection must be retained for unidentified specimens, very small specimens, new locality records, and/or a particular region. In addition to the unidentified specimen jar, a voucher collection of a

ALTERNATIVES FOR STREAM REACH DESIGNATION

The collection of a representative sample of the fish assemblage is essential, and the appropriate sampling station length for obtaining that sample is best determined by conducting pilot studies (Lyons 1992b, Simonson et al. 1994, Simonson and Lyons 1995). Alternatives for the designation of stream sampling reaches include:

- **Fixed-distance designation**—A standard length of stream, e.g., a 150-200-meter reach (Ohio EPA 1987), 100-meter reach (Massachusetts DEP 1995) may be used to obtain a representative sample. Conceptually, this approach should provide a mixture of habitats in the reach and provide, at a minimum, duplicate physical and structural elements such as riffle/pool sequences.
- **Proportional-distance designation**— A standard number of stream channel “widths” may be used to measure the stream study reach, e.g., 40 times the stream width is defined by Environmental Monitoring & Assessment Program (EMAP) for sampling (Klemm and Lazorchak 1995). This approach allows variation in the length of the reach based on the size of the stream. Application of the proportional-distance approach in large streams or wadeable rivers may require the establishment of sampling program time and/or distance maxima (e.g., no more than 3 hours of electrofishing or 500-meter reach per sampling site, [Klemm et al. 1993]).

subsample of each species identified in the field should be preserved and labeled for subsequent laboratory verification, if necessary. Obviously, species of special concern (e.g., threatened, endangered) should be noted and released *immediately* on site. Labels should contain (at a minimum) location data (verbal description and coordinates), date, collectors' names, and sample identification code and/or station numbers for the particular sampling site. Young-of-the-year fish less than 20 millimeters (total length) are not identified or included in the sample, and are released on site. Specimens that can be identified in the field are counted, examined for external anomalies (i.e., deformities, eroded fins, lesions, and tumors), and recorded on field data sheets. An example of a "Fish Sampling Field Data Sheet" is provided in Appendix A-4, Form 1. Space is available for optional fish length and weight measurements, should a particular program/study require length frequency or biomass data. However, these data *are not required* for the standard multimetric assessment. Space is allotted on the field data sheets for the *optional* inclusion of measurements (nearest millimeter total length) and weights (nearest gram) for a subsample (to a maximum 25 specimens) of each species. Although fish length and weight measurements are optional, recording a range of lengths for species encountered may be a useful routine measure. Following the data recording phase of the procedure, specimens that have been identified and processed in the field are released on site to minimize mortality.

6. The data collection phase includes the completion of the top portion of the "Fish Sampling Field Data Sheet" (Appendix A-4, Form 1),

QUALITY CONTROL (QC) IN THE FIELD

1. Quality control must be a continuous process in fish bioassessment and should include all program aspects, from field collection and preservation to habitat assessment, sample processing, and data recording. Field validation should be conducted at selected sites and will involve the collection of a duplicate sample taken from an adjacent reach upstream of the initial sampling site. The adjacent reach should be similar to the initial site with respect to habitat and stressors. Sampling QC data should be evaluated following the first year of sampling in order to determine a level of acceptable variability and the appropriate duplication frequency.
2. Field identifications of fish *must* be conducted by qualified/trained fish taxonomists, familiar with local and regional ichthyofauna. Questionable records are prevented by: (a) requiring the presence of at least one experienced/trained fish taxonomist on every field effort, and (b) preserving selected specimens (e.g., Klemm and Lazorchak 1995 recommend a subsample of a maximum 25 voucher specimens of each species) and those that cannot be readily identified in the field for laboratory verification and/or examination by a second qualified fish taxonomist (see Section 8.2). Specimens must be properly preserved and labeled (refer to Section 8.1.1, number 5). When needed, chain-of-custody forms must be initiated following sample preservation, and must include the same information as the sample container labels.
3. All field equipment must be in good operating condition, and a plan for routine inspection, maintenance, and/or calibration must be developed to ensure consistency and quality of field data. Field data must be complete and legible, and should be entered on standardized field data forms and/or digital recorders. While in the field, the field team should possess sufficient copies of standardized field data forms and chains-of-custody for all anticipated sampling sites, as well as copies of all applicable Standard Operating Procedures (SOPs).

which duplicates selected information from the physical/chemical field sheet. Information regarding the sample collection procedures must also be recorded. This includes method of fish capture, start time, ending time, duration of sampling, maximum and mean stream widths. The percentage of each habitat type in the reach is estimated and documented on the data sheet. Comments should include sampling conditions, e.g., visibility, flow, difficult access to stream, or anything that may prove to be valuable information to consider for future sampling events or by personnel unfamiliar with the site.

8.2 LABORATORY IDENTIFICATION AND VERIFICATION

Fish records of questionable quality are prevented by preserving specimens (that cannot be readily identified in the field) for laboratory examination and/or a voucher collection for laboratory verification. Specimens must be properly preserved (e.g., 10% formalin for tissue fixing and 70% ethanol for long-term storage) and labeled (using museum-grade archival labels/paper, and formalin/alcohol-proof pen or pencil). Labels should contain (at a minimum) site location data (i.e., verbal description and site coordinates), collection date, collector's names, species identification (for fishes identified in the field), species totals, and sample identification code and/or station number. All samples received in the laboratory should be tracked using a sample log-in procedure (Appendix A-4, Form 2). Laboratory fisheries professionals *must* be capable of identifying fish to the lowest possible taxonomic level (i.e., species or subspecies) and should have access to suitable regional taxonomic references (see Section 8.4) to aid in the identification process. Laboratories that do not typically identify fish, or trained fisheries professionals that have difficulty identifying a particular specimen or group of fish, should contact a taxonomic specialist (i.e., a recognized authority for that particular taxonomic group). Taxonomic nomenclature *must* be kept consistent and current. Common and scientific names of fishes from the United States and Canada are listed in Robins et al. (1991).

8.3 DESCRIPTION OF FISH METRICS

QUALITY CONTROL (QC) FOR TAXONOMY

1. A representative voucher collection must be retained for unidentified specimens, small specimens, and new locality records. In addition, a second voucher jar should be retained for a subsample of each species identified in the field (e.g., Klemm and Lazorchak 1995 recommend a subsample of 25 voucher specimens of each species). The vouchers must be properly preserved, labeled, and stored in the laboratory for future reference (see Section 8.2).
2. Voucher collections should be verified by a second qualified fish taxonomist, i.e., a professional other than the taxonomist responsible for the original field identifications. The word "validated" and the name of the taxonomist that validated the identification should be added to each voucher label. Specimens sent from the laboratory to taxonomic specialists should be recorded in a "Taxonomy Validation Notebook" (see Chapter 7), noting the label information and date sent. Upon return of the specimens, the date received and findings should also be recorded in the notebook (and the voucher label), along with the name of the person who performed the validation.
3. Information on samples completed (through the identification/validation process) will be tracked in a "Sample Log" notebook, to track the progress of each sample (Appendix A-4, Form 2). Sample log entries will be updated as each step is completed (e.g., receipt, identification, validation, archive).
4. A library of taxonomic literature is essential for the aid and support of identification/verification activities, and must be maintained (and updated as needed) in the laboratory. A list of selected taxonomic references is provided in Section 8.4.

Through the IBI, Karr et al. (1986) provided a consistent theoretical framework for analyzing fish assemblage data. The IBI is an aggregation of 12 biological metrics that are based on the fish assemblage's taxonomic and trophic composition and the abundance and condition of fish. Such multiple-parameter indices are necessary for making objective evaluations of complex systems. The IBI was designed to evaluate the quality of small Midwestern warmwater streams but has been modified for use in many regions (e.g., eastern and western United States, Canada, France) and in different ecosystems (e.g., rivers, impoundments, lakes, and estuaries).

The metrics attempt to quantify a biologist's best professional judgment (BPJ) of the quality of the fish assemblage. The IBI utilizes professional judgment, but in a prescribed manner, and it includes quantitative standards for discriminating the condition of the fish assemblage (Figure 8-1). BPJ is involved in choosing both the most appropriate population or assemblage element that is representative of each metric and in setting the scoring criteria. This process can be easily and clearly modified, as opposed to judgments that occur after results are calculated. Each metric is scored against criteria based on expectations developed from appropriate regional reference sites. Metric values

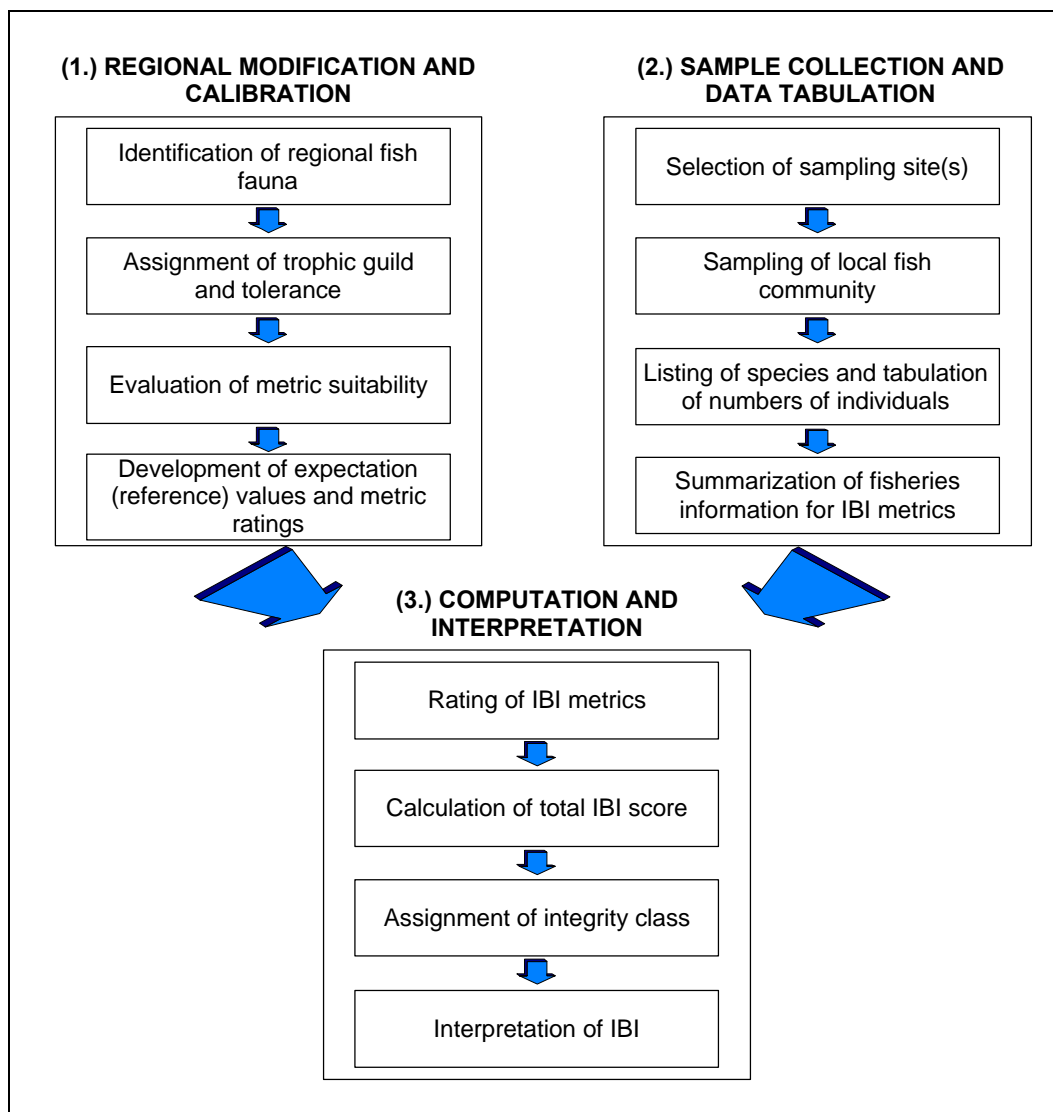


Figure 8-1. Sequence of activities involved in calculating and interpreting the Index of Biotic Integrity (adapted from Karr et al. 1986).

approximating, deviating slightly from, or deviating greatly from values occurring at the reference sites are scored as 5, 3, or 1, respectively. The scores of the 12 metrics are added for each station to give an IBI ranging from a maximum of 60 (excellent) to a minimum of 12 (very poor). Trophic and tolerance classifications of selected fish species are listed in Appendix C. Additional classifications can be derived from information in State and regional fish texts, by objectively assessing a large statewide database, or by contacting authors/originators of regional IBI programs or pilot studies. Use of the IBI by water resource agencies may result in further modifications. Many modifications have occurred (Miller et al. 1988) without changing the IBI's basic theoretical foundations.

The IBI serves as an integrated analysis because individual metrics may differ in their relative sensitivity to various levels of biological condition. A description and brief rationale for each of the 12 IBI metrics is outlined below. The original metrics described by Karr (1981) for Illinois streams are followed by substitutes used in or proposed for different geographic regions and stream sizes. Because of zoogeographic differences, different families or species are evaluated in different regions, with regional substitutes occupying the same general habitat or niche. The source for each substitute is footnoted below. Table 8-1 presents an overview of the IBI metric alternatives and their sources for various areas of the United States and Canada.

EXAMPLES OF SOURCES FOR METRIC ALTERNATIVES

Karr et al. (1986)
 Leonard and Orth (1986)
 Moyle et al. (1986)
 Fausch and Schrader (1987)
 Hughes and Gammon (1987)
 Ohio EPA (1987)
 Miller et al. (1988)
 Steedman (1988)
 Simon (1991)
 Lyons (1992a)
 Barbour et al. (1995)
 Simon and Lyons (1995)
 Hall et al. (1996)
 Lyons et al. (1996)
 Roth et al. (1997)
 Simon (1999)

8.3.1 Species Richness and Composition Metrics

These metrics assess the species richness component of diversity and the health of resident taxonomic groupings and habitat guilds of fishes. Two of the metrics assess assemblage composition in terms of tolerant or intolerant species.

Metric 1. Total number of fish species Substitutes (Table 8-1): Total number of resident native fish species and salmonid age classes.

This number decreases with increased degradation; hybrids and introduced species are not included. In coldwater streams supporting few fish species, the age classes of the species found represent the suitability of the system for spawning and rearing. The number of species is strongly affected by stream size at most small warmwater stream sites, but not at large river sites (Karr et al. 1986, Ohio EPA 1987).

Metric 2. Number and identity of darter species Substitutes (Table 8-1): Number and identity of sculpin species, benthic insectivore species, salmonid juveniles (individuals); number of sculpins (individuals); percent round-bodied suckers, sculpin and darter species.

These species are sensitive to degradation resulting from siltation and benthic oxygen depletion because they feed and reproduce in benthic habitats (Kuehne and Barbour 1983, Ohio EPA 1987). Many smaller species live within the rubble interstices, are weak swimmers, and spend their entire lives in an area of 100-400 m² (Matthews 1986, Hill and Grossman 1987). Darters are appropriate in most

Mississippi Basin streams; sculpins and yearling trout occupy the same niche in western streams. Benthic insectivores and sculpins or darters are used in small Atlantic slope streams that have few sculpins or darters, and round-bodied suckers are suitable in large midwestern rivers.

Metric 3. Number and identity of sunfish species. Substitutes (Table 8-1): Number and identity of cyprinid species, water column species, salmonid species, headwater species, and sunfish and trout species.

Table 8-1. Fish IBI metrics used in various regions of North America.^a

Alternative IBI Metrics	Midwestern United States	Central Appalachians	Sacramento-San Joaquin	Colorado Front Range	Western Oregon Ohio	Ohio Headwater Sites	Northeastern United States	Ontario	Central Corn Belt Plain	Wisconsin-Warmwater	Wisconsin-Coldwater	Maryland Coastal Plain	Maryland Non-Tidal
1. Total Number of Species	X	X	X	X				X	X			X	X
#native fish species					X	X	X		X	X			
# salmonid age classes ^b				X	X								
2. Number of Darter Species	X	X		X		X			X	X			
# sculpin species					X								
# benthic insectivore species								X					
# darter and sculpin species							X						
# darter, sculpin, and madtom species										X			
# salmonid juveniles (individuals) ^b			X		X		X						
% round-bodied suckers						X ^c							
# sculpins (individuals)			X										
# benthic species												X	X
3. Number of Sunfish Species	X			X		X			X	X			
# cyprinid species					X								
# water column species							X						
# sunfish and trout species								X					
# salmonid species			X						X				
# headwater species							X						
% headwater species							X		X				
4. Number of Sucker Species	X				X	X	X		X	X			
# adult trout species ^b			X		X								
# minnow species				X			X		X				
# sucker and catfish species								X					
5. Number of Intolerant Species	X			X	X	X	X			X	X	X	X
# sensitive species							X		X				
# amphibian species			X										
presence of brook trout								X					
% stenothermal cool and cold water species											X		
% of salmonid ind. as brook trout											X		
6. % Green Sunfish	X												
% common carp					X								
% white sucker				X			X						
% tolerant species						X	X		X	X	X	X	X
% creek chub		X											
% dace species								X					
% eastern mudminnow												X	

Table 8-1. Fish IBI metrics used in various regions of North America.^a

Alternative IBI Metrics	Midwestern United States	Central Appalachians	Sacramento-San Joaquin	Colorado Front Range	Western Oregon Ohio	Ohio Headwater Sites	Northeastern United States	Ontario	Central Corn Belt Plain	Wisconsin-Warmwater	Wisconsin-Coldwater	Maryland Coastal Plain	Maryland Non-Tidal
7. % Omnivores	X			X		X	X	X	X	X			
% generalist feeders		X											
% generalists, omnivores, and invertivores													X
8. % Insectivorous Cyprinids	X												X
% insectivores					X		X		X	X		X	X ^e
% specialized insectivores		X		X									
# juvenile trout			X										
% insectivorous species						X	X						
9. % Top Carnivores	X					X	X	X	X	X	X		
% catchable salmonids					X								
% catchable trout			X										
% pioneering species						X			X				X
Density catchable wild trout			X										
10. Number of Individuals (or catch per effort)	X	X	X	X	X	X ^d	X ^d		X	X	X ^d		X
Density of individuals							X						X
% abundance of dominant species												X	X
Biomass (per m ²)													X ^f
11. % Hybrids	X							X					
% introduced species				X	X								
% simple lithophills						X			X	X			X
# simple lithophills species							X						
% native species			X										
% native wild individuals			X										
% silt-intolerant spawners												X	
12. % Diseased Individuals (deformities, eroded fins, lesions, and tumors)	X	X		X	X	X	X	X	X	X		X	X

Note: X = metric used in region. Many of these variations are applicable elsewhere.

a Taken from Karr et al. (1986), Leonard and Orth (1986), Moyle et al. (1986), Fausch and Schrader (1987), Hughes and Gammon (1987), Ohio EPA (1987), Miller et al. (1988), Steedman (1988), Simon (1991), Lyons (1992a), Barbour et al. (1995), Simon and Lyons (1995), Hall et al. (1996), Lyons et al. (1996), Roth et al. (1997).

b Metric suggested by Moyle et al. (1986) or Hughes and Gammon (1987) as a provisional replacement metric in small western salmonid streams.

c Boat sampling methods only (i.e., larger streams/rivers).

d Excluding individuals of tolerant species.

e Non-coastal Plain streams only.

f Coastal Plain streams only.

These pool species decrease with increased degradation of pools and instream cover (Gammon et al. 1981, Angermeier 1987, Platts et al. 1983). Most of these fishes feed on drifting and surface invertebrates and are active swimmers. The sunfishes and salmonids are important sport species. The sunfish metric works for most Mississippi Basin streams, but where sunfish are absent or rare, other

groups are used. Cyprinid species are used in coolwater western streams; water column species occupy the same niche in northeastern streams; salmonids are suitable in coldwater streams; headwater species serve for midwestern headwater streams; and trout and sunfish species are used in southern Ontario streams. Karr et al. (1986) and Ohio EPA (1987) found the number of sunfish species to be dependent on stream size in small streams, but Ohio EPA (1987) found no relationship between stream size and sunfish species in medium to large streams, nor between stream size and headwater species in small streams.

Metric 4. Number and identity of sucker species. Substitutes (Table 8-1): Number of adult trout species, number of minnow species, and number of suckers and catfish.

These species are sensitive to physical and chemical habitat degradation and commonly comprise most of the fish biomass in streams. All but the minnows are longlived species and provide a multiyear integration of physicochemical conditions. Suckers are common in medium and large streams; minnows dominate small streams in the Mississippi Basin; and trout occupy the same niche in coldwater streams. The richness of these species is a function of stream size in small and medium sized streams, but not in large (e.g., non-wadeable) rivers.

Metric 5. Number and identity of intolerant species. Substitutes (Table 8-1): Number and identity of sensitive species, amphibian species, and presence of brook trout.

This metric distinguishes high and moderate quality sites using species that are intolerant of various chemical and physical perturbations. Intolerant species are typically the first species to disappear following a disturbance. Species classified as intolerant or sensitive should only represent the 5-10 percent most susceptible species, otherwise this becomes a less discriminating metric. Candidate species are determined by examining regional ichthyological books for species that were once widespread but have become restricted to only the highest quality streams. Ohio EPA (1987) uses number of sensitive species (which includes highly intolerant and moderately intolerant species) for headwater sites because highly intolerant species are generally not expected in such habitats. Moyle (1976) suggested using amphibians in northern California streams because of their sensitivity to silvicultural impacts. This also may be a promising metric in Appalachian streams which may naturally support few fish species. Steedman (1988) found that the presence of brook trout had the greatest correlation with IBI score in Ontario streams. The number of sensitive and intolerant species increases with stream size in small and medium sized streams but is unaffected by size of large (e.g., non-wadeable) rivers.

Metric 6. Proportion of individuals as green sunfish. Substitutes (Table 8-1): Proportion of individuals as common carp, white sucker, tolerant species, creek chub, and dace.

This metric is the reverse of Metric 5. It distinguishes low from moderate quality waters. These species show increased distribution or abundance despite the historical degradation of surface waters, and they shift from incidental to dominant in disturbed sites. Green sunfish are appropriate in small midwestern streams; creek chubs were suggested for central Appalachian streams; common carp were suitable for a coolwater Oregon river; white suckers were selected in the northeast and Colorado where green sunfish are rare to absent; and dace (*Rhinichthys* species) were used in southern Ontario. To avoid weighting the metric on a single species, Karr et al. (1986) and Ohio EPA (1987) suggest using a small number of highly tolerant species (e.g., alternative Metric 6— percent abundance of tolerant species).

8.3.2 Trophic Composition Metrics

These three metrics assess the quality of the energy base and trophic dynamics of the fish assemblage. Traditional process studies, such as community production and respiration, are time consuming to conduct and the results are equivocal; distinctly different situations can yield similar results. The trophic composition metrics offer a means to evaluate the shift toward more generalized foraging that typically occurs with increased degradation of the physicochemical habitat.

Metric 7. Proportion of individuals as omnivores. Substitutes (Table 8-1): Proportion of individuals as generalist feeders.

The percent of omnivores in the community increases as the physical and chemical habitat deteriorates. Omnivores are defined as species that consistently feed on substantial proportions of plant and animal material. Ohio EPA (1987) excludes sensitive filter feeding species such as paddlefish and lamprey ammocoetes and opportunistic feeders like channel catfish. In areas where few species fit the true definition of omnivore, the proportion of generalized feeders may be substituted (Leonard and Orth 1986).

Metric 8. Proportion of individuals as insectivorous cyprinids. Substitutes (Table 8-1): Proportion of individuals as insectivores, specialized insectivores, insectivorous species, and number of juvenile trout.

Insectivores, primarily insectivores, are the dominant trophic guild of most North American surface waters. As the invertebrate food source decreases in abundance and diversity due to habitat degradation (e.g., anthropogenic stressors), there is a shift from insectivorous to omnivorous fish species. Generalized insectivores and opportunistic species, such as blacknose dace and creek chub were excluded from this metric by Ohio EPA (1987). This metric evaluates the midrange of biological condition, i.e., low to moderate condition.

Metric 9. Proportion of individuals as top carnivores. Substitutes (Table 8-1): Proportion of individuals as catchable salmonids, catchable wild trout, and pioneering species.

The top carnivore metric discriminates between systems with high and moderate integrity. Top carnivores are species that feed, as adults, predominantly on fish, other vertebrates, or crayfish. Occasional piscivores, such as creek chub and channel catfish, are not included. In trout streams, where true piscivores are uncommon, the percent of large salmonids is substituted for percent piscivores. These species often represent popular sport fish such as bass, pike, walleye, and trout. Pioneering species are used by Ohio EPA (1987) in headwater streams typically lacking piscivores. Pioneering species predominate in unstable environments that have been affected by temporal desiccation or anthropogenic stressors, and are the first to reinvade sections of headwater streams following periods of desiccation.

8.3.3 Fish Abundance and Condition Metrics

The last 3 metrics indirectly evaluate population recruitment, mortality, condition, and abundance. Typically, these parameters vary continuously and are time consuming to estimate accurately. Instead of such detailed population attributes or estimates, general population parameters are evaluated. Indirect estimation is less variable and much more rapidly determined.

Metric 10. Number of individuals in sample. Substitutes (Table 8-1): Density of individuals.

This metric evaluates population abundance and varies with region and stream size for small streams. It is expressed as catch per unit effort, either by area, distance, or time sampled. Generally sites with lower integrity support fewer individuals, but in some nutrient poor regions, enrichment increases the number of individuals. Steedman (1988) addressed this situation by scoring catch per minute of sampling greater than 25 as a 3, and less than 4 as a 1. Unusually low numbers generally indicate toxicity, making this metric most useful at the low end of the biological integrity scale. Hughes and Gammon (1987) suggest that in larger streams, where sizes of fish may vary in orders of magnitude, total fish biomass may be an appropriate substitute or additional metric.

Metric 11. Proportion of individuals as hybrids. Substitutes (Table 8-1): Proportion of individuals as introduced species, simple lithophils, and number of simple lithophilic species.

This metric is an estimate of reproductive isolation or the suitability of the habitat for reproduction. Generally as environmental degradation increases the percent of hybrids and introduced species also increases, but the proportion of simple lithophils decreases. However, minnow hybrids are found in some high quality streams, hybrids are often absent from highly impacted sites, and hybridization is rare and difficult to detect. Thus, Ohio EPA (1987) substitutes simple lithophils for hybrids. Simple lithophils spawn where their eggs can develop in the interstices of sand, gravel, and cobble substrates without parental care. Hughes and Gammon (1987) and Miller et al. (1988) propose using percent introduced individuals. This metric is a direct measure of the loss of species segregation between midwestern and western fishes that existed before the introduction of midwestern species to western rivers.

Metric 12. Proportion of individuals with disease, tumors, fin damage, and skeletal anomalies

This metric depicts the health and condition of individual fish. These conditions occur infrequently or are absent from minimally impacted reference sites but occur frequently below point sources and in

THE INDEX OF WELL-BEING (IWB)

The Iwb (Gammon 1976, 1980, Hughes and Gammon 1987) incorporates two abundance and two diversity measures in an approximately equal fashion, thereby representing fish assemblage quality more realistically than a single diversity or abundance measure. The Iwb is calculated using the formula:

$$Iwb = 0.51nN + 0.5 \ln B + \bar{H}_N + \bar{H}_B$$

where

N = number of individuals caught per unit distance sampled

B = biomass of individuals caught per unit distance

\bar{H} = Shannon diversity index, calculated as:

$$\bar{H} = -\sum \frac{n_i}{N} \ln \left(\frac{n_i}{N} \right)$$

where

n_i = relative number or weight of the i th species

N = total number or weight of the sample

THE MODIFIED INDEX OF WELL-BEING (MIWB)

The MIwb (Ohio EPA 1987) retains the same formula as the Iwb; however, highly tolerant species, hybrids, and exotic species are eliminated from the abundance (i.e., number and biomass) components of the formula. This modification increases the sensitivity of the index to a wider array of environmental disturbances.

areas where toxic chemicals are concentrated. They are excellent measures of the subacute effects of chemical pollution and the aesthetic value of game and nongame fish.

Metric 13. Total fish biomass (optional).

Hughes and Gammon (1987) suggest that in larger (e.g., non-wadeable) rivers where sizes of fish may vary in orders of magnitude this additional metric may be appropriate. Gammon (1976, 1980) and Ohio EPA (1987) developed an Index of Well-Being (Iwb) and Modified Index of Well-Being (MIwb), respectively, based upon both fish abundance and biomass measures. The combination of diversity and biomass measures is a useful tool for assessing fish assemblages in larger rivers (Yoder and Rankin 1995b). Ohio EPA (1987) found that the additional collection of biomass data (i.e., in addition to abundance information needed for the IBI) required to calculate the MIwb does not represent a significant expenditure of time, providing that subsampling techniques are applied (see Field Sampling Procedures 8.1.1).

Because the IBI is an adaptable index, the choice of metrics and scoring criteria is best developed on a regional basis through use of available publications (Karr et al. 1986, Ohio EPA 1987, Miller et al. 1988, Steedman 1988; Simon 1991, Lyons 1992a, Simon and Lyons 1995, Hall et al. 1996, Lyons et al. 1996, Roth et al. 1997, Simon 1999). Several steps are common to all regions. The fish species must be listed and assigned to trophic and tolerance guilds. Scoring criteria are developed through use of high quality historical data and data from minimally-impaired regional reference sites. This has been done for much of the country, but continued refinements are expected as more ecological data become available for the fish community.

8.4 TAXONOMIC REFERENCES FOR FISH

The following references are provided as a list of taxonomic references currently being used around the United States for identification of fish. Any of these references cited in the text of this document will also be found in Chapter 11 (Literature Cited).

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Enclosure 15. Hazardous Materials Reutilization, Hazardous Waste Minimization and Disposal Guide

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2013 HAZARDOUS MATERIALS REUTILIZATION, HAZARDOUS WASTE MINIMIZATION AND DISPOSAL GUIDE



The purpose of this guide is to communicate regulatory requirements and management procedures relevant to the utilization of hazardous material, and minimization and disposal of hazardous waste. It is your responsibility to notify the hazardous waste Media Manager of new wastes requiring characterization. The hazardous waste Media Manager should be notified before the waste is generated if at all possible.

Implementing effective environmental management, by incorporating these procedures, shows our commitment to environmental stewardship through regulatory compliance, pollution prevention, and continual improvement.

Understanding how your job impacts the environment and what regulatory requirements apply provides for a reduction in environmental impacts, ensures environmental compliance through enhanced awareness and is essential in maintaining our Environmental Management System (EMS).

Annual training is required for all personnel managing hazardous waste and hazardous materials. Web-based training is available via ECATTS at <https://navfac.ecatts.com>.

For questions regarding hazardous waste management or hazardous material use, please see Appendix 1 for Hazardous Waste Media Manager contacts for your installation.

This guide is for the following Naval installations in the Hampton Roads area ONLY.



Naval Station Norfolk, NSA Hampton Roads, Lafayette River Annex, Craney Island, Naval Weapons Station Yorktown, Yorktown Fuels, Cheatham Annex, New Kent ROTH, Joint Expeditionary Base Little Creek-Fort Story, St. Julien's Creek Annex, South Gate Annex, Scott Center Annex, Naval Medical Center Portsmouth, Naval Air Station Oceana, Dam Neck Annex, NSA Northwest Annex, Fentress Air Field, Dare County Bombing Range

DOCUMENT TITLE: Hazardous Materials Minimization, Hazardous Waste Reutilization and Disposal Guide				
CONTENTS TABLE OF CONTENTS BEGINS ON PAGE IV				
PREPARED BY: Hazardous Waste Program Managers			APPROVED BY: EQMB	
REV. NO.	EFFECTIVE DATE	DESCRIPTION OF REVISION	APPROVAL	
			SIGNATURE	DATE
A	2005	ORIGINAL ISSUE		
B	Dec. '07	Updated POC, aerosol and oil filter information; added Universal Waste Guidance, changed ECAP Tech to CHRIMP Tech and updated inspection checklists		
C	March '08	Updated POC information and phone numbers, bio-hazardous waste information	<i>Lee Hay</i>	25 Nov 08
D	Oct. '09	Updated compressed gas cylinder, bio-hazardous waste, Universal Waste, and POC information. Updated inspection checklists and included Joint Expeditionary Base Fort Story installation in guidance.	<i>Lee Hay</i>	3 Nov 09
E	Aug. 10	Updated guidance throughout. Material Turn-In - Waste Audiences	<i>Lee Hay</i>	19 Aug 10
F	March 12	Updated guidance throughout. Streamlined format and waste SOPs.	<i>Lee Hay</i>	26 Mar 12
G	Feb 12	Updated POCs, added guidance on CR, THF.	<i>Lee Hay</i>	20 Feb 13

FORM EMS-2 (REV. B)

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GUIDE INTRODUCTION

This guide applies to naval installations in the Hampton Roads area and was developed in accordance with applicable Navy instructions (Ref. A) and Federal and State laws. It is divided into four (4) main sections:

- I. Waste Minimization Information
- II. Hazardous Material Reutilization Information
- III. Hazardous Waste Management and Disposal Information
- IV. Management of Specific Materials/Wastes

The first three sections of this guide will provide you information on how to best manage your excess Hazardous Material (HM) or the Hazardous Waste (HW) that you may generate.

The **Waste Minimization Information** section will provide tips and information on how to generate less waste. Reducing waste generation is the most cost-effective way to manage waste. By not creating waste, an activity reduces its environmental footprint, protects the environment for future generations, and helps maintain the public image of the Navy as good environmental stewards.

The **Hazardous Material Reutilization Information** section provides various options other than disposal. Information and procedures are provided on how to return HM to Hazardous Material Minimization Centers (HAZMINCENs), shelf-life extension procedures, various recycling and/or cross-decking efforts, and material transfer procedures to DLA Disposition Services for public resale.

The **Hazardous Waste Management and Disposal Information** section of this guide details the procedures to be followed to dispose of an item. HW disposal is the most costly and regulated method of managing expired or unneeded HM. The cost of disposal is often more than the purchase cost of the material, thus every effort should be made to avoid generation of a hazardous waste. The options in Sections I and II should be explored prior to HW disposal.

Section IV of this guide, **Management of Specific Materials/Wastes**, provides instructions for the management of specific HW that are generated most frequently in the Hampton Roads Region.

Useful contact information is listed at the beginning of each section. For a full list of points of contact related to this guide, see Appendix 1.

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- APPENDIX 8: ESTABLISHING A JOB ORDER NUMBER (JON)
- APPENDIX 9: CALL 2 RECYCLE GUIDELINES

REFERENCES

- A. OPNAV 5090.1C CHG. 1 CHAPTER 15 "HAZARDOUS WASTE MANAGEMENT ASHORE,"
[HTTP://WWW.NMCPHC.MED.NAVY.MIL/ENVIRONMENTAL_HEALTH/OPNAVINST_5090_1C.ASPX.](http://www.nmcphe.med.navy.mil/environmental_health/opnavinst_5090_1c.aspx)
- B. OPNAV 5100.23G, CHAPTER 7, "HAZARDOUS MATERIAL CONTROL AND MANAGEMENT"
[HTTP://DONI.DAPS.DLA.MIL/DIRECTIVES/05000%20GENERAL%20MANAGEMENT%20SECURITY%20AND%20SAFETY%20SERVICES/05-100%20SAFETY%20AND%20OCCUPATIONAL%20HEALTH%20SERVICES/5100.23G%20W%20CH-1.PDF](http://doni.daps.dla.mil/directives/05000%20GENERAL%20MANAGEMENT%20SECURITY%20AND%20SAFETY%20SERVICES/05-100%20SAFETY%20AND%20OCCUPATIONAL%20HEALTH%20SERVICES/5100.23G%20W%20CH-1.PDF)
- C. JOINT SERVICES POLLUTION PREVENTION AND SUSTAINABILITY LIBRARY
[HTTP://WWW.P2SUSTAINABILITYLIBRARY.MIL/QUERYNONAV.ASPX?TOPIC=244](http://www.p2sustainabilitylibrary.mil/querynonav.aspx?topic=244)
- D. DOD SHELF LIFE PROGRAM, [HTTPS://WWW.SHEFLIFE.HQ.DLA.MIL/POLICY_DOD4140_27.ASPX](https://www.shelflife.hq.dla.mil/policy_dod4140_27.aspx)
- E. 40 CFR PART 261 "IDENTIFICATION AND LISTING OF HAZARDOUS WASTE"

I. WASTE MINIMIZATION INFORMATION

A) **USEFUL CONTACT INFORMATION** - see Appendix 1.

B) **WORK PRACTICES AND MATERIAL SUBSTITUTION** - In an effort to reduce the generation of Hazardous Waste (HW), users of Hazardous Material (HM) should incorporate CHRIMP and the following business practices into their everyday work.

PLEASE NOTE!

When applicable, relevant technical manual guidance must be the prevailing factor in any decision to use a substitute for a hazardous material.

- **HM control and management:** Activities should adopt procedures to manage, minimize, and control the acquisition of HM. This is an excellent way to prevent waste, fraud and abuse as well as to ensure that HM is utilized prior to expiration. Having the correct amount of HM for a job and using the HM before it expires will save time and money in reduced HW. Please refer to Ref. B for specific guidance on HM Storage.
- **HM procurement through the Re-Use store:** HM may be available for no cost at the Reuse Store. Instead of bringing more HM (that must be managed in accordance with Navy guidelines) on Navy property, reuse another work center's overage. The Reuse Store is primarily located at NS Norfolk Building X-218. The Navy ERP (N-ERP) website provides Asset Visibility by Installation and Region and allows customers to see if material are available at their local HAZMINCEN for free issue or for purchase. N-ERP is a CAC enabled website so CAC certificate is required but a login and password may not be required to check material availability.
- **HAZMINCEN Locations:**
 - NS Norfolk: Building LF-50 (Building X-218 Reuse Store)
 - NAS Oceana: Building 826
 - Fort Eustis Building 1205

Note: NS Norfolk customers are encouraged to contact Building X-218 to confirm material availability of Reuse/SHIPR material (walk-ins are welcome).

- **Self-Help:** When working on a project, ensure that all appropriate work permits are obtained prior to starting your project. You can get free paint and other building materials for small jobs to spruce up your command at your base's Self-Help Center.
- **Process changes:** Is there a way to conduct the work without using a HM or creating a HW? The Navy is constantly testing safer, more environmentally friendly chemicals and processes. For the latest developments, call your P2 Media Manager or Naval Air Technical Data & Engineering Service Command (NATEC) representative (<https://mynatec.navair.navy.mil>).
- **Solvents:** Can generate large volumes of HW with stringent management requirements and costly disposal. Consider replacing solvents containing MEK, xylene, and toluene with less toxic materials such as EP-921. Clean parts requiring high purity solvents with fresh solvent and use the solvent to clean other dirtier parts before replacing.

- **Material substitution:** Is there a less hazardous or more “environmental friendly” material that can be substituted for the HM? Green procurement is the purchase of **approved** environmentally preferable products and services in accordance with one or more of the established Federal “green” procurement preference programs.

- **Green Products:** Consider green products and/or services as the first choice in all procurement, including service contracts. DoN activities must purchase green products when planning to purchase products and/or services in the following categories (note that this list is not all inclusive):
 - Office products (including electronic equipment) and printing services
 - Fleet maintenance products
 - Building construction, renovation, maintenance, and janitorial products
 - Traffic control
 - Parks and recreation and landscaping services
 - Appliances and lighting

Federal green procurement preference programs

Products manufactured from recovered materials	http://www.epa.gov/cpg
Environmentally preferable products	http://www.epa.gov/epp
Energy efficient products	http://www.eere.energy.gov/femp/technologies/ee_products.cfm
Bio-based products	http://www.biopreferred.gov/?SMSESSION=NO
EPA’s Design for the Environment Safer Product Labeling Program	http://epa.gov/dfe/pubs/projects/formulat/formpart.html
Alternative fuels and fuel efficient vehicles	http://www.eere.energy.gov/topics/vehicles.html

To support the Green Procurement Program(GPP), Contracting and Purchasing personnel must take GPP training through Navy Schools, Defense Acquisition University, DLA’s Buying Green Workshop, NAVSUP’S DON Consolidated Card Program Management Division (CCPMD) Website (<https://www.navsup.navy.mil/ccpmd>), and NAVFAC Environmental Compliance, Assessment Training and Tracking System(<https://navfac.ecatts.com/>).

Defense Logistics Agency (DLA) has developed an environmental products catalog that can be found at <http://www.dscr.dla.mil/userweb/dscrld/epa/epinfo.htm>. This catalog gives brief equipment descriptions, national stock numbers (NSNs), and environmental benefits of products.

- **Recycle/Reuse:** Instead of disposing of an item, is there another use for this material within your command? Can the item be recycled through the Regional Recycling Program? If the item is not currently accepted through the Program, should it be?

The P2 media managers can assist in waste reduction efforts by identifying pollution prevention equipment and conducting process evaluations. Additional information and resources are available at Ref. C the Joint Services P2 library.

C) CONSOLIDATED HAZARDOUS MATERIAL REUTILIZATION AND INVENTORY MANAGEMENT PROGRAM (CHRIMP)

In accordance with the Chief of Naval Operations (CNO) message dated January 3, 2003, all ships and shore installations are required to fully implement CHRIMP. All commands (ship or shore) can return excess and unused HM to the Fleet Industrial Supply Center (FISC) HAZMINCENs (see section I.B for HAZMINCEN locations). For more information please see section II.B of this guide.

D) REGIONAL SOLID WASTE AND RECYCLING

- Information on Naval Facilities Engineering Command Mid-Atlantic (NAVFAC MIDLANT) Regional Resource, Recovery, and Recycling Program and other recycling programs can be obtained by contacting the Mid-Atlantic Regional Recycling Program (RRP) contact listed in Appendix 1.
- The Regional Recycling Centers are located at:
 - NS Norfolk: Building Z-309
 - NAS Oceana & Dam Neck Annex: Oceana Building 934
 - Joint Expeditionary Base Little Creek-Fort Story West: FS West Building 3661
 - NWS Yorktown and Cheatham Annex: Yorktown Shed 6
- To continue recycling in a safe and environmentally responsible manner, we need your help when preparing for delivery to the Recycling Center. It is important that you have a clear understanding of which materials are acceptable and which are not. To help you in preparing your loads and to ensure they will be accepted at the Recycling Center, the following information is provided. This does not encompass all possible items, rather it is a general list of most frequently delivered items.
 - Hours of operation are Monday-Friday 0700-1500 (no appointment necessary)
 - DD1348 required
 - No after-hours drop-off on certain turn-ins
 - For additional information contact the RRP

NOTE!

Items collected and received may change from time to time based on the commodities markets. If you find or have items not included below and you are uncertain about them, please call your installation Recycling Center.

- 1) Examples of materials that are recycled
 - a. **Mixed stream office recycling:** All office recycling is accomplished through a mixed stream recycling method utilizing 90 gallon blue recycling bins. These bins are located in various areas in all buildings on the installation. The bins are picked up on prescheduled days and on call emergencies. All material is also accepted at all the Recycling Centers. The following materials are accepted in the blue recycling bins: white and colored paper; newspaper; phone books; plastic bottles; small cardboard containers; file folders; magazines; aluminum cans; envelopes.
 - b. **Cardboard:** Flat cardboard may be placed in dumpsters marked "Cardboard Only". Cardboard is accepted at all recycling centers.
 - c. **Metal Items:** Metal items may be placed in dumpsters marked "Metal Only". Metal items are also accepted at the Recycling Centers. Units with special needs should contact their Recycling Center, located on their installation.

- d. **Dock (Mooring) Lines:** All lines can be coiled, and secured to a pallet when dropped off at the Recycling Centers.
- e. **Drums (Metal or Plastic):** Contact your Recycling Center before turning in empty drums/containers for special instructions. Drums containing one inch or more liquid will be rejected.
- f. **Empty Compressed Gas Cylinders:** Prior to receipt of the cylinders the needle valve must be removed and the cylinder cut in half, or cut wide enough to indicate that the cylinder cannot be under pressure again.
- g. **Appliances:**
- Useable appliances such as air conditioning and refrigeration (A/C&R) units, washers, and dryers may be turned in to DLA Distribution Services for possible resale. Contact DLA for guidance (see section II.E for details).
 - Unusable washers and dryers may be recycled.
 - Unusable AC&R units (e.g. refrigerators, air conditioners, water fountains, freezers, or any item that normally contains refrigerant), may be recycled IF:
 - (1) All remaining refrigerant has been removed and unit is certified “refrigerant-free” by a certified technician. Contact NAVFAC-MIDLANT maintenance or your FMS to coordinate this service. At NS Norfolk, this service is provided by self-help and coordinated through your FMS.
 - (2) The run capacitors and start capacitors have been removed (a/c units).
 - (3) The compressors have been removed (refrigerators and a/c units)
 - (4) All oils have been removed and properly disposed of.
- h. **Motor Vehicle Parts:** Units must deliver their parts in government vehicles.
- Engine blocks must be drained* of all fluids; oil filters and pans must be removed.
 - Transmissions must be open and drained* of all fluids.
 - Rear ends must be drained* and the plate removed.
- *drained oils can be turned in by calling the Environmental Services Desk (ESD)*
- i. **Batteries:** recyclable lead acid batteries are accepted provided they meet the following restrictions:
- Only **lead acid** batteries that are **not metal encased**. In special cases metal encased lead acid batteries may be taken by the Recycling Program depending on market conditions- contact your installation recycling manager for clarification.
 - Batteries must be in good condition with caps securely in place. Batteries that are cracked or have missing caps must be disposed of as HW- contact the NAVFAC MIDLANT Environmental Services Desk (ESD) for disposal.
 - The customer must deliver the batteries to the Recycling Centers in a government owned vehicle.
 - All batteries not meeting the requirements listed above are to be turned over for disposal to NAVFAC-MIDLANT ESD.
- j. **Toner Cartridges:** Cartridges must be placed in a clear plastic bag or in a box and sealed to prevent powder from spilling; place beside the 90 gallon Blue Recycling container for pickup.
- k. **Expendable Brass Casings:** All MPPEH residue (i.e., inert small arms spent brass casings .50 caliber or smaller), lead, and mixed metals or shrapnel will be turned-in to the local QRP via the NAVFAC MIDLANT QRP Hampton Roads Operations Manager or QRP MPPEH Supervisor. Please refer to

COMNAVREGMIDLANTINST 5090.6 Appendix D (Installation Explosive Hazardous Waste Management Plan) for a full list of requirements regarding the management of MPPEH residue. Requirements for managing expended brass casings include but are NOT limited to the following:

- Small arms cartridge cases should be separated by metal types (i.e., steel, chrome, aluminum, brass). Under no circumstances should large .50 caliber and small .22 caliber, be mixed or co-mingled with any other size cartridge casings in the same container. They must be packed separately. Range residue, other than small arms cases, i.e. shrapnel or lead, will be placed in its own container and clearly marked.
- Expended brass casings must be managed in sealed and labeled 55-gallon drums in a facility or area where the drums are protected from the elements (i.e. rain, snow, etc.). At no time before or after certification and verification should water be allowed to enter the drums.
- Drums must be accompanied by a DD 1348-1A that includes the Generating Command/Range, Quantity, Date, Names and Signatures of personnel certifying and verifying that all shell casing are inert. (NOTE: Each shell casing requires a two-person 100% visible inspection that the shell casing is inert. QRP has been instructed to turn away expended brass that does not contain the appropriate paperwork with authorized dual signatures and certification statement.)

- 2) Some materials that are **rejected** (***questions contact Recycling Manager or See Section IV***)
- a. Any material containing hazardous or toxic substances, materials or waste
 - b. Gasoline, diesel fuel, propane or other petroleum products
 - c. Pressurized Cylinders and Fire Extinguishers
 - d. Asbestos of any kind (such as pipe insulation or surfacing materials)
 - e. Wire rope or cable in lengths greater than 6 feet
 - f. A/C&R units that are NOT certified CFC free or have run/start capacitors
 - g. PCB containing materials such as capacitors, ballast, and transformers
 - h. Fluorescent or mercury vapor lights and related fixtures
 - i. Radioactive materials or containers
 - j. Free flowing fluids of any kind
 - k. Dirt, debris, trash or waste of any kind
 - l. Food or food byproducts
 - m. Bedding or clothing products
 - n. Cooking oil or grease
 - o. Wood (accepted only at selected sites)
 - p. Yard waste
 - q. Tires (accepted only at selected sites)
 - r. Rags/Shop Towels
 - s. Lawn or plastic furniture
 - t. Speedy-Dry or absorbent materials or chemicals
 - u. Medical waste of any kind

II. HAZARDOUS MATERIAL REUTILIZATION INFORMATION

If you have excess or unused hazardous material, it is important that the following alternatives to disposal be considered. Disposal of HM should be utilized as a last resort.

- Returning to supply (HAZMINCENs) for credit or reuse
- Extending shelf-life
- Crossdecking use
- Turning in to DLA Disposition Services Norfolk (formerly DRMO)

A) **USEFUL CONTACT INFORMATION** - see Appendix 1.

▪ HAZMINCEN Locations:

- NS Norfolk: Building LF-50 (Building X-218 Reuse Store)
- NAS Oceana: Building 826
- Fort Eustis Building 1205

B) **RETURNING HAZARDOUS MATERIALS (HM) TO SUPPLY (HAZMINCENs)**

If you purchase HM and determine the item is not needed, it can be returned to the HAZMINCENs for a refund or for reuse. Refunds are provided for new/unopened HM purchased from the HAZMINCEN. Please note that refunds are not given on special (non-stock) orders. FISC also offers a Reuse Store located at Naval Station Norfolk, Building X-218. The Reuse Store will accept and issue excess or unused HM **free of charge**. HM destined for the Reuse Store can be turned in at any of the FISC HAZMINCENs across the region. To return excess/unused material, the item must meet the following conditions:

- 1) Material must be accompanied by 4 (four) copies of completed DD Form 1348-1A or DD Form 1348-1 created by HICSWIN (see Appendix 2 for instructions).
- 2) Material must be unopened and have original labels. (Partially used material may be considered for cross-decking or turned in for disposal.)
- 3) Container must be undamaged or minimally damaged (i.e. slightly dented) and have minimal rusting.
- 4) FISC will accept Type I that has not expired and Type II shelf life material that has not been extended more than two times (see section II.C). Contact DLA Disposition Services for items that have been extended more than two times.

IF YOU HAVE MORE THAN 4 PALLETS OF EXCESS HM TO TURN-IN (SHIPS)

- Coordinate the offload/turn-in through the assigned CHRIMP Technician **24 hours** in advance of desired off-load.
- All HM leaving ships must be processed through the HAZMINCEN via HICSWIN.
- The offload procedure is as follows:
 - PLANNING:** Once informed of a request for an offload, the designated ship representative will contact the CHRIMP office.
 - REVIEWING:** The CHRIMP technician will examine the items to determine what is still usable and what is excess used material.
 - TRACKING:** Data management depends on the type of excess stock. HICSWIN will be the software used for all reuse material offloaded; R-Supply will be used for all BP-28 (Deep Stock) material offloaded. These programs have the capability to print four (4) copies of DD Form 1348-1A or 1348-1, "Material Turn-In." The 1348-

1A or 1348-1 must have the ECAP acronym stamped on the document prior to turn-in.

DISPOSAL: should the HM require disposal, contact NAVFAC MIDLANT ESD services to arrange for pick-up by calling 757-341-0412/0460.

- Additional information regarding disposal procedures is detailed in Section III.

C) EXTENDING SHELF LIFE - One of the most effective waste minimization programs that can be established is the active life-cycle management of hazardous materials before they become hazardous waste. All shelf-life material is either Type I or Type II.

- Type I shelf-life items are materials that have a set expiration date, which cannot be extended. Once this date has passed, the material cannot be used for its intended purposes and can be turned into DLA Disposition Services for resale. The containers must be unopened and in good shipping condition (no excessive rust).
- Type II shelf-life items are materials that do not have a specific expiration date. The manufacturer typically will recommend that the item be re-evaluated on a particular date. The label will usually state a "Test" or "Re-Inspect" date. Type II shelf-life items can be extended providing the material is still viable or usable. For most Type II materials, shelf-life extension tests are not complicated, do not require a laboratory, and can be done on the spot by anyone with a minimum of training (usually consisting of nothing more than visual checks for damage or deterioration). FISC Norfolk is available to assist with shelf-life extensions- please contact the HAZMINCENS for additional assistance.
- The General Services Administration (GSA) and all military services have developed separate storage standards. For example, shelf-life extension of paint can be accomplished according to the Federal Standard 793, "Depot Storage Standards". End users are authorized and encouraged to examine paint using FED-STD-793 guidelines or by using practical, end-use related tests to determine if the materials still meet their intended use. End users may extend the shelf life as long as the paint performs satisfactorily for their needs. Before disposing of paint, you are strongly encouraged to review FED-STD-793, paragraph 4. See NAVSUP P-485, Chapter 4, paragraph 4664 for further shelf-life material management guidance. For further assistance in determining if the shelf life can be extended, contact CHRIMP Technician on board or your supply officer. The best way to extend the life of all Type II materials is proper storage. For example, paints should not be stored below freezing and should be protected from rain or salt spray.
- DLA Aviation, formerly Defense Supply Center Richmond (DSCR), VA has a Quality Status List (QSL) which extends certain Type II Federal Stock Class (FSC) material. Included on the QSL are Federal Stock Classes (FSCs): 6635, 6750, 6810, 6840, 6850, 9110, 9150, and 9160. To obtain a copy of the microfiche that show the shelf-life extensions, contact DLA Aviation (see Appendix 1 for contact information).
- REFERENCES - "Shelf Life Identification Management and Control" (PIN# V805830) is a video available at any electronic media center. More information on DOD's shelf-life extension program may be found in Ref. D.

D) CROSSDECKING MATERIAL

HM may be available for no cost at the Reuse Store. Instead of bringing more HM (that must be managed in accordance with Navy guidelines) on Navy property, reuse another work center's overage. The Reuse Store is primarily located at NS Norfolk Building X-218. The Navy ERP (N-ERP) website provides Asset Visibility by Installation and Region and allows customers to see if material are available at their local HAZMINCEN for free issue or for purchase. N-ERP is a CAC enabled website so CAC certificate is required but a login and password may not be required to check material availability.

PLEASE NOTE!

Prior to receiving HM from another activity, contact your Safety representative or CHRIMP Technician to ensure that the material is authorized for use. The material must be listed on your Authorized Use List (AUL) or Type Ships Hazardous Material List (T-SHML). Also your Safety representative or CHRIMP Technician can assist you in obtaining a Material Safety Data Sheet (MSDS) for the item.

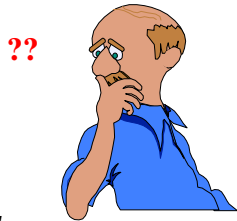
E) DLA DISPOSITION SERVICES, NORFOLK - may accept material for resale that the HAZMINCENs cannot accept, even expired materials. Contact DLA Disposition Services to ensure acceptance and to arrange for the transfer of material. Requirements include:

- 1) Containers should be in good condition-not rusted or dented
- 2) If kits are being turned in, all parts of the kit must be included
- 3) Paperwork required:
 - a. Two (2) copies of completed DD Form 1348-1A, or 1348-1 created in HICSWIN for each item. (See Appendix 2 for instructions).
 - b. MSDS for each item.
 - c. The Occupation Safety and Health Administration (OSHA) Hazardous Chemical Warning Label must be present on the items (must be adhesive type label).
- 4) Examples of materials ACCEPTED by DLA Disposition Services Norfolk:
 - All flammable materials (solvents, paints, etc.)
 - All photographic chemicals
 - Corrosive material (acids, bases, etc.)
 - Used synthetic oils and used synthetic hydraulic fluids
 - Mercuric nitrate
 - Cleaning compounds
 - Greases, POLs
- 5) Examples of materials NOT ACCEPTED by DLA Disposition Services Norfolk
 - Oxidizers (hydrogen peroxide, emergency escape breathing devices, etc.)
 - Dented or excessive rusted drums
 - Open containers
 - Compressed Gas Cylinders or Fire Extinguishers
 - Used items that would be considered waste
 - Items containing any level of polychlorinated biphenyls (PCBs)
 - Any radioactive materials

If your HM is rejected, please request a "917 rejection form" which provides specific information explaining why your HM was rejected. If the item was rejected for clerical reasons, make the necessary corrections and re-attempt transfer. Otherwise, contact the NAVFAC MIDLANT ESD for disposal of the item (see Section III for specific instructions).

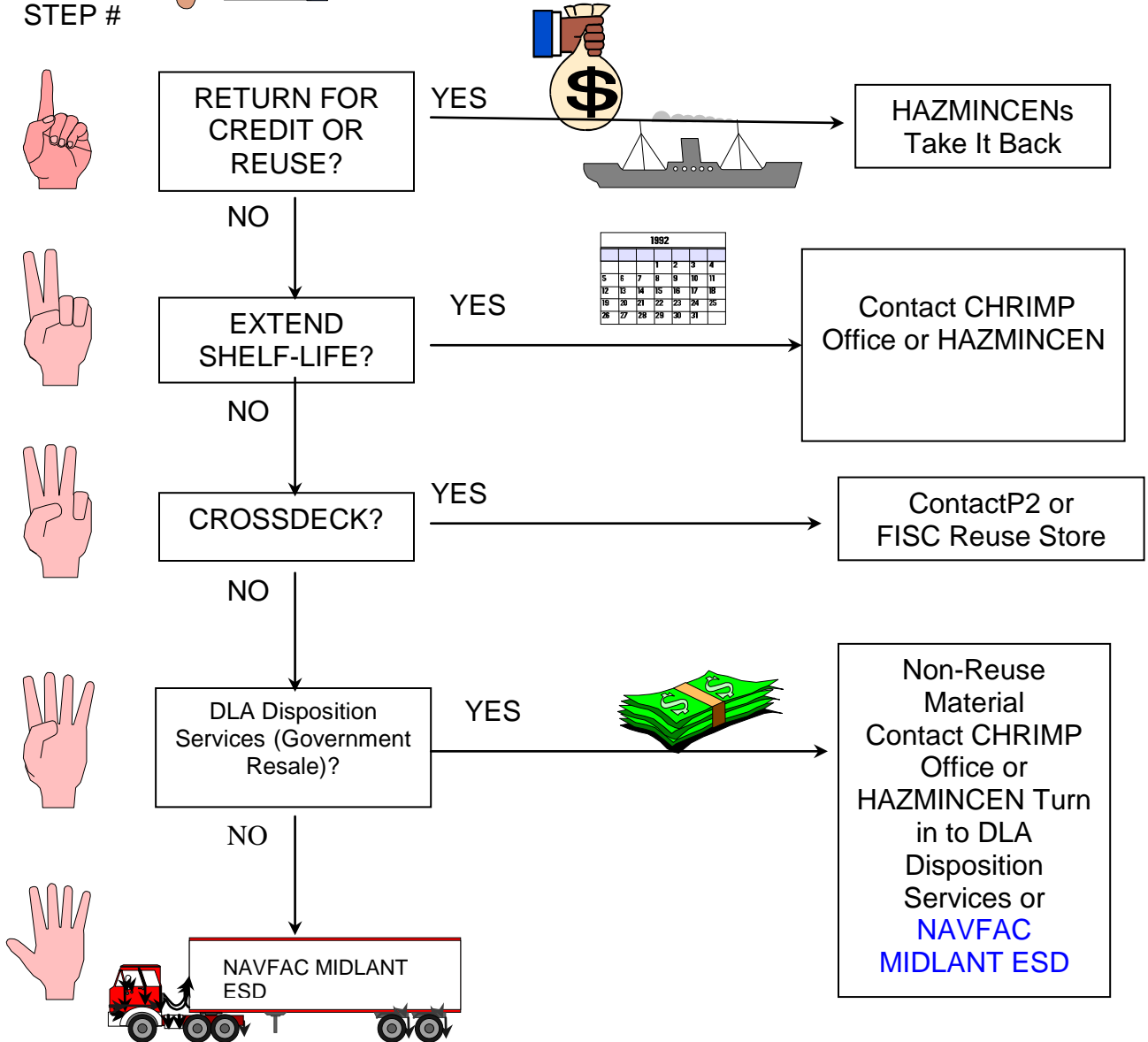
NOTE!

DO NOT TRANSPORT MATERIAL TO DLA WITHOUT PRIOR AUTHORIZATION FROM THE DLA HAZARDOUS MATERIAL PROCESSOR THAT MATERIAL WILL BE ACCEPTED



What to do with hazardous material?

STEP #



NOTE- SELF TRANSPORT OF HW IS NOT PERMITTED!

Under no circumstances should HW be transported by a vehicle not authorized by NAVFAC MIDLANT Environmental. It is illegal to transport HW without meeting the required EPA and DOT training, certifications and commercial driver's license endorsements.

III. HAZARDOUS WASTE MANAGEMENT AND DISPOSAL INFORMATION

What is a Hazardous Waste?

In accordance with Ref. E, for a material to become a hazardous waste it must first become a solid waste. A solid waste is any discarded material that is not excluded by regulation.

Discarded material can be a solid, liquid, or gas and is any which is:

- Abandoned
- Inherently Waste-Like (Hazardous Waste to be recycled)

A solid waste becomes a hazardous waste when it is:

- Not excluded or exempted by RCRA (examples of wastes that are not hazardous waste due to exclusions or exemptions are scrap metal and household waste).
- A Characteristic Waste (determined by generator knowledge or testing). These include wastes that are:
 - Ignitable
 - Corrosive
 - Reactive
 - Toxic
- A Listed Waste. These include wastes specifically identified in RCRA of the Code of Federal Regulations. (ex; 2,4-Dinitrotoluene, benzene, phenol, nitroglycerine, etc.)

If a HM is determined to no longer be suitable for its intended purpose and all other routes of utilization have been attempted, the last management alternative is disposal as waste.

NAVFAC MIDLANT ESD, the region's HW transportation and disposal agent and will pick up HW at Hazardous Waste Accumulation Areas (HWAAs), Satellite Accumulation Areas (SAAs), Universal Waste Accumulation Areas (UWAAs) and other specified locations.

Funding for disposal of Fleet (FLT) activity's generated wastes has been established. Non-FLT activities are required to submit a valid Job Order Number (JON) when turning in waste. For assistance in establishing a job order number, contact the appropriate Hazardous Waste Media Manager or NAVFAC MIDLANT ESD or follow the procedure in Appendix 8. HW management and disposal instructions are listed below.

A) USEFUL CONTACT INFORMATION - see Appendix 1.

B) ACCUMULATION OF HAZARDOUS WASTES – SHORE ACTIVITIES:

The EPA and the Virginia Department of Environmental Quality (VDEQ) regulate the management and disposal of HW. NAVFAC MIDLANT is the HW permit holder for the Navy. To ensure compliance, the appropriate Hazardous Waste Media Manager must approve establishment of all HW accumulation areas **prior to use**, as well as closure of the areas **prior to the planned closure date**. In addition, the Hazardous Waste Media Manager must be informed of any issues that have the potential to affect the Navy's ability to comply with the governing environmental regulations. All HW must be accumulated in designated areas. If HM is stored in the same location as HW, ensure the areas are clearly marked to identify HM from HW. There are three main types of authorized hazardous waste accumulation areas: Satellite Accumulation Areas (**SAAs**); Hazardous Waste Accumulation Areas (**HWAAs**); and Universal Waste Accumulation Areas (**UWAAs**).

1. SATELLITE ACCUMULATION AREA (SAA)

SAA PURPOSE: to allow proper management of HW as it accumulates without interfering with the work process. There are no limits on the number of waste streams that can be accumulated, but the TOTAL AMOUNT MUST NOT EXCEED 55 gallons (or 1 quart of acutely hazardous waste). Each waste stream shall be stored in a separate container and the container must be compatible with the waste being stored. If a SAA will be unattended due to unit deployment, project ending, etc., waste must be turned in to NAVFAC MIDLANT ESD and the Hazardous Waste Manager contacted to have the area shutdown two weeks in advance.

GENERAL REQUIREMENTS FOR ALL HW AREAS

- All containers must be labeled and kept closed except when adding or removing waste.
- Operators must be trained annually on proper area management and emergency response procedures.
- Areas must be identified with legible signs as a SAA with the point of contact's information, NO SMOKING, and emergency procedures and numbers.
- Areas must have adequate suitable spill control equipment to contain contents of the area should a spill occur. Spill equipment/supplies must be maintained. Follow spill reporting procedures in Appendix 3
- A fire extinguisher must be located within 50 feet of the area. An ABC type extinguisher is recommended. The fire extinguisher shall be routinely inspected in accordance with safety or fire departments requirements.
- Good housekeeping standards must be employed at all times. Keep areas orderly with adequate aisle space and clear of trash.

SAA SPECIFIC REQUIREMENTS: a SAA area must meet several criteria, including:

- Be located at or near the point of waste generation.
- Be under the control of the operator of the process that generates the waste.
- Operators must be trained annually on proper area management and emergency response procedures.
- Containers must be labeled with the words "Hazardous Waste" and the contents of the container.
- The container does not require an accumulation start date, however, if a container becomes full prior to pick up, it must be dated immediately, and moved to an approved HWAA or a permitted facility within 72 hours.
- May only store a max of 55-gal total of all HW (or 1 quart acutely hazardous waste).

SAA INSPECTIONS:

The checklist included in Appendix 5 provides a concise listing of the regulatory requirements of a SAA. It is **highly recommended** that each HW generator perform undocumented reviews of their SAA at least weekly, using the checklist. The Installation Environmental Office will perform SAA inspections at least quarterly to provide technical support, management guidance, and regulatory oversight.

SAA DISPOSAL PROCESS:

When a container is 75% full (or one quart of acute HW), contact NAVFAC MIDLANT ESD to schedule a pickup. Be sure to inform Dispatcher your area is a SAA site.

2. HAZARDOUS WASTE ACCUMULATION AREA (HWAA)

HWAA PURPOSE: to allow for the temporary accumulation of HW in preparation for transportation to a permitted treatment, storage or disposal facility.

GENERAL REQUIREMENTS FOR ALL HW AREAS

- All containers must be labeled and kept closed except when adding or removing waste.
- Operators must be trained annually on proper area management and emergency response procedures.
- Areas must be identified with legible signs as a HWAA with the point of contact's information, NO SMOKING, and emergency procedures and numbers.
- Areas must have adequate suitable spill control equipment to contain contents of the area should a spill occur. Spill equipment/supplies must be maintained. Follow spill reporting procedures in Appendix 3
- A fire extinguisher must be located within 50 feet of the area. An ABC type extinguisher is recommended. The fire extinguisher shall be routinely inspected in accordance with safety or fire departments requirements.
- Good housekeeping standards must be employed at all times. Keep areas orderly with adequate aisle space and clear of trash.

HWAA SPECIFIC REQUIREMENTS:

- Provide at least 14-days notice to the Hazardous Waste Media Manager prior to the need for a HWAA set-up to allow for area set up and timely notification to the VDEQ.
- Provide at least seven (7) days notice to the Hazardous Waste Media Manager prior to closure of a HWAA.
- Containers must be labeled with the words "HAZARDOUS WASTE", contents of the container, and the start date of when the waste is placed in the container.
- Must be inspected every seven (7) calendar days.

HWAA INSPECTIONS:

Operators of a HWAA must perform a documented inspection of their site every seven (7) calendar days and maintain those inspection records for three (3) years. The inspection is to be documented using the HWAA checklist that is included in Appendix 6. The checklist provides a concise listing of the regulatory requirements of a HWAA.

Any deficiency/violation must be corrected immediately. Deficiency corrections must be noted on the inspection sheet in the space provided. Corrective action taken, date accomplished, and initials of person performing corrective actions must be recorded.

The Installation Environmental Office will perform HWAA inspections at least quarterly to provide technical support, management guidance, and regulatory oversight.

HWAA DISPOSAL PROCESS:

At or before 45 days of accumulation, contact the NAVFAC MIDLANT ESD to schedule a pickup of the waste. If waste is not picked up by the ESD within their allotted service response time (1 week), recall the ESD immediately!

3. UNIVERSAL WASTE ACCUMULATION AREA (UWAA)

UWAA PURPOSE: to allow for the temporary accumulation of specific waste streams in preparation for transportation to a permitted treatment, storage or disposal facility.

GENERAL REQUIREMENTS FOR ALL HW AREAS

- All containers must be labeled and kept closed except when adding or removing waste.
- Operators must be trained annually on proper area management and emergency response procedures.
- Areas must be identified with legible signs as a UWAA with the point of contact's information, NO SMOKING, and emergency procedures and numbers.
- Areas must have adequate suitable spill control equipment to contain contents of the area should a spill occur. Spill equipment/supplies must be maintained. Follow spill reporting procedures in Appendix 3
- A fire extinguisher must be located within 50 feet of the area. An ABC type extinguisher is recommended. The fire extinguisher shall be routinely inspected in accordance with safety or fire departments requirements.
- Good housekeeping standards must be employed at all times. Keep areas orderly with adequate aisle space and clear of trash.

UWAA SPECIFIC REQUIREMENTS:

The current Universal Waste regulations apply to four types of widely generated HW: *batteries, pesticides, mercury-containing equipment, and lamps*. All UWAA's must adhere to various environmental regulatory requirements including:

- Containers must be labeled with the words "UNIVERSAL WASTE", contents of the container, and the start date of when the waste is placed in the container.
- A seven (7) day advance notice should be provided to the Hazardous Waste Media Manager to allow time for set up of the UWAA. For closure of a UWAA, contact the Hazardous Waste Media Manager before the planned closure date.

UWAA INSPECTIONS:

It is **highly recommended** that each generator perform monthly reviews of their UWAA using the checklist in Appendix (7).

The Installation Environmental Office will perform UWAA inspection at least quarterly to provide technical support, management guidance, and regulatory oversight. The standard operating procedure and inspection checklist for UWAA's are included in Appendix 7.

UWAA DISPOSAL PROCESS:

At or before 270 days of accumulation (9 months), prior to expiration of the one year accumulation period, contact NAVFAC MIDLANT ESD to schedule a pickup of the waste. Inform the NAVFAC MIDLANT ESD that your waste is stored in a UWAA.

C) WASTE PACKAGING REQUIREMENTS - SHIPS OR SHORE ACTIVITIES

Hazardous waste must be properly packaged in the original or an approved container. DOT requires specific packaging for shipment. Direct specific questions regarding container availability and packing requirements to the NAVFAC MIDLANT ESD.

NOTE! ONLY NAVFAC MIDLANT ESD OR A PRE-APPROVED CONTRACTOR IS PERMITTED TO TRANSPORT HW WASTE OFF BASE OR ON OPEN ROADS UNDER ANY CIRCUMSTANCES. IT IS ILLEGAL TO TRANSPORT HW ON PUBLIC ROADWAYS WITHOUT MEETING THE REQUIRED EPA AND DOT TRAINING, CERTIFICATIONS, COMMERCIAL DRIVERS LICENSE ENDORSEMENTS, AND PROPER SHIPPING DOCUMENTS.

a. MATERIAL / WASTE PAPERWORK REQUIREMENTS – SHIP OR SHORE

- Four completed copies of the DD Form 1348-1A, or 1348-1 created in HICSWIN, are required for turn-in of unusable HM or HW to NAVFAC MIDLANT ESD. Instructions on how to complete this form are listed in Appendix 2.
- Contact the NAVFAC MIDLANT ESD at 757-341-0412/0460 and fax a copy of the completed DD Form 1348-1A, or 1348-1 created in HICSWIN, to 445-1079 prior to scheduling a pickup and to ensure prompt service.
- All four copies of the DD Form 1348-1A, or 1348-1 created in HICSWIN, are required at time of pickup. Copies are distributed as follows: client, MIDLANT driver, on container, and returned to FISC.
- For ships, one copy of the 1348-1 created in HICSWIN with the ECAP acronym stamped on the document and signed by the CHRIMP Technician is needed.
- For material that was not procured through the Navy stock system, a Material Safety Data Sheet (MSDS) is required.

b. MATERIAL / WASTE TURN-IN REQUIREMENTS – SHIPS

- Ships in local private shipyards: Contact the CHRIMP Office to initiate this action for you. Only CHRIMP Technicians are authorized to contact NAVFAC MIDLANT ESD to schedule a pickup of the waste. Allow adequate time for waste screening and quality control (QC) for CHRIMP and NAVFAC MIDLANT ESD.
- Ships at Norfolk Naval Shipyard: contact the NNSY Occupation, Safety, Health, and Environmental Office (Code 106), for assistance with HW disposal.
- Ships at Naval Weapons Station Yorktown: contact the NAVFAC MIDLANT ESD to arrange an offload.
- Ships at NS Norfolk (4 pallets or less) or JEB Little Creek (2 pallets or less): NAVFAC MIDLANT ESD offers several HW pickup points on the piers. The specific piers and pickup times are listed below. Each ship is to contact and coordinate with their assigned CHRIMP Technician. A representative from the ship must accompany the HW from the time it leaves the ship to the time it is picked-up by NAVFAC MIDLANT ESD. **Under no circumstances shall waste be left unattended or abandoned on piers**

Naval Station Norfolk Pier pickup schedule is: Monday – Friday

0800-0915	Pier 9
0800-0915	Pier 12
1000-1115	Pier 3
1000-1115	Pier 4

4 pallets or less

JEB Little Creek Pier pickup schedule is: Tuesday and Thursday

0800-0900	Pier 15
1000-1100	Quaywall

2 pallets or less

- Ships at NS Norfolk (more than 4 pallets) or JEB Little Creek (more than 2 pallets) must request and turn-in through the CHRIMP Office, the Logistic Support Representative (LSR) or the FISC Hazmat representative. Once informed of a request for off-load, the CHRIMP Technician will screen the material and determine what is still usable and what is waste. The CHRIMP Technician and NAVFAC MIDLANT ESD representatives will then coordinate the off-load. A representative from the ship must accompany the waste until it is picked up by the NAVFAC MIDLANT ESD. Under no circumstances shall waste be left unattended or abandoned on the piers. If possible, ships should utilize the pier pickup option over the course of several days instead of scheduling an offload.

PLEASE NOTE!

It is a violation of state and federal law to abandon HM/HW.

IV. MANAGEMENT OF SPECIFIC MATERIALS/WASTES

A) USEFUL CONTACT AND WASTE PICKUP INFORMATION – see Appendix 1

B) WASTE MANAGEMENT REQUIREMENTS

All waste turn-ins to NAVFAC MIDLANT ESD require four copies of the DD Form 1348-1A (for shore activities) or 1348-1 (for ships). For instruction on completing Form 1348, see Appendix 2.

A job order number (JON) may be required for certain environmental services. To establish a JON, follow the procedure in Appendix 8.

For items not listed below, please contact your installation Hazardous Waste Media Manager!

PLEASE NOTE!

**BAGGED WASTE WILL ONLY BE ACCEPTED FOR PICK-UP IN CLEAR BAGS!
RED OR YELLOW BAGS SHALL NEVER BE USED!**

1) ABSORBENT MATERIAL (a.k.a. SPEEDY-DRY, KITTY LITTER)

- If the absorbent material was used to absorb HW or HM, it must be managed as a HW.
- If the absorbent material has been used to absorb oil, the absorbent will be managed in a similar fashion as oil. Oily absorbent materials should be fully utilized prior to disposal and must be placed in clear plastic bags and then containerized and turned in to the NAVFAC MIDLANT ESD.
- Please refer to section I for absorbent green alternatives. Using greener absorbents may increase product efficiency and reduce waste generation.
- See IV.B.28 for oily rag management.

2) AEROSOL CANS

Return unused aerosol cans to the HAZMINCEN for potential reuse. Contact your HAZMINCEN for more details. Also see the Material Reutilization Information (Section II) of this guide for additional alternatives to disposal. If the cans are rejected by the HAZMINCEN and the additional options listed in Section II of this guide are non-applicable, manage the aerosol cans as applicable below:

- a. Aerosol cans containing Petroleum Base Products (Oils and Lubes), corrosives, Freon, pesticides, insecticides, fungicides, CFCs or oven cleaners: These cans shall not be punctured and must be turned in to the NAVFAC MIDLANT ESD.
- b. Punctured Aerosol Cans: Shore Tenants have the option to puncture aerosol cans using equipment approved by the Hazardous Waste Media Manager. The site POC is responsible for restricting access to the aerosol puncturer to ensure correct use. The contents of the punctured

cans must be collected and must be managed as HW: contact the Hazardous Waste Media Manager to establish the appropriate accumulation area. Punctured aerosol cans may then be placed in Metals Dumpsters for recycling. ****NOTE-Aerosol cans containing pesticides and oven cleaners shall not be punctured****

THERE ARE NO NAVSEA APPROVED AEROSOL PUNCTURE DEVICES FOR SHIPBOARD USE. SHIPS ARE NOT AUTHORIZED TO PUNCTURE AEROSOL CANS!

- c. **Un-punctured Aerosol Cans:** Contact the Hazardous Waste Media Manager to set up an appropriate accumulation area to manage aerosol cans. Aerosol cans must either have tops in place or nozzles removed prior to containerizing.
- 3) **ANTIFREEZE** – is typically managed as a non-RCRA regulated waste. Contact the Hazardous Waste Media Manager to determine proper disposition. Do not mix the antifreeze with solvents or metals, as the mixture could result in a hazardous waste.
- 4) **APPLIANCES/WHITE GOODS (A/C&R Equipment)– see Recycling Section**
- 5) **AQUEOUS FILM FORMING FOAM (AFFF)**– will be managed by NAVFAC MIDLANT ESD. Contact NAVFAC MIDLANT ESD to schedule a pickup. AFFF in original containers can be turned in to the Reuse Store (NS Norfolk Building X-218).
- 6) **ASBESTOS**
- For asbestos removal from shore command pipes, buildings, roofs, floors, ceilings, etc., contact NAVFAC MIDLANT ESD to schedule an asbestos removal or waste pick-up. Four completed copies of DD Form 1348-1A and a valid Job Order Number (JON) are required.
 - For asbestos removal operations aboard ships or submarines contact the Ship Support Office.
 - If you are unsure if you are dealing with asbestos, shore activities should contact the NAVFAC MIDLANT ESD and ships should contact the Navy Environmental Preventative Medical Unit #2 (NEMPU-2).
 - For disposal of safes and file cabinets that possibly contain asbestos, shore commands should contact CNRMA Safety to confirm asbestos presence. Disposal must be coordinated with your Hazardous Waste Media Manager. The safe must be double wrapped in plastic by the generator and delivered to DLA Disposition Services at St. Juliens Creek. Contact DLA to schedule an appointment and to ensure you have the proper paperwork. If transportation is required, call MIDLANT Transportation Services for assistance.
 - For demolition and renovation operations, see section IV.8, entitled “BUILDING MATERIALS.”

7) **BATTERIES** - All batteries are not managed in the same manner. Below are the specific disposal guidelines.

- Alkaline Batteries: Alkaline batteries such as AAs, C, and D batteries can be disposed of as normal trash.
- Lead acid batteries: Lead acid batteries shall be turned into Recycling.
- Rechargeable batteries: The Call2Recycle program is designed to recycle your old, rechargeable batteries from items such as cell phones, lab tops, power tools, etc. at no costs to your facility. Rechargeable batteries that are accepted through Call2Recycle include Nickel Metal Hydride, Nickel Cadmium, Lithium Ion and Nickel Zinc. (See Appendix 9)
- All other batteries: Such as lithium, NICAD, mercury, lithium sulfur dioxide, and magnesium dioxide, shall be managed as Universal Waste in accordance with Section III.B.3. The batteries will be packaged to prevent shorting, (i.e. one battery to one Ziploc bag or terminals taped over). Contact NAVFAC MIDLANT ESD to schedule a pickup.

8) **BUILDING MATERIALS** - Building materials from demolition or renovation operations which are suspected to contain lead and/or asbestos should be characterized with representative sample(s) of the entire waste stream tested prior to disposal. Contact the Hazardous Waste Media Managers for specific guidance. For safety-related issues, contact the Regional Safety Department or your command's Health and Safety official.

REMEMBER: IMPROPER MANAGEMENT AND DISPOSAL OF HAZARDOUS WASTE VIOLATES STATE AND FEDERAL LAWS.

9) **CALCIUM HYPOCHLORITE and SODIUM HYPOCHLORITE** are highly unstable (i.e., strong oxidizers), and corrosive chemicals. There have been several instances when improper storage and handling of these chemicals has resulted in fires. In addition exposure can cause extreme damage to the skin and eyes.

Handle Hypochlorites carefully. Do not allow these containers or any packaging material to become wet. Store in compatible containers off the ground so that the containers do not come in contact with a wet floor. Inspect containers for physical integrity, notify ESD if you have any containers that are physically damaged so that they may be repackaged and disposed of promptly. Do not allow these chemicals to come in contact with combustibles such as swept material from the floor, oily rags, etc. Follow the directions specified in Material Safety Data Sheet for appropriate handling and in the event of a spill. Consult Safety and your HW Media Manager for additional information.

10) **CONTRACTOR PROJECTS** – For all waste generated onboard a Naval installation, it is the liability and responsibility of the Navy to ensure proper management and disposal. Specific arrangements for transportation and disposal of the waste vary by

contract. Please contact your HW Media Manager for questions related to waste generated during contracted projects.

11) COOKING OIL

Used cooking oil/grease can be recycled. Do not mix hazardous materials (i.e. solvents/paints) with cooking oil or grease. Do not dispose of cooking oil or grease in trash dumpsters or any drains.

At NS Norfolk there are three 300-gallon containers available for the collection of used cooking oil/grease. The containers are located at the heads of Piers 3, 10, and 14. The collection containers are located near the trash and metal only dumpsters.

*Do not store pallets of cooking oil against buildings, instead store them near the dumpster(s). If questions exist regarding the use of these containers, contact the Hazardous Waste Media Manager.

At JEB Little Creek, grease should be managed in pier-side containers or in appropriate containers at food locations.

12) CYLINDERS – (Compressed Gas Cylinders – CGC)

- Empty CGCs can be turned into recycling, see section I.D. for requirements.
- For CGCs that are not empty, including those containing Ozone Depleting Substances (ODS) such as refrigerants and halons:, you must contact the NAVFAC MIDLANT ESD for disposal. Complete and submit a 1348-1A form to the ESD. Ensure the 1348-1A form contains a valid Job Order Number, and:
 - compressed gas type
 - physical condition of cylinder(s)
 - length of cylinder(s) measured from the cylinder bottom to the valve opening; do not include the valve stem length
 - circumference or diameter of cylinder(s)
 - amount of compressed gas in cylinder(s)
 - owner of the CGC (the CGC will be returned to the owner if applicable)

13) DESICCANTS – Some desiccants may be disposed of as solid waste; contact your HW Media Manager for disposal requirements.

14) ELECTRONIC WASTES (E-WASTES) - contact DLA for guidance.

15) EXPLOSIVE WASTES – for all ammunition explosive waste or waste classified by the DOT regulations as explosive, contact your HW Media Manager for guidance.

16) FLUORESCENT / OTHER LIGHT BULBS

- **Fluorescent light bulbs (green-tip* and silver-tip), compact fluorescent bulbs, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide bulbs are to be managed as Universal Waste. Please contact your HW Media Manager for guidance. * Low mercury bulbs, often referred to as “Green tip” bulbs still contain low levels of mercury and shall be managed as Universal Waste.**

- Except at JEB Fort Story, all tube fluorescent light bulbs will be turned into the Self-Help Facility (one for one exchange) or managed as a universal waste in accordance with Section III.B.3. All other bulbs shall be managed as a universal waste and then turned in via 1348 to the NAVFAC MIDLANT ESD.
- At JEB Fort Story, tube fluorescent bulbs shall be turned in via 1348 to Building 1011 on Tuesdays from 10:30am-11:30am. A light bulb turn-in form will be provided to obtain new light bulbs. All other bulbs shall be managed as a universal waste and then turned in via 1348 to the NAVFAC MIDLANT ESD.
- Afloat commands- turn in via pier-side pickup (see Section III.C).
- PCB-containing fluorescent light ballasts are to be turned into NAVFAC MIDLANT ESD as PCB waste. To schedule a pickup call NAVFAC MIDLANT ESD. Any non-PCB fluorescent light ballasts can be turned in to RRP.

PLEASE NOTE!

Fluorescent light ballast that do not possess the marking “PCB free” are to be assumed to contain PCBs and should be managed accordingly.

- Standard household incandescent bulbs may be disposed of in regular trash.

17) FUEL FILTERS (OIL, JP-5, DIESEL AND GASOLINE)

- **Gasoline/JP-8 Filters, due to ignitability, shall be managed as hazardous waste.** Contact your HW Media Manager prior to generating gasoline filters for guidance.
- **JP-5, Diesel, and other Oil Filters**
 - Drain for a minimum of 72 hours to remove liquids (when cold draining filters, puncturing the top can aid in removing oil from filter)
 - Double bag drained filters in clear plastic bags (no more than 10 in one bag), and place in the trash or turn over to NAVFAC MIDLANT ESD or NAVFAC MIDLANT Oil Recovery for disposal.

18) INDUSTRIAL WASTEWATER - depending on the wastewater characteristics and facility permit requirements, some wastewaters may be treated at the Navy's Industrial & Oily Wastewater Treatment Plants (IWTPs) or will have to be disposed of off base via DLA. Do not mix industrial wastewater with any other wastes. For more information and assistance in disposing of industrial wastewasters contact your Water Media Manager.

19) LEATHER ITEMS- Leather materials generated from activities occurring in maintenance and welding shops, laboratories, and aboard ships shall be managed as hazardous waste and turned into NAVFAC Environmental Services for proper disposal. This includes but is not limited to leather gloves, boots, and various PPE. Should an installation tenant or command require an accumulation area for the

storage of such leather material, please contact your installation's hazardous waste media manager.

Leather materials generated from office spaces, including but not limited to chairs and sofas, will be turned into DLA for proper management. Should DLA not accept this material, please contact your installation's hazardous waste media manager for proper guidance.

20) LOW LEVEL RADIOACTIVE MATERIAL - (ex: smoke detectors, Tritium EXIT signs, Radium gauges & dials, some watches and compasses) is disposed of through the Radiological Support Office (RASO). To dispose of these items, contact RASO with the following information:

- Manufacturer Name, Trade Name, and Model Number
- National Stock Number (if applicable)
- Radiological Hazard (if known) and Amount (if known)
- Quantity of each
- Location of Items

21) MEDICAL / BIO-HAZARDOUS WASTE OUTSIDE OF MEDICAL FACILITIES

Medical/Bio-Hazardous waste includes human blood and all body fluids.

- In the event of an emergency and/or incident that generates a medical/bio-hazardous waste, tenants should contact their Facilities Management Specialist who will arrange for the proper management and disposal of this waste stream.
- Please contact your Hazardous Waste Media Manager if you have any questions regarding medical/bio-hazardous waste.

22) METHYL ETHYL KETONE PEROXIDE (MEKP)

Due to the reactive nature of this material and its high disposal costs; MEKP will be issued in either 1-ounce resin kits (NSN 6810-01-452-3268) or 2-ounce resin kits (NSN 6810-01-452-3273). Every attempt should be made to completely consume the accelerant (MEPK) in the process. To dispose of unusable quantities of MEKP, contact the NAVFAC MIDLANT ESD at for guidance.

23) OBA (Oxygenated Breathing Apparatus) CANISTERS / EEBD (Emergency Escape Breathing Device)/Nuclear/Biological/Chemical (NBC) Filters

Contact the NAVFAC MIDLANT ESD to arrange a pickup. The OBA canisters, EEBDs, and NBC filters need to be kept in the original packages. Do not attempt to disassemble the original packages.

24) OIL, USED

- **Used petroleum based oils** can be recycled. Label the container with the words **USED OIL**. Contact NAVFAC MIDLANT ESD for further instructions or to schedule a pickup.

- At the point of generation it is acceptable to consolidate the following **petroleum-based** products Used Oil, Used Hydraulic Fluid, Used PD-680 Type II, or Used JP-5 in the same container.
- **Mixtures of Used Oil and Used Gasoline or MoGas are prohibited and must be managed as HW.**
- **Used synthetic based oils** cannot be recycled and must be turned in to NAVFAC MIDLANT ESD. Do not mix synthetic oils/fluids with petroleum products.
- **Ship Generated Oily Waste:**
 - **Acceptable Oily Wastes-** Non-contaminated bilge, ballast, and ship's fuel tank cleaning wastes, including butterworthing rinse water, may be disposed of as oily waste.
 - **For all other oil containing wastes, contact** the Water Media Manager who will determine proper disposal procedures.
 - **Ensure no contaminants** have entered the bilge water or oily waste.
 - **Unacceptable contaminants include**, but are not limited to: Aqueous Film Forming Foam (AFFF); sewage (black water and gray water); HM and HW; JP4, AVGAS, MOGAS, and gasoline; boiler cleaning wastes; anti-freeze; and FSII (Fuel System Icing Inhibitor).
 - **Oily Waste Transfers During Night Hours** (between sunset and sunrise) are not normally permitted due to reduced ability to immediately detect a spill; inability to determine amount and spread of a spill; and the need to recall and fund oil clean-up personnel. Approval for ships to discharge oily waste after dark must be obtained from the CO of the appropriate installation by phone call to the local Port Ops Officer. The following additional requirements must be in place:
 1. Extra Topside Safety Watches stationed at the discharge station and on the pier or SWOB to monitor the water for any oil sheens;
 2. Oil spill clean-up equipment on hand;
 3. Adequate lighting erected; and
 4. The Chief Engineer will be on board to supervise the evolution.
 - **AT NAVSTA Norfolk**
 1. Piers are equipped with oily waste collection piping and risers for off-loading bilge water and non-contaminated oily wastes. NAVFAC MIDLANT's Ship Support Office (SSO) will coordinate connections and disconnections to the collection system through LOGREQS. To ensure adequate resources are available to respond in the event of a system casualty, discharges to the system are only permitted during daylight hours during the regular workweek.
 2. Vessels must have a 2.5 in. male camlock fitting on their oily waste overboard discharge connection in order to connect. Vessel connections will be scheduled by SSO to occur approximately 24 hours after arrival. Following connection to the system, the vessel must check for leakage from the hose and connections by flushing the hose with seawater for 5 minutes. A "T" adapter is available from NAVFAC MIDLANT, which will allow use of a 1.5 in. fire hose to flush the hose. Disconnection from the system will occur approximately 48

hours before vessel departure. Prior to disconnection, the vessel must flush the hose with seawater for 10 minutes to remove residual oil. The vessel is responsible for lowering the hose to the pier and walking the residual seawater in the hose into the pier riser. If the vessel was issued a "T" adapter, the adapter must be returned to NAVFAC MIDLANT.

3. Individual off-loads of greater than 50K Gallons, or discharge rates greater than 200 gpm, must be coordinated through SSO to ensure the pier collection system capacity is not exceeded. It is the responsibility of vessels to periodically observe the connections and hose and to report any unusual conditions that may occur.
 4. If the pier side collection system is nonoperational, NAVFAC MIDLANT SSO will arrange for collection services via a contractor or NAVFAC MIDLANT Oil Recovery Tanker Truck, square/Frac tank, or SWOB. If the vessel uses their shipboard oil water separator, NAVFAC MIDLANT SSO will coordinate pick-up of oil from the shipboard used oil tanks.
 5. Do not discharge viscous oils in to the discharge lines, this has been shown to cause failures (fuel spills).
- **At JEB Little Creek-Ft. Story:** The Ship Support Office (SSO) provides oily waste collection and handling services. For emergency requirements outside normal working hours, contact JEB Little Creek Port Ops.
 - **At WPNSTA Yorktown/Cheatham Annex:** If possible, oily waste should be off-loaded before arrival. If off-load at the facility is required, approval by the Installation Commanding Officer prior to off-loading must be obtained and NAVFAC MIDLANT Oil Recovery should be contacted for disposal.

25) PAINTS

- **Empty paint can:** is defined as an original paint can that is free of liquids and contains less than 1 inch (or 3% by volume) of dried material.
 - Metal paint cans that meet this standard can be placed in dumpsters marked "metal only"; plastic cans be placed in solid waste dumpsters.
 - Paint cans that DO NOT meet this standard must be managed as HW and turned in to NAVFAC MIDLANT ESD for disposal and must not be allowed to air dry.
- **Unused/unopened containers of paint:** should be returned to the HAZMINCEN for potential reuse. Keep containers closed; do not allow to air dry. Please see the Hazardous Material Reutilization Information section of this guide for more information and additional alternatives to disposal. If the cans are rejected by the HAZMINCEN, the items will be managed as a waste; follow the procedure listed below:
 - Liquid or solidified oil-based paint: is to be managed as a HW and properly labeled. Contact NAVFAC MIDLANT ESD to schedule a pickup. Excess un-used paint should be accumulated separately from solvent waste.

- Oil-Based Paint/Solvent related items: such as brushes, rags, and rollers shall be managed as HW. *Immediately containerize and keep containers closed at all times. Air drying is prohibited.
- Water-based (latex) paint: is to be managed as non-regulated. Properly label the container and Contact NAVFAC MIDLANT ESD to schedule a pickup. Keep cans closed. Air drying is prohibited.
- Water Based (latex) Paint Debris: such as brushes, rags, and rollers will be managed as non-regulated and can be disposed of as solid waste.

26) PARTWASHERS

- Parts washer units utilize various substances such as solvents to remove dirt, lubricants, and other foreign particles from equipment components. When this solvent becomes contaminated to the point where it must be replaced, contact your HW media manager to ensure proper waste characterization.
- If your operations change, contact your HW media manager to ensure proper waste characterization.
- Do not assume that an environmentally friendly cleaning agent will not produce HW. Waste characterization depends on factors including what is being cleaned. Contact your HW media manager to ensure proper waste characterization.
- HW solvent must be turned in to the NAVFAC MIDLANT ESD for disposal.
- For units maintained by a private company (i.e. Safety Kleen), contact your HW media manager to ensure proper waste characterization and disposal. Prior to off-site shipment of this waste, information about the waste must be provided to the NAVFAC MIDLANT ESD and a representative from the ESD must be present to sign the Hazardous Waste manifest.

27) PEST MANAGEMENT CONTROL-Contact the NAVFAC MIDLANT ESD for Pest control services.

28) POLYCHLORINATED BIPHENYL (PCB)

PCBs were domestically manufactured from 1929 until their manufacture was banned in 1979. They have a range of toxicity and vary in consistency from thin, light-colored liquids to yellow or black waxy solids. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and many other industrial applications. The most common trade name is Aroclor. Although no longer commercially produced in the United States, PCBs may be present in products and materials produced before the 1979 PCB ban. Products that may contain PCBs include:

- Transformers and capacitors
- Other electrical equipment including voltage regulators, switches, reclosers, bushings, and electromagnets
- Oil used in motors and hydraulic systems
- Old electrical devices or appliances containing PCB capacitors
- Fluorescent light ballasts (not green tips)

- Cable insulation
- Thermal insulation material including fiberglass, felt, foam, and cork
- Adhesives and tapes
- Oil-based paint
- Caulking, plastics, carbonless copy paper, floor finish

If you have items for disposal that you believe may contain PCBs, please contact the NAVFAD MIDLANT ESD for guidance on disposal.

PCB-containing fluorescent light ballasts are to be turned into NAVFAC MIDLANT ESD as PCB waste. To schedule a pickup call NAVFAC MIDLANT ESD. Any non-PCB fluorescent light ballasts can be turned in to RRP.

PLEASE NOTE!

Fluorescent light ballast that do not possess the marking “PCB free” are to be assumed to contain PCBs and should be managed accordingly.

29) RAGS / SHOP TOWELS/CLOTH ABSORBENTS

- **Oily Rags:** Place the rags in clear double plastic bags and label as “Used oil rags”.
 - **At Naval Station Norfolk:* Oily rags can be taken to the NAVFAC MIDLANT Oil Recovery located at Bldg. Q-50.
 - **At Naval Weapons Station Yorktown:* Oily rags can be taken to Building 2035 on Tuesdays and Thursdays from 7:30 to 9:00 AM.
 - **At JEB Little Creek and NAS Oceana* or if you do not have the ability to transport your rags, contact NAVFAC MIDLANT ESD at to schedule a pickup. Regardless if the rags are dropped off or picked-up, four completed copies of DD Form 1348-1A, or 1348-1 created in HICSWIN, for each item are required for turn-in.
- **Hazardous Waste (HW) Rags:** Rags that have been contaminated with HM/HW, such as MEK, gasoline, solvent or paint thinner must be managed as HW and properly labeled. Contact NAVFAC MIDLANT ESD to schedule a pickup. Do not transport rags that are considered hazardous waste. *Immediately containerize and keep containers closed at all times. Air drying is prohibited.
- **Shop Towel Laundering Service:** The current Navy Shop Towel Afloat/Ashore Management Program (STAMP) contract for the Mid-Atlantic/Northeast Region; N00189-07-D-Z010 is available on the DENIX Website at <https://www.denix.osd.mil> or from the Rag Recycling Contract Administrator. Note: All Naval vessels in port and shore activities are covered by this STAMP contract.

The current shop towel contract requires the customer to either use shop towels provided by the contractor or to own their own towels and have the contractor wash them. In the first scenario, the local contractor delivers an agreed upon quantity of towels to ship. On a schedule that has been agreed-upon, the contractor picks up soiled shop towels and replaces them with clean towels. The ship is then billed for the towels washed as well as the towels that are lost/missing. In the second scenario, the ship/government buys shop towels

and has the contractor pick them up on an agreed-upon schedule and bills the ship for the cost of washing. To obtain further assistance, contact your CHRIMP Technician or the Rag Recycling Contract Administrator.

The P2 Program may be able to provide 55-gallon-drum mounted wringers and small table top wringers that remove free liquids in rags, allowing for additional uses. P2 equipment is also available at DLA free of charge. For more information, contact the P2 Media Managers.

30) RAILROAD TIES

Railroad Ties must be sent to a permitted landfill for proper disposal. Disposal must be coordinated with the Regional Solid Waste & Recycling Program who will arrange for a dumpster. Railroad ties shall not be placed in regular Solid waste dumpsters.

31) SILVER / SILVER RECOVERY UNITS

Solutions used in silver recovery units (i.e. photography shops, weapons x-ray, dental or hospital/ship X-ray rooms) may require management as a HW. Contact the HW Media Manager for guidance on the management of these units.

32) SOIL GUIDANCE

Soil cannot be removed from construction sites without NAVFAC MIDLANT Environmental Office authorization. This also includes any soil/debris removed from stormwater drainage structures. Any movement of soil/fill material outside of project boundaries, meaning both soil brought onsite and soil from the site relocated to other areas, must be coordinated with the installation Hazardous Waste and the Pest program managers to ensure proper characterization, which may require testing, and environmental compliance. If the excavated soil is going to be reused in the construction site (i.e. for grading), no characterization is required.

Soil should be stored in a manner that prevents rain from infiltrating the soil matrix and preventing any runoff into the surrounding soil or pavement (e.g. store the soil on top of plastic sheets and covered with plastic sheets or in lined, covered dumpsters).

33) SOLVENTS (i.e. PD-680/Acetone/Alcohols etc.)

All Solvents shall be turned in to the NAVFAC MIDLANT ESD for disposal as HW. Ensure containers are kept closed at all times.

34) SPENT BLAST MEDIA

Spent blast media from blast booths or gloves boxes have the potential for recycling instead of disposal. Ensure blast media is reused/recycled within the blast booth/glove box until it is no longer feasible prior to disposal. Properly label waste container and contact NAVFAC MIDLANT ESD to schedule a pickup.

- Initiate conversation with your blast media supplier to investigate the potential of a take back or recycling program. Contact the installation HW Media Manager for guidance and assistance.

35) TETRAHYDROFURAN (THF)

THF is a chemical that is commonly used as a softener, cleaner, and a bonding enhancer for fiberglass, plastic and rubber, and may be found in such things as boat repair kits. THF degrades by auto-oxidation into crystalline form over time or if exposed to air for a time and presents an explosives risk. THF in crystal form is **highly unstable** and must be disposed of as an emergency response using detonation by EOD or a qualified contractor.

For any THF material, whether still in liquid form or crystallized, notify your base Safety and the Hazardous Waste Media Manager for proper disposal. **Do not** attempt to open, move, or transport the material until it can be properly assessed for continued use/storage/disposal. Targeted NIINS may include item 01-271-4835 and item 01-339-3640.

36) UNKNOWN -If you discover an unknown waste, please contact your HW Media Manager for guidance.

37) X-2 OR X-3 MATERIALS (CHEMICALS & RESINS)

X-2 and X-3 materials must be de-militarized prior to disposal. NAVFAC MIDLANT ESD will provide this service for an additional cost. Contact NAVFAC MIDLANT ESD to schedule a pickup at.

PLEASE NOTE:

To ensure proper handling, on the 1348-1A indicate the items are X-2 or X-3 material.

APPENDIX 1: POINTS OF CONTACT***Hazardous Waste and Pollution Prevention Media Managers***

Director	341-0400
Hazardous Waste Media Manager By Installation	
Naval Station Norfolk, Craney Island	341-0380
Yorktown, Cheatham Annex, St. Julien's Creek Annex, Southgate Annex, Scott Creek Annex, NMCP	341-0405
Joint Expeditionary Base Little Creek – Fort Story	341-0403
NAS Oceana, Dam Neck Annex, Northwest, Fentress, Dare County	341-0409
Senior Program Manager-All sites	341-0408
Environmental Pollution Prevention Media Managers	341-0402 and 341-0364

Installation Environmental Compliance Departments

Joint Expeditionary Base Little Creek – Fort Story	
Director	462-5350
Lead Environmental Protection Specialist	462-5361
Environmental Protection Specialist	462-5355
Environmental Protection Specialist	462-5353
Environmental Protection Specialist	462-5356
Naval Station Norfolk	
Director	341-0523
Lead Environmental Protection Specialist	341-0516
Environmental Protection Specialist	341-0520
Environmental Protection Specialist	341-0515
Environmental Protection Specialist	341-0511
Environmental Protection Specialist	341-0517
NAS Oceana/ Dam Neck Annex	
Director	433-3437
Lead Environmental Protection Specialist	433-3435
Environmental Protection Specialist (NW, Dare County), STKWING)	433-3461
Environmental Protection Specialist (Dam Neck)	433-3434
Environmental Protection Specialist (VACAPES, STKWING)	433-2131
Environmental Protection Specialist (AIMD, NEX, MWR)	433-3439
NWS Yorktown / Cheatham Annex/Yorktown Fuels	
Director	887-4086
Lead Environmental Protection Specialist	887-4881
Environmental Protection Specialist	887-4958
Environmental Protection Specialist	887-4095
NSA Hampton Roads	
Director	836-1862
Environmental Protection Specialist	421-8114
NSA Norfolk Naval Shipyard and Annexes	
Director	396-8270
Environmental Protection Specialist	341-0514

Environmental Services Department

NAVFAC MIDLANT ESD	341-0460/0412 Fax:341-0436
Environmental Operations Director	341-0473
NAVFAC MIDLANT HWO Supervisor	341-0435
NAVFAC MIDLANT HWO Profile Chemist	341-0471

Appendix 1: Points of Contact

Asbestos & Insulation Branch	341-0474
NAVFAC MIDLANT Lab Services (LS)	341-0462, 341-0465 (fax)
NAVFAC MIDLANT Oil Recovery	341-0412
NAVFAC MIDLANT Pest Services	341-0412, 341-0460

Regional Solid Waste and Recycling Program

Regional Director	341-1137
NAS Oceana / Dam Neck	433-2454
Joint Expeditionary Base Little Creek – Fort Story	462-7401
Naval Station Norfolk	445-8700
NSA Norfolk Naval Shipyard and Annexes	635-6310
NWS Yorktown / Cheatham Annex	887-4381
QRP-Qualified Recycling Program (Spent Brass)	433-2454 / 341-1136 / 636-4076

Defense Depot Norfolk Virginia (DDNV)

Note: headquartered on Naval Station Norfolk but services the Mid-Atlantic Region	
Compressed Gas Cylinder Yard	443-3142
Cylinder Technical Support	443-3385 449-7880 (cell)
Material Offload Scheduling (Trucks)	443-3131 or 443-3146
Material Offload Scheduling (Ships)	443-3120
X-2, X-3 Material Issue	443-3150

DLA Aviation

Note: headquartered on Naval Station Norfolk but services the Mid-Atlantic Region	
Cylinder Information	804-279-5203
Cylinders with ODS	DSN 695-5203

DLA Disposition Services

Note: headquartered on Naval Station Norfolk but services the Mid-Atlantic Region	
St. Juliens Creek Division	396-0137 xt.13
Re-sale Information	444-5826
Hazardous Material Turn-in (Receiving)	445-4450/445-9476
Waste Disposal – Supervisor	444-7685
Waste Disposal – Specialist	445-4077
Waste Disposal – Specialist	445-2976
Electronic Waste (e-waste)	445-5115/2412

Fleet Industrial Supply Center (FISC)

Note: headquartered on Naval Station Norfolk but services the Mid-Atlantic Region	
LOGISTICS SUPPORT CENTER	443-1211
HAZMINCEN – NORFOLK LF-50 (HM support provided to Little Creek)	444-2024
HAZMINCEN – OCEANA Bldg. Z-826 (HM support provided to Northwest)	433-3730
HAZMINCEN – Ft. Eustis	878-2781
Reuse Store Facility (X-218)	445-7942
Reuse Store – Cylinder Issue	444-1810, 444-4528
Hazardous Material Program Office (HMPO) East	443-1312

Consolidated Hazardous Material Reutilization & Inventory Management Program (CHRIMP)

CHRIMP Afloat Project Manager	443-2549
CHRIMP Afloat Site Manager	443-2411
CHRIMP Afloat Support Bldg. W-143 (CG/DD/DDG/FFG/LPD)	443-2411/1311/2546/2547/2558/2410
CHRIMP Afloat Support Bldg. X-218 (AOE/CVN/LHA/LHD)	444-4789/0593
CHRIMP Afloat Support for Joint Expeditionary Base Little Creek – Fort Story West provided by HMPO office Norfolk (LSD, ARS/PC)	443-2411/1311/2546/2547/2558/2410

Other Commands/Departments

Commander Navy Region Mid-Atlantic Safety	322-2926 or 2927
NEMPU2	444-7671
Naval Air Technical Data & Engineering Service Command (NATEC)	https://mynatec.navair.navy.mil
PWC Maintenance Department – Norfolk	341-0788
PWC Transportation Department – Norfolk	341-0761
Port Operations	444-7345
Ship Support Office-Norfolk/JEFLCFS	445-7447/462-4090
<u>Rag Recycling Contract Administrator</u>	<u>717-605-6856</u>
Radiation Safety Office (RASO)	887-7610/887-4692

APPENDIX 2: INSTRUCTION FOR DD FORM 1348-1A, or HICSWIN DD FORM 1348-1

<http://www.dispositionservices.dla.mil/turn-in/usable/dd1348-1a.pdf>

I. GENERAL SAFE HANDLING GUIDANCE

1. Segregate material according to Federal Stock Class (FSC), compatibility and container size.
2. Segregate used from unused HM/HW.
3. Place leaking HM in appropriate salvage containers (5, 55, or 85 gallon).
4. Properly complete four copies of DD Form 1348-1A or HICSWIN 1348-1 for all waste turn-ins. Fax one copy to MIDLANT Environmental Services Desk (FAX: 445-0179) as follows:

II. REQUIREMENTS FOR DOCUMENTATION

NAVFAC MIDLANT, DRMO, & FISC require the following information on DD form 1348-1a, or Form 1348-1 created in HICSWIN:

- Block: 02. Activity generating the waste, (Ex. Building # or Command/Ship & Hull #).
03. Activity accepting the waste (Ex. MIDLANT, DRMO, FISC, or UIC, etc.)
04. Mark for "DISPOSAL," "RECYCLING," "REUSE," "MIDLANT," "DRMO," "FISC," etc.
17. Generic name of product (listing any known contaminants).
18. Type of container (Ex. 55 gallon, 5 gallon, 10 -lb. Box)
- 19 (or 25-29) Number of containers
20. Total Weight of Shipment (May leave blank if turned into MIDLANT, they will weigh the materials MIDLANT takes custody of.)
24. Unit Identification Code (UIC) Number.
25. FSC and NIIN (The National Stock Number). Include the manufacturer.
- Open Area Additional data - Enter MSDS or profile number, if known.
- Open Area Job Order Number (JON) (required for non-FLT activities)
- Open Area A point of contact (who has knowledge about the process that generated the waste) and phone number and email address.
- Open Area Indicate that waste is from a SAA or HWAA and include date of oldest drum.

Open Area All activities not using HICSWIN, list the process that generated the waste, (Ex. painting, degreasing, etc.)

Open Area Words "Approved for transfer" and a qualified signature

Open Area FISC ECAP stamp approval noted.

In addition to the general requirements, MIDLANT upon receipt of materials will add the following information:

Open Area Unique drum control number or barcode

22 MIDLANT will sign for custody of material (one copy return to client)

23 MIDLANT will enter date of acceptance.

For off-site transportation only:

16 MIDLANT will enter the DOT proper shipping name, UN or NA code, packing group, and EPA codes when appropriate.

20 When appropriate enter weight.

Open Area Emergency Response Guide number

In addition to the general requirements listed above, DRMO also requires the following information:

Boxes 52-53 Fund Code (Command Specific)

65-66 Demilitarization Code

74-80 Unit Price

Open Area DOT Certification statement: "The HM is packaged in containers as prescribed in DOT HM Regulations 49 CFR parts 170-189." Please note that original containers meet this certification.

DD Form 1348-1A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00																																																																																																														
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YOUR U.I.C. CODE _____										YOUR JOB ORDER NO. _____										5. BOC DATE										6. MMPC										7. FRY RATE										8. TYPE CARGO										9. PG										10. QTY. RECD										11. UP										12. UNIT WEIGHT										13. UNIT CUBE										14. UFG										15. SL										16. FREIGHT CLASSIFICATION NOMENCLATURE ITEM NAME										17. ITEM NOMENCLATURE										18. TY CONT										19. NO CONT										20. TOTAL WEIGHT										21. TOTAL CUBE										22. RECEIVED BY										23. DATE RECEIVED									
TYPE OF CONTAINER IE... BAG, DRUM BOX										POINT OF CONTACT NAME _____										TELEPHONE NO. _____										BLDG NO. OR PIER _____										HOW MANY 1, 2, 10 ..										APPROVED FOR TRANSFER										YOUR SIGNATURE HERE _____										DATE _____										1																																																																																																																																	

APPENDIX 3: SPILL REPORTING PROCEDURES

1. In the event of a spill of oil or a hazardous substance, Navy personnel may take action to stop, reduce, or contain the spill, provided they have the proper training and equipment to do so without risking personal injury/contamination.

2. Report **ALL** spills to the Emergency Communications Center (ECC) immediately. Notify the ECC if any cleanup assistance required (i.e. MIDLANT Spill Response Team).

Naval Station Norfolk	444-3333
NAS Oceana	433-9111
Dam Neck Annex	433-9111
NWS Yorktown	887-4911
JEB Little Creek	462-4444
JEB Ft. Story	422-7141
NALF Fentress	433-9111
DFSP Craney Island	396-3333
NNSY	396-3333
ROTHR New Kent	887-4911
St. Helena Annex	911
NSA Northwest	911
Dare County	911
NMC Portsmouth	396-3333

ECC will dispatch the appropriate station Command Duty Officer (CDO) and the Station Fire Department to the spill location. Upon arrival of the Fire Department, the command who reported the spill will relay all of the pertinent information to the Fire Department, who will serve as the Incident Commander (IC) for the duration of the spill containment, clean up and investigation process. The following information should be obtained:

INFORMATION REQUIRED WHEN REPORTING A SPILL

Name of person reporting the spill.	Quantity spilled
Command of person reporting the spill.	Cause of spill
Location of spill, Date & time of Spill	Substance spilled
Weather conditions including wind direction and speed and cloud cover	
Slick description including color and size	
Clean-up information: method, time and person(s) performing the clean up.	
Spill Cleanup assistance requirements	
Notifications made to other commands.	

3. The National Response Center (NRC) will be notified by the Emergency Communication Center (ECC). The command responsible for spill must contact the Installation Environmental Office to ensure the spill information is available.

4. The command responsible for the spill is required to report the incident, by sending a Navy spill message, in accordance with COMNAVBASENORVA/SOPA(ADMIN)HAMPINST 5400.1F and OPNAVINST 5090.1C, 5090.3, and 3100.6H. CHECK WITH SPILL PM.

5. If there are any questions on spill reporting requirements, call your Environmental Media Manager or Installation Environmental Office for more information. Personnel that fail to report a spill or who submit false or misleading information may be subject to criminal sanctions, including fines and/or imprisonment.

APPENDIX 4: CONTAINER PROCUREMENT & MARKING DEVICES

CONTAINER PROCUREMENT

If original containers cannot be used to store the HW, acceptable containers may be obtained by the following methods:

1. The RRP has free, used drums on a limited basis. Contact the RRP for availability.
2. New or reconditioned drums can be purchased through FISC, contact FISC Customer Service for more details.
 - 55 gallon steel with bung openings: NSN 8110-00-292-9783
 - 55 gallon steel with open tops: NSN 8110-00-030-7780
 - 55 gallon plastic with bung opening: NSN 8110-01-150-0677
3. Other containers may be used if they meet the DOT container requirements. Any container used to store a hazardous waste must be made of or lined with materials, which will not react with, and are compatible with the item(s) to be stored inside them. The container must possess the ability to hold the waste without being impaired. The containers must be able to be secured/sealed to ensure the contents will not spill during routine storage or transportation.
4. Empty drums can be obtained through the NAVFAC MIDLANT ESD who will provide containers as a last resort with a DD- 1348.

MARKING DEVICES

Paint Pens may be used to mark the containers with the proper information. Ordering information for Paint Pens is listed below:

- White Paint Pen NSN 7520-01-207-4149
- Red Paint Pen NSN 7520-01-207-4161
- Yellow Paint Pen NSN 7520-01-207-4165
- Gold Paint Pen NSN 7520-01-207-4166

APPENDIX 5: SITE GUIDANCE for SATELLITE ACCUMULATION AREAS

Enclosure: Inspection Checklist for Satellite Accumulation Area (SAA)


HW Satellite Accumulation Area

CHECK TO ENSURE

- Drums are kept closed except when adding waste
- HW labels are facing outward
- Secondary containment is clean (if applicable)
- Max Capacity: 55-gallons, regardless of the # of HW containers
- When HW containers are 75% full, arrange for pickup (341-0412/0460)
- Do not date drum until is full (3 days to move to <90 days or dispose)

HW Container *Legally Required* Label

Must identify type of waste



ASD

Please call the Hazardous Waste Manager with any HW issues: _____

If an uncontrolled spill occurs , please call _____

SATELLITE ACCUMULATION AREA (SAA) CHECKLIST

INSPECTOR	INSPECTION DATE/TIME	AREA
HW CUSTODIAN	PHONE NUMBER	HW TRAINING DATE
		CODE/UNIT
All checklist questions must be answered. All "NO" answers require the violation to be noted and corrected unless otherwise noted. Comment may include violation description, action, date action completed, and other pertinent details.		
SATELLITE ACCUMULATION AREA Compliance Questions	Circle Answer	Comment
1. Is the SATELLITE ACCUMULATION AREA near the point of generation and under control of the operator of the process generating the waste?	Yes No	
2. Is the area free of any spills or container overfills (waste product on the container lid) and is good housekeeping maintained?	Yes No	
3. Is a fire extinguisher located and available within 50 feet and is the inspection current?	Yes No	
4. Is spill control equipment (Example: absorbents) available at the SATELLITE ACCUMULATION AREA?	Yes No	
5. Is the HW operator/site custodian annual training up to date?	Yes No	
6. Is a "SATELLITE ACCUMULATION AREA" sign with Primary and Alternate emergency contact information posted at the site?	Yes No	
7. Is a "NO SMOKING" Sign posted at the Satellite Accumulation Area?	Yes No	
If there is no hazardous waste currently stored at the site answer N/A for the remainder of checklist.		
8. Is the total volume of hazardous waste 55 gallons or less (OR 1 quart or less of acutely hazardous waste)?	Yes No N/A	
9. Are containers kept sealed at all times except when waste is added?	Yes No N/A	
10. Are containers in good condition (non-leaking or non-corroded) and compatible with the waste stored in them? (Example of incompatibility: corrosive waste in a metal drum).	Yes No N/A	
11. HW Labeling Checks	a. does each HW container have a HW label?	Yes No N/A
	b. clearly visible and facing out for inspection?	Yes No N/A
	c. include the words, "HAZARDOUS WASTE?"	Yes No N/A
	d. include specific contents of the waste(s)?	Yes No N/A
	e. include the accumulation date? (Containers must only be dated once the total volume of the SATELLITE ACCUMULATION AREA reaches 55 gallons, or one quart of acute HW, then all the wastes must be removed within 72 hours).	Yes No N/A
12. If the Satellite Accumulation Area container (I.E. 55 Gallon) has reached capacity has the container been dated and moved to the Hazardous Waste Accumulation Area site within 72 hours?	Yes No N/A	

For Environmental Personnel Only:

Check Inspection Type: Oversight___; Setup___; Closeout___

APPENDIX 6: SITE GUIDANCE for HAZARDOUS WASTE ACCUMULATION AREA

Enclosure: Hazardous Waste Accumulation Area Inspection Checklist for Containers Less Than or Equal to 119 Gallons.

HW (<90 Day) Accumulation Area


CHECK TO ENSURE

- Drums are kept closed except when adding waste
- HW labels are facing outward
- Secondary containment is clean
- Contact Environmental Services (341-0412/0460) to arrange HW container pickup no later than the 45th day from **ASD**
- Site **MUST** be inspected every 7 days (records kept for 3 years)
- Aisle space **MUST** allow for removal of HW and a 360 degree inspection
- No limit on volume storage

HW Container **Legally Required** Label

Must have a start date if waste is placed in drum
(ASD)

Must identify type of waste



The diagram shows a rectangular label with a red top section containing the text 'HAZARDOUS WASTE'. Below this, there are two lines for 'ACUMULATION START DATE' and 'CONTENTS'. Arrows from the text to the left point to these two fields. Below the 'CONTENTS' field, there is a red box with the text 'HANDLE WITH CARE!' and 'CONTAINS HAZARDOUS OR TOXIC WASTES' below it.

Please call the Hazardous Waste Manager with any HW issues: _____

If an uncontrolled spill occurs , please call _____

HAZARDOUS WASTE ACCUMULATION AREA (HWAA) CHECKLIST

INSPECTOR	INSPECTION DATE/TIME	AREA
HW CUSTODIAN	PHONE NUMBER	HW TRAINING DATE
		CODE/UNIT
All checklist questions must be answered. All "NO" answers require the violation to be noted and corrected unless otherwise noted. Comment may include violation description, action, date action completed, and other pertinent details.		
HAZARDOUS WASTE ACCUMULATION AREA Compliance Questions	Circle Answer	Comment
1. Are good housekeeping standards employed?	Yes No	
2. Is the area free of any spills or container overfills (waste product on the container lid)?	Yes No	
3. Is a fire extinguisher located and available within 50 feet and is Inspection current?	Yes No	
4. Is spill control equipment (examples: absorbents) available at the Site?	Yes No	
5. Are HAZARDOUS WASTE inspections conducted and properly documented every 7 days?	Yes No	
6. Are HAZARDOUS WASTE inspection records kept for 3 years?	Yes No	
7. Is the HW operator/site custodian annual training up to date?	Yes No	
8. Is a "HAZARDOUS WASTE ACCUMULATION AREA" sign with Primary and Alternate emergency contact information posted at the site?	Yes No	
9. Is a "NO SMOKING" sign posted?	Yes No	
If there is no hazardous waste currently stored at the site answer N/A for the remainder of checklist.		
10. Are HAZARDOUS WASTE containers in good condition (non-leaking or non-corroded) and compatible with the waste stored in them?	Yes No N/A	
11. For hazardous waste containing volatile organics, are individual HAZARDOUS WASTE containers either (circle applicable items) a. less than 26 gallons? b. 26 or greater but less than 119 gallons; and DOT approved? c. Is air emissions documentation allowing non-DOT containers maintained with the inspection records?	Yes No N/A Yes No N/A Yes No N/A	
12. Are incompatible wastes separated by a wall, berm, or overpack to prevent mixing?	Yes No N/A	
13. Are HAZARDOUS WASTE containers kept sealed except when waste is being added or removed?	Yes No N/A	
14. HW Labels	a. does each HW container have a HW label?	Yes No N/A
	b. clearly visible and facing out for inspection?	Yes No N/A
	c. include the words, "HAZARDOUS WASTE?"	Yes No N/A
	d. include specific contents of the waste(s)?	Yes No N/A
	e. include the accumulation date?	Yes No N/A
15. Are old Hazardous Waste labels & markings removed?	Yes No N/A	
16. Date of oldest HW container in the HWAA.		
17. Has a pickup request been submitted for all HW containers that have been accumulating for more than 45 days?	Yes No N/A	
18. Are adequate aisle spaces maintained for incident response?	Yes No N/A	

For Environmental Personnel Only: Check Inspection Type: Oversight___; Setup___; Closeout___

APPENDIX 7: SITE GUIDANCE for UNIVERSAL WASTE ACCUMULATION AREA

Enclosure: Universal Waste Accumulation Area (UWAA) Inspection Checklist

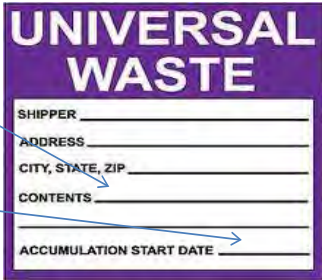
Universal Waste Accumulation Area

CHECK TO ENSURE

- Drum lids are secure and boxes sealed
- UW labels are facing outward
- **ASD** reflects the date when item is put at site
- Arrange for pickup (341-0412/0460) no later than the 270th day (9 months) from **ASD**

UW Container *Legally Required* Label

Must identify type of waste



ASD

Please call the HW Manager with any HW issues:

If an uncontrolled spill occurs , please call _____

UNIVERSAL WASTE ACCUMULATION AREA (UWAA) CHECKLIST

INSPECTOR	INSPECTION DATE/TIME	AREA
HW CUSTODIAN	PHONE NUMBER	HW TRAINING DATE
		CODE/UNIT
All checklist questions must be answered. All "NO" answers require the violation to be noted and corrected unless otherwise noted. Comment may include violation description, action, date action completed, and other pertinent details.		
UNIVERSAL WASTE ACCUMULATION AREA Compliance Questions	Circle Answer	Comment
1. Is the area free of any spills or container overfills (waste product on the container lid)?	Yes No	
2. Area good housekeeping standards employed?	Yes No	
3. Is a fire extinguisher located and available within 50 feet and is Inspection current?	Yes No	
4. Is spill control equipment (examples: absorbents) available at the Site?	Yes No	
5. Is the HW operator/site custodian annual training up to date?	Yes No	
6. Is a "UNIVERSAL WASTE ACCUMULATION AREA" sign with Primary and alternate emergency contact information posted at the site?	Yes No	
7. Is a "NO SMOKING" sign posted?	Yes No	
If there is no Universal Waste currently stored at the site answer N/A for the remainder of checklist.		
8. Are Universal Waste containers kept sealed except when waste is being added or removed?	Yes No N/A	
9. Are Universal Waste containers in good condition (non-leaking or non-corroded) and compatible with the waste stored in them?	Yes No N/A	
10. Is each Universal Waste item or the container for the Universal Waste(s) labeled or marked with one of the following phrases? Circle the applicable item:		
a. "Universal Waste – Battery(ies)", or	Yes No N/A	
b. "Universal Waste – Pesticide(s)", or	Yes No N/A	
c. "Universal Waste – Mercury Containing Equipment", or	Yes No N/A	
d. "Universal Waste – Lamp(s)"	Yes No N/A	
11. Is each Universal Waste container for the universal waste(s) labeled with the accumulation start date?	Yes No N/A	
12. Are adequate aisle spaces maintained for incident response?	Yes No N/A	
13. Date of oldest UW container in the UWAA.		
14. Has a pickup request been submitted for all UW containers that have been accumulating for no more than 270 days (9 months)?	Yes No N/A	
15. Is the Universal Waste segregated/packaged and/or stored correctly? (i.e. Waste lithium batteries individually wrapped/packaged).	Yes No N/A	

For Environmental Personnel Only:

Check Inspection Type: Oversight___; Setup___; Closeout___

APPENDIX 8: PROCEDURE FOR ESTABLISHING A JOB ORDER NUMBER

In order to provide service to any customer, a job order number (JON) must be established with the NAVFAC Midlant Financial Management Business Line, Accounts Receivable Department.

To establish a job order number the customer must provide a Funding Document (NAVCOMPT form 2275) or a Requisition & Invoice (form DD-1149). The funding document should state under the description of work "MIDLANT ENVIRONMENTAL SERVICES " at minimum and should list the type of work requested. Forms may be obtained at the comptrollers' office for each command (phone: 341-1325/1318). A copy of the completed funding document must be sent to NAVFAC-MIDLANT (Accounts Receivable), FAX # (757) 341-1318. The NAVFAC MIDLANT Accounts Receivable Department can assign a job order as soon as the funding document is received. Work may be requested as soon as a valid JON is established.

Call2Recycle Rechargeable Battery Recycling Program Management Guidelines

This program is designed to recycle your old, rechargeable batteries from items such as cell phones, lab tops, power tools, etc. at no costs to your facility. Rechargeable batteries meet the definition of Universal Waste and must be properly managed during accumulation and sent for proper disposal or recycling.

Contact your installation Hazardous Waste (HW) Media Manager to get started with your own Call2Recycle collection box.

- 1) The HW Media Manager will provide the proper tools and training to successfully manage and recycle your rechargeable batteries. In addition to the provided on-site training, web based training may be accessed at <https://navfac.ecatts.com/start>.
- 2) A POC will be designated as the responsible person for the collection box at the time it is established. The name and number of this POC will be documented on a site specific sign provided by the HW Media Manager. **Only this POC and those trained on the Call2Recycle program will be allowed to bag and place batteries into the collection box.** The sign also provides the POC with a battery recycling guide for reference.
- 3) Each battery shall be packaged in accordance with the directions on the box. Leaking or damaged batteries cannot be recycled and should be disposed of as HW. Your HW Media Manager can assist with this process. Adhering to these directions will help ensure safe storage.
- 4) The box must be dated when the very first battery is placed in it. Once the collection box is full or the 270 day limit has been reached (whichever comes first), tape the box closed and ship through UPS.
- 5) The collection boxes are already properly labeled and marked to comply with DOT and EPA regulations so additional labels or markings will not be required.
- 6) Site inspections will be performed quarterly by Environmental to check for site safety, proper storage and correct batteries.
- 7) Please coordinate with the HW Media Manager to receive new collection boxes.

HW Compliance Director	341-0400
Hazardous Waste Media Manager By Installation	
Naval Station Norfolk, Craney Island, NSA Norfolk	341-0380
NWS Yorktown, Cheatham Annex, New Kent, St. Julien's Creek Annex, Southgate Annex, Scott Creek Annex, NMCP	341-0405
Joint Expeditionary Base Little Creek – Fort Story	341-0403
NAS Oceana, Dam Neck Annex, Northwest, Fentress, Dare County	341-0409

* Central POC for questions or issues is Mike Therrien (341-0409).
 * Call2Recycle center - military@call2recycle.org or 1-877-2-RECYCLE

Enclosure 16. Integrated Pest Management Plan



INTEGRATED PEST MANAGEMENT PLAN

NAVAL AIR STATION OCEANA

OCTOBER 2016



PREPARED BY

Cover page photos courtesy of www.navy.mil.

Top left: A sailor communicates a nine-line medical evacuation request during a tactical combat casualty care field training exercise at Dam Neck Annex. U.S. Navy photo by Mass Communication Specialist 2nd Class Matt Daniels, March 18, 2011.

Top right: An F/A-18 Hornet piloted by Capt. Mark Weisgerber performs the first touch-and-go landing during a ribbon cutting ceremony at Naval Auxiliary Landing Field Fentress. Fentress re-opened after a repair project to lay down a new runway and perform numerous electrical and lighting upgrades. U.S. Navy photo by John Land, October 16, 2012.

Bottom left: F/A-18 Hornets and Super Hornets conduct a fly by during practice for the 2014 Naval Air Station Oceana Air Show. U.S. Navy photo by Mass Communication Specialist Seaman Kayla King, September 19, 2014.

Bottom right: A pilot assigned to Naval Air Station Oceana waves to friends and family during a homecoming celebration. U.S. Navy photo by Mass Communication Specialist 2nd Class Alysia R. Hernandez, April 17, 2014.



DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND, ATLANTIC
6506 HAMPTON BLVD
NORFOLK VA 23508-1278

IN REPLY REFER TO:

6250
Ser EV51CM/00407
17 OCT 2016

From: Commander, Naval Facilities Engineering Command, Atlantic
To: Commanding Officer, Naval Air Station Oceana

Subj: INTEGRATED PEST MANAGEMENT PLAN FINAL

Ref: (a) DoDI 4150.07
(b) OPNAVINST 6250.4C
(c) OPNAV M-5090.1

Encl: (1) NAS Oceana Integrated Pest Management Plan
(2) Plan Implementation Signature Sheet

1. References (a) through (c) require the installation Integrated Pest Management Plan to be revised every five years. Enclosure (1) has been prepared in collaboration with installation staff and is provided for distribution to installation pest management stakeholders. Please route enclosure (2) for signature and return a copy to NAVFAC Atlantic Code EV51. The original signature page should be retained with the plan.

2. We appreciate your assistance in reviewing and finalizing this plan. Any questions may be referred to Chris Martin, Applied Biology Branch, at DSN 262-4611, (757) 322-4611, or e-mail at chris.d.martin@navy.mil.


J. R. CIRVELLO, P.E.
By direction

Copy to:
NAVFAC MIDLANT (EV BLC)
NAVANTOCTR JACKSONVILLE (OIC, FS)
NAS OCEANA (PWO, IEPM, IPMC)

Naval Air Station Oceana Integrated Pest Management Plan Approval and Implementation

Prepared by:

- Chris Martin, Applied Biology, Naval Facilities Engineering Command, Atlantic, Code EV51, 6506 Hampton Boulevard, Norfolk, VA 23508

Technical and Administrative Approval:

Approved and signed in accordance with DODI 4150.07

Regional Integrated Pest Management Coordinator

G. JOHN MARKHAM PRINT NAME *John Markham* SIGNATURE 01/17/17 DATE

Installation Environmental Program Manager

Terry N. Chamberlain PRINT NAME *Terry Chamberlain* SIGNATURE 04/12/17 DATE

Installation Natural Resources Manager

Michael F. Wright PRINT NAME *Michael F. Wright* SIGNATURE 12 Apr 2017 DATE

Regional Cultural Resources Manager

Katherine Childs PRINT NAME *Katherine Childs* SIGNATURE 2/13/17 DATE

Public Works Officer

Shawn M. Rockwell PRINT NAME *Shawn M. Rockwell* SIGNATURE 4/28/17 DATE

Preventive Medicine Department, Branch Health Clinic

DONALD W. WATERS PRINT NAME *Donald W. Waters* SIGNATURE 4/21/2017 DATE

NAVFAC Mid-Atlantic Environmental Services

Ralph Rossman PRINT NAME *Ralph Rossman* SIGNATURE 14 Feb 2017 DATE

Approved for Implementation:

Commanding Officer

RICHARD MEADOWS PRINT NAME *Richard Meadows* SIGNATURE 1 MAY 2017 DATE

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Naval Air Station Oceana Integrated Pest Management Plan Technical Review

The Integrated Pest Management Plan has been reviewed in accordance with DODI 4150.07.



Ms Sabra Schuffel
Applied Biology Branch Manager
Naval Facilities Engineering Command, Atlantic
Norfolk, VA

Date: 9/1/14



LT Matthew Yans
Medical Entomologist
Navy Environmental Preventive Medicine Unit Two
Naval Station Norfolk, VA

Date: 30 AUG 2016

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Integrated Pest Management Plan Annual Review

Year	Completion Date	Integrated Pest Management Coordinator	Copies of changes to the Pest Management Consultant (Annual) Date Completed
17			
18			
19			
20			
21	Rewrite		

Scheduled On-Site Pest Management Technical Review

Scheduled Date	Integrated Pest Management Coordinator	Pest Management Consultant Date Review Completed
May 11-15, 2015	Ronnie Stephens	May 15, 2015 (Chris Martin)

Note: Technical Reviews should be scheduled approximately 3 years apart and in conjunction with an EMS review if possible.

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Additional Source Documents

(included on CD provided with this plan)

Pest Management Program Review Reports (2012, 2015)

General Installation Maps

Red Imported Fire Ant Quarantine Map

Applicable DOD, Federal, and State Regulations (DODI 4150.07, OPNAVINST 6250.4C, OPNAV M 5090.1, CNO Feral Cat Policy Letter)

“The Cat’s Meow” and “Don’t Let Your Cat Go AWOL” Brochure

Integrated Pest Management Plan Annual Update Form

Hampton Roads Regional Pesticide Discharge Management Plan

General Permit for Discharges Resulting From the Application of Pesticides to Surface Waters of Virginia

Commander, Navy Installation Command BASH Manual

NAS Oceana BASH Plan, Instruction 3750.4

NAS Oceana Airfield Pest Management Plan

NAS Oceana and NALF Fentress Integrated Natural Resources Management Plan

NASO Dam Neck Annex Integrated Natural Resources Management Plan

Regional Integrated Cultural Resources Management Plan for Naval Installations in Hampton Roads 2013

Spill Prevention, Control, and Countermeasures Plan 2013

Hazardous Materials Reutilization, Hazardous Waste Minimization and Disposal Guide 2013

Chikungunya Vector Surveillance & Control Plan for U.S. Navy and Marine Corps Installations 2014

West Nile Virus Vector Surveillance & Control Guide for U.S. Navy and Marine Corps Installations 2014

Aedes Surveillance and Control Plan for U.S. Navy and Marine Corps Installations 2016

Manual of Naval Preventive Medicine (NAVMED P) 5010-1 (2014), Tri-Service Food Code

Manual of Naval Preventive Medicine (NAVMED P) 5010-8 (2004), Chapter 8, Navy Entomology and Pest Control Technology

NAVFAC Online Pesticide Reporting System Tutorial

Herbicide Spray Plan for Invasive Plant Control (contract # N62470-13-D-8017-WE01), April 2016

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EXECUTIVE SUMMARY

This Integrated Pest Management Plan is a comprehensive, long-range document that captures all of the pest management operations and pesticide-related activities conducted on the installation. It incorporates pest management practices and the local, state, federal, and Department of Defense regulations, and conforms to the requirements of [Department of Defense Instruction 4150.07](#), DOD Pest Management Program, and [Chief of Naval Operations Instruction 6250.4C](#), Navy Pest Management Programs. It supplies comprehensive information about the pest management program to installation staff and internal and external compliance auditors.

The Naval Facilities Engineering Command, Atlantic's Applied Biology Center prepared this plan using information obtained through pest management data collection, on-site observations, installation personnel interviews, and document reviews.

The main goal of the various pest control functions is to support the mission of Naval Air Station Oceana. Pest control services for the installation are provided by a combination of in-house and contract pest control operators. Pest control services are needed on the installation in order to:

1. Provide services that will prolong the life of the structures through subterranean termite and nuisance pest control
2. Maintain the safety and security of industrial and storage areas through weed control
3. Provide nuisance pest control to all buildings (except public-private venture housing) and outdoor areas to ensure a good working and living environment
4. Control weed and insect pests in all recreational and lawn areas to maintain aesthetics and provide recreational facilities to personnel
5. Provide control of mosquitoes, flies, and other potential disease vectors to ensure the comfort and well-being of all personnel
6. Provide vertebrate pest control, including rodent control, to all areas of the installation.

For the current level of work to be accomplished, a sufficient staff of qualified applicators must be maintained. Contract personnel must meet state certification requirements as specified by the contract. Pest management performance assessment representatives must successfully take an initial pest management performance assessment representatives course. To maintain their certification, the pest management performance assessment representatives and Department of Defense pesticide applicators must successfully pass a Department of Defense pest management training and recertification course every three years. Pest control facilities must comply with current safety standards to provide a safe workplace and to minimize pesticide hazards.

This plan focuses on safe, environmentally-sound, and cost-effective control of pests through integrated pest management. Integrated pest management depends on education, proper surveillance, and identification of pests, non-chemical and chemical control methods, and individual responsibility for pest prevention.

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CHAPTER 1

Introduction

1.1 INTEGRATED PEST MANAGEMENT PLAN

The Integrated Pest Management Plan (IPMP) is a long-range, comprehensive planning and operational document that establishes the strategy and methods for conducting a safe, effective, and environmentally-sound Integrated Pest Management (IPM) program. The IPMP covers all pest management and pesticide-related activities conducted by civilian and military Department of Defense (DOD) personnel and commercial contractors within all functional areas of the installation.

1.1.1 Authority

[Department of Defense Instruction \(DODI\) 4150.07](#), DOD Pest Management Program; [Chief of Naval Operations Instruction \(OPNAVINST\) 6250.4C](#), Navy Pest Management Programs; and [Chief of Naval Operations Manual \(OPNAV M\) 5090.1](#), Environmental Readiness Program Manual, Chapter 24—Pesticide Compliance Ashore, require that all Navy installations develop and implement an IPMP in accordance to the guidelines. The IPMP will detail all aspects of pesticide management including administration, procurement, contract services, storage, disposal, safety, reporting, vehicles, integrated pest management, and applicable laws and regulations.

1.1.2 Department of Defense Measures of Merit

This plan provides the framework for the installation to meet the DOD's annual goals or measures of merit (MoMs). As established in [DODI 4150.07](#), and updated by the Armed Forces Pest Management Board, the MoMs are:

1. Measure of Merit 1: All DOD installations will maintain installation Pest Management Plans that have been reviewed and approved by a DOD-certified Pest Management Consultant and annually updated by the installation pest management coordinator.

Naval Air Station Oceana helps meet this goal by implementing (via the commanding officer's signature) this plan.

2. Measure of Merit 2: All DOD installations will adhere to the principals of integrated pest management and the DOD will maintain the goal of minimizing annual pesticide use by both government and contractor pesticide applicators on its installations. This goal is set at 425,000 lbs of active ingredient, the DOD's average annual usage for Fiscal Years 2007–2009 and an overall 52 percent reduction from the original fiscal year 1993 baseline.

Naval Air Station Oceana provides data for this MoM through the reporting requirement ([section 2.3](#)).

3. Measure of Merit 3: All DOD pesticide applicators will be certified. All contracted employees shall have appropriate U.S. state or host-nation pesticide applicator certification in the appropriate categories at the time the contract is let.

Naval Air Station Oceana ensures proper certification of all applicators through regular verifications and maintains a list of certifications in appendix E of this plan. See [section 2.4](#) for training and certification requirements.

1.1.3 Integrated Pest Management Plan Implementation

The IPMP must be reviewed and approved by installation stakeholders and professional pest management consultants (PPMCs) from Naval Facilities Engineering Command (NAVFAC), Atlantic and the Bureau of Medicine and Surgery (BUMED). The IPMP is implemented upon signature by the installation's commanding officer. The integrated pest management coordinator (IPMC) has the task of implementing, coordinating, and executing the IPMP among each of the functional areas of the installation.

1.1.4 Integrated Pest Management Plan Maintenance

Once the IPMP has been developed and implemented, it must be reviewed annually and updated as necessary. The installation IPMC is responsible for maintaining the IPMP.

1.1.4.1 Internal Review

The IPMC shall conduct an internal review annually in coordination with the pest management service providers (PMSPs) and other functional area points of contact (POCs). The review should include updating contract information, applicator certifications, pesticides, and pest management operations to be used on the installation, as well as, updating pesticide use records. The pest management program self-assessment checklist (appendix C) is available as a tool to review compliance issues during the internal review.

1.1.4.2 Off-Site Review

The IPMC may request that a NAVFAC Atlantic Applied Biology PPMC perform a review of regulatory requirements, reporting, and pesticide approval procedures.

1.1.4.3 On-Site Review

The NAVFAC Atlantic Applied Biology PPMC shall perform an on-site review of the entire pest management program every three years to ensure compliance with the IPMP. The review may be performed more frequently if extensive program problems exist.

1.1.4.4 Integrated Pest Management Plan Rewrite

The IPMP should be rewritten every five years to reflect new contracts, personnel, pest management practices, and regulatory changes.

1.2 INSTALLATION BACKGROUND

This plan covers pest management operations at NAS Oceana (NASO). Commands under operational control of NASO which are also covered under this plan include the NASO Dam Neck Annex (DNA) and Naval Auxiliary Landing Field Fentress (NALFF).

1.2.1 Mission

The NASO mission is to support the Navy's Atlantic and Pacific Fleet Force of strike-fighter aircraft and joint/inter-agency operations.

1.2.2 Location and Facilities

Naval Air Station Oceana is home to numerous major tenants, including several F/A-18 Hornet squadrons, and is the second largest employer in Virginia Beach, Virginia. NASO Dam Neck Annex is also located in the City of Virginia Beach, less than four miles east of NASO on the Atlantic Ocean. The Naval Auxiliary Landing Field Fentress is located about seven miles southwest of NASO in the City of Chesapeake. It is used primarily as a training field for fleet carrier landing practice. It includes an air strip, modern administrative center, and minor support buildings (including a small galley).

1.3 PEST MANAGEMENT PROGRAM OVERVIEW

The pest management program is summarized below.

1. The acting regional IPMC is an employee in the NAVFAC Mid-Atlantic Environmental Department.
2. General pest control services for the installation are provided by the NAVFAC Mid-Atlantic Environmental Services Pest Control Shop.
3. Grounds maintenance services are provided through contract with R-Con Construction (NASO and NALFF, including the airfield) and Didlake Inc. (NASO DNA).
4. In-house pesticide applicators, employed by MWR, maintain the golf course.
5. The Navy Exchange and MWR-sponsored restaurants perform their own pest management independently of the installation pest management service provider. ABC Pest Management and Hometown Pest Control service the Subway and Panda Express restaurants, respectively. Shifting Sands and Seabreeze Beach Club, CPO Club, and bowling alleys receive pest control services through contract with Orkin. Dodson Bros Pest Control services the Navy Lodge.
6. Natural resources oversees an invasive species control contract using Invasive Plant Control and Carolina Silvics, subcontractors under GMI-AECOM/Versar. Natural resources staff are also certified to apply pesticides to control invasive plant species and vegetation growth along recreation trails/resources managed by the natural resources program.
7. United States Department of Agriculture–Wildlife Services (USDA-WS) provides support to the Bird Airstrike Hazard (BASH) program.
8. Public-private venture housing, which is run by Lincoln Military Housing, receives pest control and landscaping (flag properties only) services from Orkin and Chesapeake Lawnsapes, respectively.
9. The Navy Exchange and commissary store and display retail pesticides.

10. Preventive medicine technicians from the naval health branch health clinic perform food service sanitation, facilities habitability inspections, and oversee programs to prevent vector-borne and other infectious diseases.

1.3.1 Pest Management Objectives

The objectives of the installation's pest management program are:

1. The prevention of pest-related health and safety problems that affect the mission.

Examples of health-related pests that may affect the mission include, but are not limited to mosquitoes, fire ants, and bed bugs. Any pest may impact the mission when its numbers become excessive. Prevention of pest-borne disease and injury is a component of force health protection. Force health protection seeks to maintain a healthy and fit military and civilian force in order to maintain the highest levels of readiness. Pest management is a force multiplier for construction battalions, maintenance commands, and other deployable units. Additionally, the military and civilian infrastructure on the installation must be protected in order to provide the necessary support to these units as well.

2. The prevention of pest damage to equipment and subsistence used to support the operational mission of the activities and tenant commands.

Equipment and materials are susceptible to physical damage by pests and the financial costs of such damage can be high. Rodents, for example, can cause considerable damage to electronic equipment through gnawing on electrical components. Military aircraft strike thousands of birds and wildlife every year, causing millions of dollars in damages and putting aviators and others at high risk. Examples of other pests that may damage equipment and subsistence include, but are not limited to rodents, wood-destroying pests, and stored-product pests.

3. Vegetation management to protect the local environment.

The introduction of non-native/invasive species of plants can increase the risk of fire and degrade the surrounding native environment that is home to a number of endangered and threatened animal and plant species.

4. The protection of government real property, materiel, and aesthetics.

Buildings and roads that form the infrastructure of the installation are susceptible to pests. If not adequately prevented and controlled, termites can cause extensive damage to wood structures. Weeds can cause damage to roadways and increase the risk of fire and inability for safety and security support to provide emergency response in a timely manner.

5. The reduction of the use of and dependence on pesticides.

1.3.2 Program Requirements

1.3.2.1 Administration

Proper administration of the pest management program ensures accountability and documentation through planning, record keeping, reporting, training, pesticide and contract approval, and regulatory compliance. Table 1-1 outlines the pest management administrative program requirements.

Requirement	Description	Reference	Responsibility	Locator
PLANNING	Review and revise the Integrated Pest Management Plan annually.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • DODI 4150.07 	<ul style="list-style-type: none"> • IPMC 	Section 1.2
RECORDING	Record all pest management operations conducted on the installation after each operation.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • DODI 4150.07 • 7 C.F.R.§110* 	<ul style="list-style-type: none"> • All pesticide applicators 	Section 2.3.1
MAINTAINING	Maintain records of all pest management operations conducted on installation on-site indefinitely.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • DODI 4150.07 • 7 C.F.R.§110* 	<ul style="list-style-type: none"> • IPMC in coordination with PMPARs 	Section 2.3.2
REPORTING	Compile and report all pest management operations to NAVFAC Atlantic Applied Biology monthly.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • DODI 4150.07 • 7 C.F.R.§110* 	<ul style="list-style-type: none"> • IPMC in coordination with PMPARs 	Section 2.3.3
PESTICIDE APPLICATOR CERTIFICATION	Ensure that all personnel applying pesticides on installations have current DOD pesticide applicator certification if in-house or state commercial applicator certification if contracted.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • DODI 4150.07 • 40 C.F.R.§171* 	<ul style="list-style-type: none"> • IPMC in coordination with PMPARs 	Section 2.4
COMPLIANCE	Ensure that all program elements are in compliance with all federal regulations. Navy policy is to comply with local/state regulations.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • DODI 4150.07 	<ul style="list-style-type: none"> • IPMC in coordination with PMPARs 	Section 3.3
PESTICIDE APPROVAL	Compile and submit list of new pesticides to NAVFAC Atlantic Applied Biology for approval for use on the installation.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • DODI 4150.07 	<ul style="list-style-type: none"> • IPMC in coordination with PMPARs 	Section 2.2
CONTRACT REVIEW	Review pest management contract specifications for compliance with the Integrated Pest Management Plan and	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • DODI 4150.07 	<ul style="list-style-type: none"> • Facilities Support Contracting personnel • PMPARs 	Section 2.5

	submit to NAVFAC Atlantic Applied Biology for final review and approval prior to advertising.			
<ul style="list-style-type: none"> * (applies to restricted-use pesticides only) 				

Table 1-1. Pest management administrative program requirements.

1.3.2.2 Operations

Operations are the day-to-day management of pests through pesticides and non-chemical means. Pest management on the installation includes the following categories of operations:

1. Ornamental and turf—Control and management of pests of landscape plants and turf including arthropods, fungi, and weeds.
2. Right-of-way—Control and management of vegetation along roadways as well as vegetation control to maintain firebreaks to protect installation assets and along fence lines to enhance security.
3. Aquatic Weed Control—Control of vegetation in ponds and ditches.
4. Industrial, Institutional, Structural, and Health-Related—Control and management of pests in and around installation infrastructure (buildings, runways, etc.). Pests may include cockroaches, termites, bees, venomous animals, stored product insects, rodents, feral animals, and animals posing a BASH concern.
5. Public Health—Control and management of human and animal disease vectors such as rodents, mosquitoes, flies, ticks, and fleas.
6. Nuisance Pest Control—Control of insect pests that are a nuisance or annoyance to base personnel, but do not present a health risk.
7. Invasive weeds—Removal of non-native species of plants that are detrimental to native plant and animal habitats.
8. Vertebrate Control—Control of animal predators that prey upon protected species and their habitats, or infest food and material storage.

Each of these operations must meet various requirements that are listed and described in table 1-2.

Requirement	Description	Reference	Responsibility	Locator
INTEGRATED PEST MANAGEMENT	“Federal agencies shall use Integrated Pest Management techniques in carrying out pest management activities and shall promote Integrated Pest Management through procurement and regulatory policies, and other activities.”	<ul style="list-style-type: none"> • 7 U.S.C. § 136r-1 	<ul style="list-style-type: none"> • IPMC • Pesticide applicators 	Section 3.1.1
STORAGE	Pesticides kept on installations must be procured and stored in accordance with installation and federal regulations. Navy policy is to comply with local/state regulations.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • AFPMB TG 17 • 29 C.F.R. §1910 • 40 C.F.R. §165 	<ul style="list-style-type: none"> • Pest control shop supervisor 	Section 3.4.3
CONTAINERS	All containers used to store or transport a pesticide must have the original or copy of the original label attached. Service containers must have attached label identifying: the person responsible for the container, the name of chemical, and the signal word.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • DODI 4150.07 • 40 C.F.R. §156 	<ul style="list-style-type: none"> • Pesticide applicators 	Section 3.4.5.1
VEHICLES	Must carry pesticide spill kits and properly secure pesticides and pesticide application equipment when not in use.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C 	<ul style="list-style-type: none"> • Pesticide applicators • Vehicle operators 	Section 3.4.3.3

APPLICATION	Only registered pesticides will be used. Applicators must apply pesticides in a manner that ensures safety and protects the environment. A copy of the pesticide label shall be available at the application site.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • DODI 4150.07 • 40 C.F.R.§166 	<ul style="list-style-type: none"> • Pesticide applicators 	Section 3.4.5
APPLICATOR SAFETY	<p>The installation must provide procedures, medical support, equipment, and supplies to ensure the safety of DOD pesticide applicators during pest control operations.</p> <p>Note: Contractors are responsible for supplying their own PPE and having a medical support plan in place in the event of an accident.</p>	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • 29 C.F.R.§1910 	<ul style="list-style-type: none"> • Naval Branch Health Clinic • Safety Department 	Section 4.1
OCCUPATIONAL HAZARDS MONITORING	Workplace monitoring shall be conducted by the medical department to ensure a safe and healthful environment for pest management personnel.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • OPNAVINST 5100.23G 	<ul style="list-style-type: none"> • Naval Branch Health Clinic 	Section 4.1.2.9
CLEANING AND DISPOSAL	Equipment shall be cleaned to prevent health and environmental hazards due to chemical residues. Prevent water from container and	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • 40 C.F.R.§165 • 40 C.F.R.§260-273 	<ul style="list-style-type: none"> • Pesticide applicators 	Section 3.4.6

	equipment rinsing from entering storm drains and water bodies. Dispose of empty containers properly. Manage and dispose hazardous waste and non-hazardous waste properly.			
SPILL PREVENTION	Spill kits should be maintained in pest control shops and on pest control vehicles. Pest management personnel should be familiar with the installation spill contingency plan.	<ul style="list-style-type: none"> • OPNAVINST 6250.4C • 40 C.F.R.§300 	<ul style="list-style-type: none"> • Pesticide applicators 	Section 5.3.4

Table 1-2. Pest management operations program requirements.

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CHAPTER 2

Program Administration

2.1 ROLES AND RESPONSIBILITIES

The success of the pest management program depends largely on a clear understanding of the roles and responsibilities for the organizations and personnel involved. The following is a listing of the key organizations and personnel and their duties as presented in DOD guidance documents for the implementation of the IPMP.

2.1.1 Commander, Navy Installations Command

The CNIC is responsible for the funding and prioritizing of the pest management program.

2.1.2 Installation Commanding Officer

The installation commanding officer (CO) is responsible for the compliance and enforcement of the pest management program. The installation CO delegates compliance and enforcement of the pest management program to the IPMC via the IPMC designation letter. Responsibilities of the installation CO include:

1. Budgeting for IPMPs, training, operations, and facilities in compliance with legal and DOD requirements.
2. Designating an integrated pest management coordinator in writing
3. Implementing and supporting the IPMP
4. Ensuring all pest management operations are conducted safely and have minimal impact on the environment
5. Ensuring an IPM program, minimizing the use of pesticides, is implemented
6. Ensuring the installation's IPM plan and program are in compliance with all applicable federal, state, and local laws as well as DOD regulations.

2.1.3 Integrated Pest Management Coordinator

The IPMC is designated by the installation CO in writing as the advisor to the installation CO and coordinator of all installation pest management activities. The IPMC designation letter is in [appendix E](#). Responsibilities of the IPMC include:

1. Coordinating the installation's pest management program including implementation, maintenance, and annual update of the IPMP

2. Coordinating the rewrite of the IPMP every 5 years
3. Promoting integrated pest management (IPM) in the pest management program to cost-effectively and safely manage pests and to prevent adverse environmental impact
4. Coordinating reporting of all pest management operations on the installation to NAVFAC Atlantic Applied Biology
5. Ensuring current certification and continuing pest management training of pesticide applicators and PMPARs
6. Receiving and compiling lists of new pesticides and uses from all Pest Management Service Providers (PMSPs) on the installation and submitting them to NAVFAC Atlantic Applied Biology for review and approval
7. Maintaining current list of approved pesticides
8. Acting as liaison between installation and Applied Biology and local, state, and federal agencies for pest management and pesticide regulatory issues
9. Ensuring the installation contracting officers submit pest management contract specifications to the Applied Biology PPMC for review prior to advertising

2.1.4. In-House Pest Control Shop

The in-house pest control shop performs routine pest management on the installation and responds to service requests from tenants. Responsibilities of the shop include:

1. Controlling nuisance, public-health, and structural pests
2. Conducting pest control inside buildings and facilities
3. Conducting pest control on improved grounds
4. Submitting pesticide use requests to the IPMC or through NOPRS
5. Communicating pest management issues and requirements via the IPMC
6. Submitting daily pest management operation records to the IPMC or through NOPRS

2.1.5 Environmental Division

The installation environmental division provides oversight on environmental protection and compliance regarding pest management operations.

2.1.5.1 Environmental Compliance

Responsibilities of the environmental department include:

1. Reviewing and approving new pesticides and pest management operations that may adversely impact the environment

2. Conducting internal compliance assessments of the pesticide and pest management program
3. Providing technical review of the IPMP.

2.1.5.2 Natural Resources

As part of the environmental division, the installation natural resources manager (INRM) is responsible for managing natural resources at the installation. In this capacity, the manager may be responsible for conducting or contracting some pest management operations (e.g., invasive species management). The role of the natural resources section is further described in the installation's Integrated Natural Resources Management Plan (INRMP). A copy of the INRMP is included on the CD of supporting documents provided with this plan. Responsibilities of the INRM include:

1. Providing information on protected species, endangered or threatened species, noxious or invasive species, and environmentally-sensitive sites
2. Providing guidance on the management of nuisance wildlife
3. Maintaining and implementing the INRMP
4. Acting as the technical representative for species identification
5. Managing all installation Natural Resources
6. Consulting with regulatory agencies to obtain wildlife and wetland related permits
7. Controlling invasive and nuisance wildlife species creating an emergency situation or negatively impacting a protected species
8. Maintaining, analyzing, and reporting natural resources related data
9. Budgeting, justifying and submitting requests for funding specific to natural resources program management activities involving pest management.

2.1.5.3 Cultural Resources

The cultural resources manager is responsible for managing cultural resources at the installation, including, but not limited to, properties that are officially listed in or eligible for inclusion in the National Register of Historic Places (NRHP). In this capacity, the manager may be responsible for approving pest control in and around these areas. The cultural resources are further described in the installation's Integrated Cultural Resources Management Plan (ICRMP). A copy of the ICRMP is included on the CD of supporting documents provided with this plan.

2.1.6 Facilities Engineering and Acquisition Division

The Facilities Engineering and Acquisition Division (FEAD) prepares, manages, and assesses pest control and grounds maintenance contracts. The performance assessment representative (PAR) monitors and evaluates the performance of contracted PMSPs to ensure that pest control measures are properly applied. The PAR serves as liaison between the contractor, the IPMC, and other installation environmental media managers. Responsibilities of the FEAD include:

1. Preparing contracts ensuring that all requirements of the IPMP are included in the contract specifications
2. Coordinating with the NAVFAC Atlantic Applied Biology PPMC for a review of pest management contract specifications prior to advertisement for bid
3. Maintaining copy of each contract on file
4. Monitoring pest management contractors; ensuring effective and safe application of pest management practices, identifying and documenting discrepancies, and seeking corrective action with contractors in accordance with the contract
5. Ensuring contractors record all pest management activities and submit reports including actual pesticide use through the NAVFAC Online Pesticide Reporting System (NOPRS) or to the IPMC on a monthly basis.

All PMPARs shall be delegated the authority (in the contract and in the PMPAR appointment letter) to halt any contract pesticide applications that:

1. Endanger or present a hazard to humans, animals, or the environment
2. Violate contract specifications, or applicable federal, state, DOD, or Navy laws/regulations
3. Violate the pesticide label.

2.1.7 Naval Branch Health Clinic

The NASO Naval Branch Health Clinic includes preventive medicine, occupational health and industrial hygiene. This section discusses responsibilities for each department.

2.1.7.1 Preventive Medicine

The Naval Branch Health Clinic provides public health support to the installation in accordance with Navy Medical (Command) (NAVMED) P-5010, Manual of Naval Preventive Medicine, and [OPNAVINST 6250.4C](#). Responsibilities of the health clinic include:

1. Acting as advisor and liaison to the installation CO for public health pest prevention and management
2. Conducting surveys for pests of medical importance, such as cockroaches, mosquitoes, bed bugs, etc., through habitability and food service sanitation inspections
3. Establishing and maintaining liaison with local health agencies as they pertain to vector management and vector-borne and zoonotic disease prevention
4. Maintaining current certification as DOD category 8 (public health) pesticide applicator
5. Developing and maintaining an emergency plan for vector and pest control during a vector-borne disease outbreak or disaster
6. Providing technical review of the IPMP

7. Reporting vector-borne/zoonotic diseases.

2.1.7.2 Industrial Hygiene

Industrial hygiene (IH) personnel perform surveys (i.e., for pest management employees) to characterize occupational exposures (i.e., to inherent chemical, physical, ergonomic, and biological stressors) and control measures (e.g., engineering–local exhaust and mechanical dilution ventilation systems; administrative–warning signs, standard operating procedures, training requirements, etc.; and personal protective equipment–respiratory protection and chemical resistant clothing). In addition, IH surveillance information is used to initiate, continue, or end medical surveillance.

2.1.7.3 Occupational Health

Occupational health personnel are responsible for performing all necessary medical surveillance (such as physical examinations and blood testing) for government pest management personnel, as deemed necessary.

2.1.8 Contract Pest Management Service Providers

Contract PMSPs are required to be certified as pesticide applicators by the Commonwealth of Virginia. These responsibilities apply to all contractors on the installation. Responsibilities of contract PMSPs include:

1. Conducting pest management operations in accordance with the contract specifications or lease agreements and the IPMP and in compliance with federal and state laws and regulations
2. Submitting a list of pesticides proposed for use on the installation to their government representative
3. Communicating all pest management issues and requirements via the government representative
4. Submitting daily pest management operation records to the government representative or through NOPRS.

2.1.9 Morale, Welfare, and Recreation

Morale, welfare, and recreation (MWR) provides recreational activities for military and civilian personnel on the installation. This includes a golf course, stables, playgrounds, traveling event sites, equipment rentals, a shooting/archery range, and athletic fields. Additionally, MWR oversees commercial food concessions including the bowling alley, movie theater, and golf course snack bars, Great Escape, and others. With respect to golf course and athletic field maintenance, MWR must:

1. Ensure that all personnel who apply pesticides maintain current certifications in the appropriate categories (see [section 2.4](#) for more information)
2. Ensure that all pesticides are approved, prior to use, by the NAVFAC PPMC and installation IPMC
3. Provide copies of the pesticide labels to the IPMC
4. Maintain and report records of all pesticide applications in accordance with the requirements outlined in this IPMP

5. Maintain the pesticide storage and mixing facility in accordance with the requirements of this IPMP and installation regulations
6. Obtain adequate supplies of pesticides, pesticide dispersal equipment, and personal protective equipment (PPE), and ensure equipment is properly maintained
7. Ensure that all pesticide applicators practice IPM
8. Ensure that landscape cultural management practices are used to maintain the health of plants and turf to prevent disease and pest infestations
9. Ensure that new plants brought onto the installation for landscaping in recreational areas are not invasive, infested with pests, or infected with disease
10. Coordinating with the installation natural resources manager (INRM) prior to conducting operations concerning nuisance wildlife trapping/removal, protected species, noxious or invasive species, and environmentally-sensitive sites.

With respect to MWR food establishments, MWR must:

1. Ensure that proper sanitation is maintained in all food handling facilities
2. Submit any contract specifications (outside of the installation pest management contract) for pest management to the IPMC for technical review prior to submitting the contract for bid
3. Ensure that only current, state-licensed pesticide applicators apply pesticides
4. Ensure that all pest management activities are reported in accordance with the requirements outlined in this IPMP (for pest management that is conducted separately from the installation contract).



Figure 2-1. Sailors from various commands enjoy a trail ride with their loved ones at the MWR Oceana stables. U.S. Navy photo by Mass Communication Specialist 2nd Class Matthew D. Leistikow, June 16, 2007.

2.1.10 Navy Exchange

The Navy Exchange (NEX) displays and sells household and garden pesticides for retail sale. Additionally, the NEX runs commercial food concessions including Subway, Panda Express, Great Steak, Auntie Anne's, and White Lotus Sushi. With respect to pesticide sales, the NEX must:

1. Ensure that pesticides are displayed in accordance with the pesticide label and other federal, state, and local regulations.
2. Ensure that store employees are properly trained on emergency procedures in the event of a pesticide spill.

With respect to food concessions, the NEX must:

1. Ensure proper sanitation is maintained in all food handling facilities
2. Submit any contract specifications (outside of the installation pest management contract) for pest management to the IPMC for technical review prior to submitting the contract for bid
3. Ensure only current, state-licensed pesticide applicators apply pesticides
4. Ensure all pest management activities are reported in accordance with the requirements outlined in this IPMP (for pest management that is conducted separately from the installation contract).

Figure 2-2. An external view of the NEX located at NASO. U.S. Navy photo by Photographer's Mate 1st Class Michael W. Pendergrass, August 9, 2002.



2.1.11 Commissary

The commissary not only sells food and healthcare items, but also household pesticide items. The commissary must:

1. Ensure proper sanitation is maintained in the store
2. Ensure food items for sale are free from stored product pests
3. Ensure commissary facilities are surveyed and controlled for invading pests
4. Coordinate with the Army Veterinarian on pest or sanitation problems
5. Ensure that pesticides are displayed in accordance with the pesticide label and other federal, state, and local regulations
6. Ensure store employees are properly trained on emergency procedures in the event of a pesticide spill.



Figure 2-3. A customer enters the commissary located just outside NASO. U.S. Navy photo by Photographer's Mate 1st Class Michael W. Pendergrass, August 13, 2002.

2.1.12 United States Army Veterinary Services

The veterinary services department provides clinical support for military working dogs and services for privately-owned pets and animals. Veterinary technicians also provide food inspection for the commissary and for other food items delivered to the installation. Responsibilities of the veterinarian include:

1. Conducting surveillance for pests which damage, destroy, and contaminate food stored in the commissary and installation facilities
2. Ensuring stored field rations (e.g., meals, ready to eat (MREs), etc.) are free from pests
3. Advising preventive medicine (PREVMED) and the IPMC of any zoonotic diseases that may require pest management
4. Providing advice and education to pet owners on preventing pest infestations.

2.1.13 Public Private Venture Housing

The public-private venture (PPV) housing manager provides pest control and landscape maintenance for military family housing residents.

1. Ensure that pesticide usage reports for outdoor pesticide applications (including herbicides) are forwarded to the IPMC or the NAVFAC Atlantic PPMC, or reported using NOPRS
2. Ensure that only current, state-licensed pesticide applicators apply pesticides
3. Coordinating with the installation natural resources manager (INRM) prior to conducting operations concerning nuisance wildlife trapping/removal, protected species, noxious or invasive species, and environmentally-sensitive sites.

2.1.14 Building Occupants and Barracks/Housing Residents

All installation personnel have the responsibility for:

1. Apply good sanitary and pest exclusionary practices to prevent pest infestations
2. If permitted for personal use, use pesticides in accordance with the pesticide label

3. Coordinate and cooperate fully with IPMC and PMSPs in scheduling pest management and preparing the areas for pesticide treatment if necessary.

2.1.15 Agricultural Outleases

The agricultural program falls under both the Natural Resources and Real Estate programs for management. Agricultural land is leased to farmers and the farmers conduct the pesticide applications. If the farmer identifies other pest management concerns the Natural Resources and Real Estate program will work with the IPMC to resolve those issues with the farmer and/or other pest management specialists. Responsibilities include:

1. Ensure that all pesticides are approved prior to use and that all pesticide usage reports are forwarded to the IPMC or the NAVFAC Atlantic PPMC, or reported using NOPRS
2. Ensure that only current, state-licensed pesticide applicators apply pesticides.

2.2 PESTICIDE APPROVAL

Only pesticides approved by both the Environmental Protection Agency (EPA) and the state shall be used. Additionally, DOD and Department of the Navy (DON) directives require installations to submit a list of all pesticides that will be used during control operations to the cognizant NAVFAC Atlantic PPMC for review and approval ([OPNAVINST 6250.4C](#), paragraph 4). The purpose of this approval process is to ensure that only registered pesticides which are safe, effective, and appropriate for the site will be used on the installation. Requests for pesticide approval will be submitted to the NAVFAC Atlantic PPMC via the installation IPMC using NOPRS (see [section 2.3.3](#)). Once a pesticide is approved, it may be used on-site as per the label directions. New pesticides may also be added to the list and submitted for approval as needed. The list should be reviewed and updated annually by the IPMC as part of the IPMP maintenance. Pesticides currently approved for use on the installation are listed in [appendix D](#).

The IPMC shall maintain a hard copy or electronic version of the manufacturer's label and safety data sheet (SDS) for each pesticide on the pesticide authorized use list (AUL). The PMPARs or the PMSPs should also maintain copies. Pesticide labels and their registration status can be found on the EPA's National Pesticide Information Retrieval System at <http://ppis.ceris.purdue.edu/>.

2.3 RECORDS AND REPORTING

All shore installations and units performing pest control operations shall maintain daily records of pesticide applications and submit reports of pest management operations monthly to the cognizant PPMC. ([OPNAVINST 6250.4C](#), paragraph 23 and [OPNAV M-5090.1](#), paragraph 24-3.4)

2.3.1 Pest Management Record Keeping

All PMSPs shall record pest management operations daily. Records shall include all pest management operations including surveys and non-chemical control operations performed on the installation by commercial contractors as well as work performed by DOD pest management personnel. The records will include the following information: date of application, location and site, type of operation, target pest, area treated, name of applicator, pesticide information (trade name, active ingredient, and formulation), amount of pesticide applied, and calculated pounds of active ingredient applied. The following operations are excluded from the record keeping requirement:

1. Personal use of insect repellent

2. Application of repellent by deployable units during mass treatment of clothing and tentage
3. Application of pesticides for personal relief by residents of military housing
4. Application of pesticides for flea and tick control physically to pets by pet owners and veterinary services.

Records, including all pest management operations such as surveys and non-chemical control operations, shall be submitted to the IPMC monthly via the NAVFAC Online Pesticide Reporting System ([section 2.3.3](#))

Note: Personnel with access to the Navy and Marine Corps Intranet (NMCI) network and a Common Access Card (CAC) may view a multitude of shore installation maps through GeoReadiness Explorer (GRX). Several functions within this program may be useful to environmental personnel and pesticide applicators such as the capability to retrieve the coordinates of a location, and measurement tools which the user then can use to calculate the size of a job.

GRX Global: <https://maps.navy.mil/rsims/MapView/Default.aspx?MapID=12334>

GRX Regional: <https://maps.navy.mil/rsims/portal/>

2.3.2 Maintaining Pest Management Operations Records

The installation must archive complete daily pest management operation records on-site indefinitely. Pesticide applications for each building, structure, or outdoor site must be accounted for. Past hardcopy records must be archived so as to prevent them from being destroyed. Electronic records shall be stored to prevent destruction or loss; back-up copies are recommended. All records reported to NAVFAC Atlantic will be stored and may be used as a back-up. Downloading records from NOPRS at least annually and maintaining them on-site is highly recommended.

2.3.3 Pest Management Service Provider Reporting Procedures

Reports will be reviewed by the IPMC and the NAVFAC Atlantic PPMC to provide program oversight to the installation and to generate data for tracking overall DON pesticide usage.

All PMSPs that have Internet access must use the NAVFAC Online Pesticide Reporting System to record, report, and manage pesticide and pest management records. This system is preferred to other methods because it eliminates the need to send hardcopy or electronic records to the IPMC and then to the PPMC. The records are entered directly into a central database that can be accessed by the PPMC and the IPMC and downloaded into a spreadsheet. The only computer requirement is reliable Internet access. Integrated pest management coordinators must contact the NAVFAC Atlantic PPMC to establish a supervisor account. Pest management service provider's applicators can then contact the IPMC to request an applicator account. The NOPRS PowerPoint tutorial is included on the CD of supporting documents provided with this plan.

2.4 TRAINING, CERTIFICATION, AND LICENSING

Integrated pest management requires personnel who are properly trained to investigate and diagnose pest problems, select the appropriate pest management method, apply the appropriate pesticide, perform these operations so that they are safe to humans and the environment, and educate and advise their customers on pest prevention methods. All DOD personnel who apply or supervise the application of pesticides shall be trained and certified within two years of employment in accordance with the DOD Plan for the

Certification of Pesticide Applicators, or EPA-approved state certification plan ([OPNAVINST 6250.4C](#), paragraph 11). Additionally, professional pest management personnel shall be certified if their duties include:

1. Making recommendations for the use of pesticides, applying pesticides, or directly supervising the application of pesticides
2. Conducting demonstrations on the proper use and techniques of pesticide application or the supervision of pesticides
3. Conducting field research that includes using or supervising the use of pesticides.

An exception to the standard training and certification requirements are those individuals approved by the IPMC to apply ready-to-use pesticides as part of the self-help program.

2.4.1 Verification of Qualifications

Copies of contractor or lessee state licenses shall be obtained from all PMSP personnel applying pesticides on the installation. Verification of DOD pesticide applicator certifications, as well as IPMC and PMPAR accreditation, can be obtained from the NAVFAC Atlantic PPMC. A list of applicator certifications as well as a list of pest control business licenses is found in [appendix E](#).

2.4.2 Requirements for Department of Defense Pesticide Applicators

DOD applicators may be certified in the following categories:

1. Category 2—Forestry
2. Category 3—Ornamental and Turf (e.g., landscape arthropod and vertebrate pests)
3. Category 5—Aquatic (e.g., aquatic weeds in lakes, ponds, rivers, streams, irrigation canals, stormwater drainage ditches)
4. Category 6—Right-of-Way (e.g., weeds on sidewalks, along fence lines, parking lots, road ways, storage tank grounds, runways/taxiways/other airfield surfaces)
5. Category 7—Industrial, Institutional, Structural, and Health-Related (e.g., termites and other wood-destroying insects, cockroaches, crickets and other invading organisms)
6. Category 8—Public Health (e.g., mosquitoes, ticks, fleas, rodents)
7. Category 11—Aerial Application (e.g., application of pesticides for any pest by fixed or rotary-wing aircraft).

Preventive medicine technicians (PMTs) are required to be certified only in Category 8 and receive certification during PMT school. Golf course applicators are only required to be certified in categories 3, 5, and 6.

Initial certification in categories 2, 3, 5, 6, 7, and 8 for civilian employees is a three and a half week course conducted by a designated DOD training agency. The Navy course is conducted by the Navy Entomology Center of Excellence (NECE) in Jacksonville, Florida. Initial certification and recertification in category 11 is a one week course conducted by the Air Force Reserve. Certification for all categories is

valid for three years. With proper justification, certifications can be extended for an additional six months by the applicator’s certifying authority. Recertification courses for civilians in all categories except category 11 are conducted annually by NAVFAC Atlantic. Initial and recertification course schedules can be viewed at http://www.acq.osd.mil/eie/afpmb/training_Certification.html.

2.4.3 Requirements for Commercial Contract Applicators

“Licensed firms shall perform all pest management services procured by contract using only trained operators who are certified in the applicable state in the required EPA pest management categories for the work planned. Copies of state or host nation business licenses and applicator certifications shall be reviewed prior to award” ([OPNAVINST 6250.4C](#), paragraph 15b). Copies of contractor business licenses and applicator certificates can be found in [appendix E](#). All contract pesticide applicators applying pesticides on the installation must hold a state commercial or government pesticide applicator’s license. Virginia pesticide applicator categories equivalent to DOD categories are found in table 2-1. The Office of Pesticide Services within the Virginia Department of Agriculture and Consumer Services (VDACS) certifies applicators, registers pesticide products, and licenses pesticide businesses. More information can be found at: <http://vdacs.virginia.gov/pesticides/>.

To apply pesticides on the installation for grounds maintenance, to control household/structural pests inside/outside buildings, or for mosquito control, the contracted pesticide applicator must hold a pesticide applicator license in the appropriate categories issued by the VDACS Office of Pesticide Services.

DOD		Virginia	
2	Forest	2	Forest Pest Control
3	Ornamental and Turf	3A,3B	Ornamental (3A) and Turf (3B) Pest Control
5	Aquatic	5A	Aquatic Pest Control - General
6	Right-of-Way	6	Right-of-Way Pest Control
7	Industrial, Institutional, Structural, and Health-Related	7A	General Pest Control
		7B	Wood Destroying Pest Control
		7D	Vertebrate Pest Control (Excluding Structural Invaders)
8	Public Health	8	Public Health Pest Control
10	Demonstration and Research	10	Demonstration and Research Pest Control
11	Aerial Application	11	Aerial Pesticide Application
No DOD equivalent		1A,1B	Agricultural Plant (1A) and Animal (1B) Pest Control
		1C	Fumigation of Soil and Agricultural Products
		1D	Chemigation
		4	Seed Treatment
		5B	Marine Anti-Foulant Paints (TBT)
		7C	Fumigation (Non-Agricultural)
		7E	Sewer Root Pest Control
		9	Regulatory Pest Control
		12	Wood Preservation and Wood Products Treatment

Table 2-1. Virginia pesticide applicator certification categories and DOD equivalents.

2.4.4 Requirements for Natural Resource Management Applicators

Commercial contract applicators applying herbicides for invasive weed control or habitat restoration must hold a state license. Personnel using pesticides for animals other than rodents must hold appropriate state and/or federal permits/licenses. DOD employees applying pesticides for invasive weed control or habitat restoration should be DOD-certified as a pesticide applicator.

2.4.5 Requirements for Performance Assessment Representatives

Pest management performance assessment representatives (PMPARs) assess the performance of contractors in the Performance-Based Acquisition (contracting) Program. The installation is required to train personnel to provide performance assessment for commercial pest control or grounds maintenance services in pest management within one year of appointment and send them to refresher training every three years ([OPNAV M-5090.1](#), paragraph 24-3.19). Naval Facilities Engineering Command provides initial and refresher PMPAR training annually. The training schedule is available at the Armed Forces Pest Management (AFPMB) Web site at: http://www.acq.osd.mil/eie/afpmb/training_Certification.html.

2.4.6 Requirements for Integrated Pest Management Coordinators and Environmental Personnel

“The IPMC shall have the educational background, technical knowledge, and management skills to implement and oversee the pest management program” ([DODI 4150.07](#), section E.4.4.1). Newly designated IPMCs are required to receive training in the administrative and operational requirements of installation pest management. Environmental personnel who have compliance oversight of pesticides on the installation should also receive training. The initial PMPAR and IPMC course provides the necessary training. Naval Facilities Engineering Command, Atlantic conducts these courses annually. If applying pesticides or recommending pesticide applications, the IPMC must be certified as a DOD pesticide applicator. Training schedules are available at: http://www.acq.osd.mil/eie/afpmb/training_Certification.html.

2.5 PEST MANAGEMENT CONTRACTING

Contracts requiring the use of pesticides must be reviewed and approved by the NAVFAC Atlantic Applied Biology PPMC. This includes contracts issued by non-appropriated activities and tenant commands on the installation. Pest control contracts are required to be monitored by a trained PMPAR ([OPNAVINST 6250.4C](#), paragraph 1).

2.5.1 Pest Management Contracts

2.5.1.1 Grounds Maintenance Contract

The installation has a grounds maintenance contract in place under the BOS contract. Grounds maintenance work includes the use of pesticides (herbicides) to control weeds in semi-improved and improved grounds including substations, fence lines, railroads, thermal lines, parking lots, ditches, and ponds. The contractor also uses non-chemical methods of weed control such as line trimming. To put in a call for grounds maintenance services, personnel must contact the public works call center at (757) 341-1700. The names of the current contract companies are listed in [appendix E](#).

2.5.1.2 Miscellaneous Pest Management Contracts

Several facilities on the installation contract pest management services independently of the installation provider. Subway, Panda Express, and the Navy Lodge contract with ABC Pest Management, Hometown Pest Control, and Dodson Bros Pest Control, respectively. Several MWR facilities, including the Shifting Sands Beach Club, Seabreeze Beach Club, CPO Club, and bowling alleys receive pest control services through contract with Orkin.

The USDA-WS performs wildlife removal in the hangars and on the airfield, guided by their interservice support agreement with the Navy and the installation's BASH plan. The natural resources department maintains the necessary permits for the USDA-WS to conduct these services. Additionally, natural resources contracts invasive species control through Invasive Plant Control, a subcontractor under GMI-AECOM.

2.5.2 Contract Specifications and Review

Pest management contract specifications must be written to ensure effectiveness, safety, and regulatory compliance. The facilities support contract/base operation support (FSC/BOS) performance-based contract template for pest control (sub-annex 1503020) and grounds maintenance (sub-annex 1503050) is available from NAVFAC Atlantic or on the NAVFAC Portal (requires login) at: <https://hub.navfac.navy.mil/webcenter/portal/pw/FSC+Mgmt+and+Facility+Services++/FSC/BOS+Temp+lates>. The facilities contracting officer (KO) or contracting officer representative (COR) can provide additional information. The KO shall send the contract specifications to the NAVFAC Atlantic PPMC for review prior to sending the contract out for bidding ([OPNAVINST 6250.4C](#), paragraph 4).

Termite pretreatment contract specifications for new construction shall also be reviewed by the NAVFAC Atlantic PPMC prior to procurement. The [Unified Facilities Guide Specifications \(UFGS\) 31 31 16 Soil Treatment for Subterranean Termite Control](#) should be included in all new construction contracts for termite pretreatment. See [section 3.2.4.3](#) for more information on termite treatment contracts.

2.5.3 Government Representatives

Contractors will communicate and submit required pest management reports via their government representative. For the pest control and grounds maintenance (FSC/BOS) contracts, the representative is the PMPAR who is responsible for assessing the contract. For Non-Appropriated Fund Instrumentality programs (NAFI) (i.e., NEX, MWR) contracts, the representative is the local NAFI organization manager. In cases where a government representative is not available, the installation IPMC may liaison with a contractor's representative.

2.5.4 Contract Requirements

The application of pesticides on Navy properties by contractors is strictly regulated by Department of Defense and Navy regulations, this IPMP, and state regulations. These requirements apply to all pesticide applications including insecticides, herbicides, fungicides, molluscides, etc. to any area in or outdoors. These requirements apply to any size contract (small purchase or facility support contract generated) and services acquired by any other means including government purchase cards ([EBUSOFFINST 4200.1](#), chapter 6, paragraph 7). The specific requirements for contracted pest control operators working on Navy properties are:

1. Contractor Work Plan (CWP): If required by the contract, a CWP shall be submitted as part of the contractor's proposal. The CWP specifies how the contractor will meet the contract requirements.

If CWP is non-specific regarding pesticide application locations and requirements a pesticide/herbicide spray plan must be prepared and submitted for approval.

2. Pesticide Applicator Certification: All contractor personnel, who apply pesticides (which include all herbicides), shall be certified/licensed in the appropriate applicator category in accordance with [section 2.4.4](#) of this IPMP. All contractors who will apply pesticides shall, prior to the start of work, supply a copy of the certificate(s)/license(s) in accordance with contract specifications. Pesticide business licenses and pesticide applicator certificates are included in [appendix E](#) of this IPMP.
3. Pesticide Approval: Pesticides used by contractors must be approved and added to the installation pesticide AUL, before use, by the NAVFAC Atlantic PPMC as described in [section 2.2](#). The list of proposed pesticides shall be included in the CWP or submitted to the designated Government representative using the format designated in the contract specifications. The pesticide AUL is in [appendix D](#) of this IPMP.
4. Pesticide Mixing, Storage, and Disposal: Contractors shall not store, mix, or dispose of pesticides or clean pest control equipment on the installation unless an approved pesticide storage and mixing area is specified in the contract and authorized by the KO. One exception to this is soil treatment for termite prevention during building construction; the contractor must mix the termiticide on-site while the PMPAR or IPMC is there to witness.
5. Pesticide Applications: Only pesticides listed on the pesticide AUL shall be used and applied in a manner consistent with the pesticide label.
6. Pest Management Reporting: Contractors shall submit reports in accordance with the reporting requirements in [section 2.3.3](#).
7. Contractor Vehicles:
 - a. Safety equipment: Vehicles used to transport pesticides shall be equipped with a fire extinguisher and a spill and decontamination kit, and be capable of cleaning up the maximum amount of pesticide transported at any given time. Clean water shall be carried for use in emergency personal decontamination.
 - b. Security: All pesticides carried on the vehicles shall be secured in locked compartments at all times. Vehicles shall not be left unattended at any time unless properly locked and secured.
 - c. Identification: Vehicles will be clearly marked as pest control vehicles.
 - d. Appearance: All vehicles shall be maintained with a clean and orderly appearance, free from observable pesticide spills, residues, or build-up.
 - e. Transporting pesticides: Pesticides shall not be transported in the cab or occupied part of any vehicle. They shall always be carried in a separate compartment from the occupied cab.
8. Compliance Assessment: All contractors are subject to regulatory compliance assessments by the PMPAR, IPMC, environmental compliance staff, and other authorized government personnel. Pest control vehicles, pesticide applications, and administrative requirements are subject to inspection. Authorized government personnel may also require the contractor to stop work if the work is not being performed in a safe manner.

2.5.5 Contract Performance Assessment

Contracts shall be assessed by a trained PMPAR to ensure environmental and contractual compliance. For FSC/BOS contracts, Functional Assessment Plans (FAP) for pest control and grounds maintenance should be developed and implemented. Functional Assessment Plan templates are available from the KO or NAVFAC Atlantic Applied Biology. Periodic assessments for pests prior to, during, or after pest control operations should be conducted to ensure efficacy of the services. Pest survey methods for contract performance assessments are found in chapter 8 on each of the Integrated Pest Management Sheets. Periodic assessment of the contractors during pesticide application should also be conducted to ensure appropriate safety measures are being taken. The contractors' vehicles and equipment must be made available for inspection when requested. In the absence of a PMPAR, a preventive medicine technician can provide information on the efficacy of pest control in some facilities. The PMT conducts monthly inspections that include pest surveys of food service facilities and child development centers. The PMPAR and the IPMC should liaison and coordinate performance assessment activities with the PMT.

CHAPTER 3

Operations

3.1 INTEGRATED PEST MANAGEMENT

Presidential [Executive Order \(EO\) 13514](#), Federal Leadership in Environmental, Energy, and Economic Performance, October 5, 2009, requires federal agencies to promote pollution prevention and eliminate waste by implementing integrated pest management and other appropriate landscape management practices. United States Code ([7 U.S.C. § 136r-1](#)) states, “Federal agencies shall use Integrated Pest Management techniques in carrying out pest management activities and shall promote Integrated Pest Management through procurement and regulatory policies, and other activities.” Department of Defense policy is to, “Incorporate sustainable Integrated Pest Management (IPM) philosophy, strategies, and techniques in all aspects of DOD and Component vector control and pest management planning, training, and operations, including installation Integrated Pest Management Plans and other written guidance to reduce pesticide risk and prevent pollution” ([OPNAVINST 6250.4C](#)).

3.1.1 Integrated Pest Management Defined

Integrated pest management is, “a planned program incorporating education, continuous surveillance, record keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. IPM uses targeted, sustainable (effective, economical, environmentally sound) methods including habitat modification, biological, genetic, cultural, mechanical, physical, and regulatory controls, and when necessary, the judicious use of least hazardous pesticides” ([OPNAVINST 6250.4C](#), paragraph 2). There are significant differences between IPM and traditional pest control methods. Table 3-1 lists some of the differences.

In IPM programs, treatments are not made according to a predetermined schedule. Rather, treatments are made only when and where monitoring has indicated that the pest will cause unacceptable economic, medical, or aesthetic damage. Treatments are chosen and timed to be most effective and least hazardous to non-target organisms and the general environment.

Pest Management	Traditional Pest Control	IPM
Program Strategy	Reactive	Preventive
Customer Education	Minimal	Extensive
Potential Liability	High	Low
Emphasis	Routine pesticide application	Pesticides used when exclusion, sanitation, and other non-chemical methods are inadequate
Inspection and Monitoring	Minimal	Extensive
Pesticide Application Frequency	By schedule	By need

Pest Management	Traditional Pest Control	IPM
Pesticide Application Target	Area-wide spraying	Spot treatment of areas where pests are found
Customer Involvement in Preventing Pests	Minimal	Extensive

Table 3-1. Comparison of traditional pest control and integrated pest management methods.

Under an IPM program, execution of individual pest management practices involves the following steps:

1. Identify pests.
2. Establish action thresholds that are sufficient to warrant treatment. In determining threshold levels, the amount of public health, aesthetic, or economic threat that can be tolerated must be correlated with the population size of pests, natural enemies, time in the season, and/or life stage of the pest or host.
3. Develop plans/strategies through an integration of treatment methods that are effective against the pest, least disruptive to natural controls, and least hazardous to human health and the environment.
4. Monitor pest population before and after treatment. Monitoring is an ongoing activity.
5. Implement pest control measures if economic damage or public health threat are above the established action threshold.
6. Document results.
7. Evaluate/redesign plan to determine the outcome of treatment actions.

Controlling pests has traditionally been the responsibility of the pest control operator. Using IPM, preventing and controlling pests is the responsibility of all personnel on the installation.

3.1.2 Integrated Pest Management Compliance

All pesticide applicators are trained in IPM techniques during initial and refresher licensing or certification training. Government representatives shall assess the PMSP's compliance with IPM. This may include:

1. Reviewing the approved pesticide list for use of less toxic pesticides, baits with sustainable control, short-residual and pest-specific products, and products used for spot treatment rather than broadcast application
2. Ensuring contractor work plans and partner pest management plans incorporate IPM
3. Reviewing pest management records to ensure that only approved pesticides are used, spot applications are performed, non-chemical methods are used, and routine surveys are being performed

4. Observing pest control service calls to ensure pest control operators identify conditions conducive to pest infestations, provide information to building occupants on how they can prevent pests, use only approved pesticides, perform spot treatments, properly apply baits, conduct routine surveys, and monitor baits/bait stations/traps.

3.1.3 Integrated Pest Management Sheets

The IPM sheets in [chapter 8](#) provide general guidelines for the integrated control of pests. They may be used as a reference for surveillance and non-chemical and chemical control alternatives.

3.2 CURRENT PEST MANAGEMENT OPERATIONS

Nuisance and health-related pests and vegetation are managed on the installation.

3.2.1 Inspections

Routine inspections provide early detection of pests. Pest inspections should be conducted routinely at all food service, sales, and storage facilities. Preventive medicine technicians conduct food safety inspections including surveys for pests and pest signs at the galleys and food facilities each month. They also inspect the child development center, exchanges, and barber shops. The preventive medicine department provides monthly and quarterly sanitation inspection reports and, if necessary, immediate recommendations to facility managers when contractor-administered pest control operations are needed to control pests. U.S. Army Veterinarian food inspectors conduct food quality inspections that include examining food items for pests at the commissary and at food service and sales locations.

3.2.2 General Household and Nuisance Pests

Nuisance pests, such as cockroaches and ants, often account for the most significant pest problems indoors. Non-chemical practices which limit pest access to food, water, and shelter are the primary sustainable means of control. Sanitation, trapping, and pest exclusion are all prime examples of such non-chemical control measures. Low-toxicity insecticidal baits are also used effectively against cockroaches and ants. Most pesticide applications can be effective in immediate reduction of pest populations, but have short residual efficacy and are not sustainable in the long term.

In buildings that are most susceptible to pest infestation, these measures are performed on a scheduled basis through preventive maintenance contracts. Common use areas and food consumption areas of other buildings, such as restrooms, coffee messes, lounge areas, and vending machine rooms, are serviced on either a monthly or quarterly basis, depending on the preventive maintenance contract for that building, with response to call-backs as necessary. This also includes common use areas of the barracks, warehouses, and administration buildings. Buildings where there is no food and where problems occur only occasionally such as shops and storage buildings, are handled on a service call basis. Pesticide treatments in food handling areas shall be confined to crack and crevice placement when using residual aerosol or dust formulations. Insect growth regulators and baits are used to complement other control measures. Self-contained light traps may also be utilized in these areas. Low-odor formulations are used in offices and in other spaces where a pesticide odor would be objectionable.

3.2.3 Grounds Maintenance

Grounds maintenance is performed on improved or landscaped grounds. Pest management during grounds maintenance may involve weed control; control of pests and disease on plants, trees, and turf; and control of vertebrate animals (e.g., squirrels, moles) that may destroy plants and turf. Mechanical removal of

weeds and mowing are routinely performed. Grounds maintenance also includes weed control in drainage ditches that may contribute to mosquito control, habitat/cover removal for wildlife, and increased flow of stormwater. Weed control is performed along roadways, fence lines, and at fuel farms where they pose fire and visibility concerns.

3.2.3.1 Turf and Ornamental Pests

Turf and ornamental pests include insects and diseases. White grubs and ants infest the soil and roots of plants. Japanese beetles, bagworms, tent caterpillars, sod webworms, and armyworms feed on the leaves of plants. Leafhoppers, scale insects, and aphids are referred to as plant sucking insects and feed on the fluids inside of plants. Oak borers and bark beetles are insects that bore into plants or trees and disrupt the plants' ability to transport nutrition and water. Various plant diseases including brown patch and dollar spot are also possible turf diseases that may be encountered. Ornamental diseases can cause leaf spots, blights, mildews, and wilts from fungi, bacteria, and viruses.

3.2.3.2 Weed Control

A wide variety of herbicides are available for controlling unwanted vegetation. Extreme care should be taken when using herbicides around waterways. Herbicides can be used around mowing obstacles such as signs, fire hydrants, and manholes. Herbicides are used to control weeds along cracks in sidewalks and asphalt parking areas, along fence lines, around buildings, along ditch banks, and airfield paved or concrete surfaces. Selective herbicides are used to control various weeds that occur in lawns on the installation. Various cultural and chemical controls can be used to deal with these and other weed control problems. When using chemical controls, both selective and non-selective herbicides may be used.

3.2.3.3 Aquatic Weed Control

Aquatic weed control work should be conducted in accordance with the Integrated Natural Resource Management Plan (INRMP). The policy is to control and limit the spread of invasive species of plants, and to protect aquatic plant species. Each pesticide must be approved prior to use to prevent harm to the natural resources that feed in the ponds.

3.2.4 Golf Course and Athletic Fields

Pest management operations include the following:

1. Weed, fungus, and insect control on golf course grounds
2. Weed control on ball fields
3. Weed control in miscellaneous MWR facilities.

Undesirable vegetation in the turf grass, including crabgrass, clover, and goosegrass are controlled by using pre- and post-emergent selective herbicides.

Insect pests include cutworms and white grubs, while turf diseases encountered may include spring dead spot and pythium, among others. Significant damage to the turf can often be avoided by inspecting the turf daily during the periods when pest and disease problems are likely to occur. Disease occurrence is often decreased or avoided through cultural control, such as proper fertilization and watering. Natural controls are maximized when chemical control operations are based on need instead of a schedule. This careful use of chemical control can help avoid environmental and pest resistance caused by overuse of

pesticides. The only exemptions to need-based control are the preventive treatments for pythium and dollar spot.

3.2.5 Structural Pests

Structural pests which have an impact on activity operations include termites, powder post beetles, wood borers, and wood destroying fungi. Of these, subterranean termites and wood destroying (decay) fungi cause the most damage.

3.2.5.1 Structural Control Program

A well-managed structural pest control program includes inspection, prevention, and chemical treatments when needed. All susceptible structures that contain wood or wooden structural members should be inspected on an annual basis. The records should note when a building was inspected, the location of any infestation found, and the description of any treatment performed.

3.2.5.2 Termite Control

Various control techniques as part of an integrated approach to structural pest control include:

1. The use of construction practices which protect wood from attack
2. The control of moisture through proper drainage and ventilation
3. The use of termiticides for barrier treatment of soil and hollow masonry units of building foundations
4. The use of treated wood and or metal and concrete supporting structures
5. The fumigation for extensive drywood termite infestations.

Corrective chemical treatments should be performed when termites are found actively damaging wood. Control operations should be based on annual inspections of buildings and reports of termite swarming from building occupants. All wood that is damaged by termites or wood rot fungi should be replaced with treated wood to prevent future damage.

Top priority is given to preventive control treatments, such as preconstruction termite soil treatments and the use of treated wood to protect wood from attack. Once treated with termiticides, care must be taken to prevent disturbance of the soil barrier within one foot of the foundation (if moved by gardening activity or covered when raised flower beds are installed against a building). This can be a serious problem in housing areas where people are encouraged to beautify their yards. Raised beds must be four-sided (i.e., not using the foundation as one side) and soil within one foot of the foundation can't be cultivated for planting.

3.2.5.3 Administration of Termite Treatment Contracts and Warrantees

Termite treatment contracts shall follow all of the requirements found in [section 2.5.4](#). The NAVFAC Atlantic PPMC should review contract specifications for termite control. Termiticides, when needed, must be applied at the highest EPA-labeled concentration and application rate. Soil treatment for termite prevention will be conducted during building construction in accordance with the Unified Facilities Guide Specifications (UFGS) 31 31 16 ([DODI 4150.07](#), section E.4.7.15.1). In accordance with UFGS 31 31 16,

the contractor shall provide a warranty of no less than five years. This ensures that if termite activity is discovered during the five year warranty period, the contractor will re-treat the soil and repair or replace any damage that has been caused by termite infestation. Termiticides used for termite control must be nonrepellent, such as pesticides with the active ingredient of fipronil, imidacloprid, chlorfenapyr, or chlorantraniliprole. DOD-certified pesticide applicators or PMPARs trained in pest control shall inspect applications of pesticides by contractors to control termites or other wood-destroying organisms.

3.2.6 Invasive and Non-Indigenous Species Management

Executive order (EO) 13112 is implemented at DOD installations through [DODI 4150.07](#) (section E4.7.6) which requires that installations prevent, detect, and monitor invasive species. Guidance on the use of available control techniques may be obtained from the installation's Environmental Department and the NAVFAC Atlantic PPMC.

Species of concern on the installation include non-native flora such as kudzu (*Pueraria lobata*) and common reed (*Phragmites australis*). Information on the impacts, distribution, and management of invasive species can be found in the installation INRMP. Also, more information on invasive species of Virginia can be found at: http://www.dcr.virginia.gov/natural_heritage/vaisc/species/index.htm.

3.2.7 Stored Product Pests

Stored product pests are a potential problem at any installation. Inspection upon receipt of products and rejection of obviously infested materials generally prevents heavily infested material from being placed in the storage area.

3.2.7.1 Dermestid Beetle

If the dermestid beetle is found in a commodity, the whole lot of food must be condemned. The pointed hairs on the larvae will cause digestive problems if the contaminated food is eaten. An accurate identification of dermestids is required to condemn the lot. For the most part, sanitation (keeping storage areas clean) and stock rotation minimize or prevent pest infestation. If an infestation is found, the most effective way to control dermestids is through deep cleaning, vacuuming, and discarding or segregating the infested product while surveying adjacent areas.

3.2.7.2 Storing Meal, Ready-to-Eat Rations

More stringent controls are required for prevention of stored products pests when storing meal, ready-to-eat (MRE) rations. Guidance on this program can be found in [AFPMB Technical Guide No. 38](#), Protecting Meals, Ready-to-Eat Rations (MREs) and Other Subsistence during Storage.

3.2.8 Health-Related Pests

In accordance with [OPNAVINST 6250.4C](#) (paragraph 4c), the Naval Branch Health Clinic Preventive Medicine Department is responsible for conducting inspections and surveys aboard the installation to determine the species, source, location, and density of medically-important arthropods and provide the results to the public works and facilities departments for use in planning pest control operations. Mosquitoes, biting flies, and filth flies constitute the most important insect pests for both disease transmission and general annoyance. Controlling these insect pests should be based on a thorough knowledge of the target pest, actionable surveillance data, and compelling evidence of an infestation that poses an emergent public health risk.

3.2.8.1 Mosquito Biology and Medical Importance

There are over 3,000 mosquito species worldwide and about 150 species in the U.S. All mosquitoes have the same life cycle and are similar in their biology and habits. However, differences in breeding habitats and host preference occur between the species and these subtle differences affect how we survey and control them. Mosquitoes can be separated into two groups, depending on where they lay their eggs. The flood-water mosquitoes lay their eggs in temporary bodies of water such as artificial containers, tree holes, tidal marches, etc. Eggs of flood-water mosquitoes are laid on moist substrate just above the surface of the water; this group includes *Aedes* and *Psorophora* species. Permanent-water mosquitoes lay their eggs in permanent or semi-permanent water such as ponds, lakes, marshes, ditches, etc. Eggs of permanent water mosquitoes are laid on the water's surface; this group includes *Anopheles* and *Culex* species. It is only the female mosquito that bites; female mosquitoes require a blood-meal before they can lay viable eggs. The male mosquito feeds on plant sugars such as nectar, and does not bite. The Navy Bureau of Medicine and Surgery entomologists, centered at the Navy Entomology Center of Excellence (NECE) and the Navy Environmental and Preventive Medicine Units (NEPMUs), are responsible for providing professional guidance, recommendations, and on-site assistance on all technical matters relating to disease vectors and other medically important pests (OPNAVINST 6250.4C, paragraph 4c).

Mosquitoes are both a major nuisance and a medically important pest. Protozoan pathogens (e.g., Malaria), nematode worms (e.g., dog heartworm), and a number of different viruses (e.g., West Nile Virus, Zika Virus), can all be transmitted by mosquitoes. The NECE West Nile Virus Surveillance and Control Guide for U.S. Navy and Marine Corps Installations can be found at:

<http://www.med.navy.mil/sites/nmcphc/Documents/nece/WNV-Surveillance-and-Control-Guide-2014.pdf>

Dengue, Chikungunya virus (CHIKV), and Zika virus are all known to be transmitted by *Aedes aegypti* and *Aedes albopictus* mosquitoes, which are common in tropical and subtropical areas throughout the world. *Aedes aegypti* can also transmit Yellow Fever. *Aedes* mosquitoes breed in containers and generally bite during the day. Humans are the reservoir for Dengue, CHIKV, and Zika virus. These diseases can be introduced into an area by persons infected during travel in areas where these diseases are found. Local transmission can occur if the vector mosquito species is present in the area, and the vector mosquito becomes infected after biting an infected person. Transmission of Zika virus through blood and sexual contact has also been reported. *Aedes* mosquitoes are an invasive species whose eggs, which remain viable when dried, are easily transported throughout the world in shipping containers, equipment, and vehicles. They are daytime and nighttime biters with crepuscular (dawn and dusk) peak feeding activity. Surveillance activities should be performed during peak times of activity. The *Aedes* mosquitoes are not effectively controlled by standard nighttime ultra-low volume (ULV) applications. Dawn or dusk ULV applications are recommended against these species. Additional information on *Aedes* vector surveillance, control, and the viruses they transmit can be found on the web site for the Navy and Marine Corps Public Health Center (<http://www.med.navy.mil/sites/nmcphc/program-and-policy-support/Pages/Chikungunya.aspx>), the Armed Forces Pest Management Board (<http://www.acq.osd.mil/eie/afpmb/>), and the Center for Disease Control (CDC) (<http://www.cdc.gov/zika/pdfs/VectorControlAedesMosquitoes.pdf>).

3.2.8.2 Mosquito Surveillance

Routine mosquito surveys are the responsibility of preventive medicine technicians. However, if a PMT is not available, a pest control provider can conduct mosquito surveillance. If additional assistance is needed, Navy entomologists from NECE or the NEPMUs can provide assistance in establishing mosquito surveillance programs. Survey operations are essential to determine the species present, the population level involved, and the potential risk of disease transmission. Surveys also serve as a valuable tool in

evaluating control operations. Mosquito surveillance includes conducting both larval and adult surveys. Larval surveys are important because they determine exactly where mosquitoes are breeding, providing the information necessary to manage or eliminate mosquitoes at the source. Larval surveys involve regular dipping stations that are selected, noted on a map, and inspected periodically throughout the mosquito season. In areas where mosquito control is conducted, random larval sampling should be made to check the effectiveness of the control program.

Adult mosquito surveys may be conducted by either collecting mosquitoes from resting sites or using traps. Traps should be placed near where the mosquitoes are expected to be found, during the periods they are active. Two adult mosquito traps that are available with National Stock Numbers (NSNs) are the CDC light trap and the Biogents (BG) Sentinel trap. Traps should be baited with CO₂ from dry ice, when available or, in the case of the BG traps, with the manufactures' recommended lure. The BG Sentinel trap is specifically designed to collect daytime-feeding mosquitoes, and has been found to collect *Ae. aegypti* and *Ae. albopictus* (Zika vectors) more effectively than the standard CDC light trap. Adult collections are then counted, identified to genus or species, and then may be submitted to a regional Army or Air Force public health laboratory for testing, so that the disease transmission risk can be assessed. Adult surveys focus on collecting female mosquitoes because they are the only ones that bite. A high proportion of adult males in a trap collection usually will indicate a nearby larval habitat, and a survey of the area should be done to locate possible breeding sites.

The Preventive Medicine Department located at the Branch Health Clinic Oceana is conducting surveillance on the installation. They survey adult mosquitoes on the installation using five CDC style light traps, and plan to use BG Sentinel traps as well. There is also one surveillance site using two sentinel chickens. This is done in collaboration with the City of Virginia Beach's Mosquito Control and NASO's surveillance program. They are located at the Natural Resources building across from the Oceana stables. The chickens are screened once a week and their blood is screened for West Nile, Eastern Equine Encephalitis, and St. Louis Encephalitis infections. During the mosquito season, Preventive Medicine collects mosquitoes three times a week. The adult collections are counted by the Preventive Medicine staff. Recommendations for spraying are made depending on the mosquito count results.

Employee and resident mosquito complaints can be made through the regional call center/local service desk and then forwarded to preventive medicine.

3.2.8.3 Mosquito Control

Mosquito control methods are either permanent (e.g., eliminating the water source) or temporary (e.g., chemical control) in nature and may be directed against larvae or adults. The most effective way to control mosquitoes is to target the larval stage. Larvicides, pesticides specifically labeled to control mosquito larval stages, should be applied to areas where water stands for longer than 7 days when results of mosquito dip counts exceed 1-2 larvae per dip.

Biological control can be accomplished by the introduction of mosquito fish (*Gambusia* sp.), which are surface feeders that are predaceous on mosquito larvae. *Gambusia* have the ability to outcompete other species, so it is important to consult with the environmental division prior to introducing them, as well as to only introduce them into waters that do not drain into other waterways. To decrease the amount of standing water, it is important to have a drainage system allowing proper runoff of rain water from roadways. Ditches should be maintained free of weed growth. This increases water flow in the ditch allowing access of natural mosquito predators. It is also important to educate the public on source reduction when the problem mosquitoes originate from artificial containers (e.g., bird baths, gutters, flower pots) found around homes and other buildings.

This installation performs ULV pesticide applications to control adult mosquitoes on an as needed basis via the in-house pesticide applicator. If 5 or more *Aedes* mosquitoes are caught per trap, consult the Emergency Disease Vector Control Plan (EDVCP). When female adult mosquito counts exceed 25 per night per trap, it is recommended that chemical control be initiated upon approval from preventive medicine. These recommended thresholds may vary depending on location of the installation and preventive medicine guidance. If local transmission of a disease is confirmed, thresholds will likely decrease. If a trap count exceeds the threshold, the area surrounding that trap should be surveyed to identify and treat the active breeding site. For many species, mosquito activity is greatest from dusk to dawn. Ultra-low volume treatments must be made during peak mosquito activity when weather conditions are optimal; therefore, for control of non-*Aedes* mosquitoes, ULV pesticide applications should be conducted in the early morning hours before the sun warms the ground or in the evening after the ground has cooled (when temperature inversion usually occurs). Control operations for *Aedes* mosquitoes should be targeted in the early morning or late afternoon rather than daytime because weather conditions are more favorable for the treatment.

Regular testing of ULV aerosol droplet dispersal is required to assure maximum control, minimum insecticide use, and prevention of automobile finish spotting caused by droplets that are too large. This testing must be done at the beginning of each spray season and for every 50–100 hours of operation, or when the pesticide is changed. More information is included in [AFPMB TG No. 13](#), Ultra Low Volume Dispersal of Insecticides by Cold Aerosol and Thermal Fog Ground Equipment. Government personnel can obtain slides for aerosol droplet size testing from the Testing and Evaluation Department at the Navy Entomology Center of Excellence, Jacksonville, Florida. Additionally, application of residual insecticides labeled for mosquito control in relatively small areas near the source of the mosquitoes has been shown to be highly effective. Automated pesticide misting devices are not allowed according to [DODI 4150.07](#) (section E4.10.3).

If mosquito populations are extremely high or infestations occur in hard to reach areas, aerial application of adulticides or larvicides by helicopter or fixed-wing aircraft may be the only effective treatment method available. An environmental assessment (EA) for the installation will need to be prepared. Validation for aerial spraying must be obtained from a category 11-certified pest management consultant with BUMED or NAVFAC Atlantic and clearance for aerial spray operations must be obtained from the Federal Aviation Administration. The validation statement and the execution of a requirements type contract should be done before they are required to minimize delays in initiation of control operations.

3.2.8.4 Filth Fly Management

Performing routine sanitation is the best method to manage filth flies (houseflies, blow flies, flesh flies, bottle flies, etc.). Removal of refuse and routine cleaning of garbage cans and dumpsters, and tight fitting lids, will minimize the problem. Garbage cans and dumpsters should be placed on concrete pads at least 100 feet from facilities to reduce breeding under and around the containers and to minimize access to the facilities. Continuous monitoring of sanitation conditions in and around food service areas helps assure that significant fly breeding will not occur.

Chemical control of filth flies is short-term and unsustainable. The choice of fly control techniques must be based on an on-site evaluation of the problem. Pest control personnel inspect areas where garbage is handled and treat these locations with approved insecticides when flies exceed control limits. Preventive medicine technicians also inspect these areas and report significant findings to facility managers for corrective action. Exclusion devices, such as screens and air curtains, help prevent the entrance of flying insects into buildings when installed and properly maintained. Aerosol insecticide treatments are provided when adult flies become a problem in indoor spaces. Automated pesticide misting devices are not allowed according to [DODI 4150.07](#) (section E4.10.3). Light trap devices are also helpful for filth fly control in

food handling areas, but only when they are placed inside of the building. Use only non-contaminating light traps with some way of containing the dead insects. For more information on filth fly management, see [AFPMB TG No. 29](#), Integrated Pest Management In and Around Buildings.

3.2.8.5 Bed Bug Management

Bed bugs belong to a family of blood-feeding, ectoparasitic insects called *Cimicidae*. They have a number of features that make them very effective pests and difficult to control. Their small, flattened body allows them to hide in inconspicuous places such as cracks and crevices. A female can lay several hundred eggs during her lifetime. Bed bugs can survive a long time without feeding; and many insecticides have been rendered ineffective due to resistance development. The most common way bed bugs are introduced is by the movement of infested items (e.g., bedding, clothing, and luggage) from one place to another. The common bed bug is not known to transmit human disease. For most people, the bite of a bed bug is painless and will usually go unnoticed, though many people can have allergenic skin reactions, ranging in severity from local inflammation and itchiness, to asthmatic symptoms and anemia. Although the common bed bug seems to prefer human hosts, they are also capable of feeding on birds, rodents, or other mammals. While other cimicid species, like bat bugs and swallow bugs, mainly feed on bats or birds, but may incidentally bite people when their usual host abandons the nest or is eliminated from the building.

Bed bugs can be difficult pests to detect without a diligent survey strategy. Bed bugs typically feed at night when the host is asleep, and hide in cracks and crevices during the day. It is very important to thoroughly inspect areas where bed bug infestation is suspected. Typical harborage areas might include mattress seams, box springs, bed frames, night stands, picture frames, loose wallpaper, and curtains. Bed bugs typically travel 5–20 feet from their harborage area to feed. When populations are small, infestations may go unnoticed. Some tell-tale signs of a larger bed bug population include the presence of fecal spotting, shed skins, increased biting frequency, and in serious cases a distinct, obnoxiously sweet, odor produced by the bugs. Persons conducting inspections and surveys should be properly trained on what to look for and where to look for infestations. The NECE and EPMU personnel are available to provide training on bed bug inspections.

Bed bugs are a public health issue; installation preventive medicine department should be contacted immediately. Bed bug control may be more difficult to achieve today with increased travel and more stringent limitations on available control materials. A successful control program will require a carefully planned and integrated approach. For more information on controlling bed bugs see [AFPMB Technical Guide No. 44](#), Bed Bugs—Importance, Biology, and Control Strategies.

3.2.8.6 Rodent Management

Rodent control work is an ongoing program to eliminate the causes of rodent infestations. Major emphasis is placed on sanitation and exclusion to limit the amount of food and harborage available to rodents. Tamper-proof bait stations should be maintained in high infestation areas. There are specific EPA requirements for first generation anticoagulant products (warfarin, chlorophacinone, and diphacinone), second generation anticoagulant products (brodifacoum, bromadiolone, difenacoum, and difethialone), and non-anticoagulants (bromethalin, cholecalciferol, and zinc phosphide). Bait stations are required for all outdoor, above-ground placements and must be placed within 100 feet of man-made structures. Bait stations are also required indoors if exposure to children, pets, or nontarget animals is possible. Mechanical traps (snap traps, glue traps, etc.) are another effective control method. Trapping is an effective way of quickly reducing a large mouse population.

3.2.8.7 Bird Management

Several bird species found within the boundaries of the installation may pose a direct or indirect hazard to human health and safety. Blackbirds (i.e. European Starlings, Red-winged Blackbirds, Brown-headed Cowbirds), Rock Pigeons, and sparrows are species that may pose the largest health concern and are not covered under the Migratory Bird Treaty Act. These species can be controlled without special U.S. Fish and Wildlife Service (USF&WS) permits in place. These birds can often be found utilizing buildings where people are routinely working. Their droppings pose a health hazard as a possible cause of histoplasmosis and other respiratory problems when airborne. In addition, bird ectoparasites, such as mites, can also fall on installation employees. Species of birds that are covered under the Migratory Bird Treaty Act do require special permits before any control measures can be taken. Control methods vary depending on the situation, but nuisance bird species may be resolved through several non-lethal techniques to include bird spikes on roost sites, exclusion, repellents and repetitive harassment. Lethal control should be the last option and performed by the appropriate personnel.

3.2.8.8 Bird/Wildlife Aircraft Strike Hazard

Wildlife populations on the airfield continually present a BASH concern and danger to human health and safety. Habitat that may provide food, cover, or water for various bird/wildlife species may need to be addressed. Corrective recommendations may include removing unused airfield equipment to eliminate perch sites, placing anti-perching devices on equipment to remain, wiring streams and ponds, brush/tree removal, the use of pyrotechnics, or changing the grass mowing program. The USDA-WS performs wildlife removal in the hangars and on the airfield. The natural resources department maintains the necessary permits for the USDA-WS to conduct these services.

The installation-developed NASO Airfield Pest Management Plan is included on the CD of additional source documents included with this plan, along with the Commander, Navy Installations Command Bird/Wildlife Aircraft Strike Hazard (BASH) Manual and the installation BASH Plan.

3.2.8.9 Feral Animal Management

Feral or free-ranging domestic cats and dogs are considered by the professional wildlife management community to be one of the most widespread and serious threats to the integrity of native wildlife populations (e.g., birds, bats) and natural ecosystems in North America. Navy commands must prevent feral cat and dog populations, and ensure their humane removal from Navy lands through close coordination and cooperation between natural resources, pest management, security, veterinary, and housing personnel. In accordance with the Chief of Naval Operations Policy Letter Preventing Feral Cat and Dog Populations on Navy Property (10 Jan 2002) and [OPNAV M-5090.1](#), chapter 12, Navy commands shall not allow trap-neuter-release or the release of unwanted house pets on their lands due to the potential of feral or free-ranging cat populations to act as disease reservoirs, threatening human health, native wildlife populations, and natural ecosystems.

Cats may occasionally be found near food handling areas or dwelling in crawl spaces under buildings where they can cause flea problems inside of the buildings. The elimination of available food by keeping garbage cans and dumpsters sealed will decrease the appeal of the area to the cats. Elimination of shelter is also a good means of control. The installation should discourage people from feeding stray cats. Guidance on feral cat management can be found in [AFPMB Technical Guide No. 37](#), Integrated Management of Stray Animals on Military Installations.

3.2.8.10 Wildlife Management

Native and feral animals can adapt to and thrive within human habitations. The animals may become a nuisance, damage buildings or property, or be a source of human disease transmission. They can also kill native animals and plants or disrupt their habitats. In Virginia, the term “nuisance species” has specific legal meaning. “Nuisance species” refers to animals, primarily non-native, exotic, or introduced species that may be controlled by lawful means without the need to obtain a state or federal permit. Mammals designated as such in Virginia are the house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), black rat (*Rattus rattus*), coyote (*Canis latrans*), feral hog (*Sus scrofa*), nutria (*Myocastor coypus*), and woodchuck (*Marmota monax*) (4 VAC 15-20-160). Animal damage control efforts will emphasize the use of integrated pest management techniques which exclude pests and mitigate damage rather than control populations whenever practical. The field use of chemical toxicants which cause secondary poisoning effects is generally prohibited for bird and mammal control by [E.O. 11870](#). The USDA-WS or Environmental personnel will be called for wildlife removal.

3.2.8.11 Aerial Spraying

Aerial spraying can be conducted to effectively control disease-carrying insects, pest insects, and undesirable vegetation over a large area. Validation for aerial spraying must be obtained from a category 11-certified pest management consultant with BUMED or NAVFAC Atlantic and clearance for aerial spray operations must be obtained from the FAA. The validation statement and the execution of a requirements type contract should be done before they are required to minimize delays in initiation of control operations.

3.2.8.12 Red Imported Fire Ant

Red imported fire ants (RIFA) are a significant health concern due to their aggressive nature when disturbed and the allergic reaction that occurs in some people. The fire ant’s mound building and stinging behavior interferes with recreational and grounds maintenance activities. Bait and residual insecticides are available for control of fire ants. Monthly inspections for fire ant mounds should be made in all improved and unimproved areas, with treatment as necessary. Infested areas should be treated with bait, followed by a drench of any mounds 6–8 weeks later. Any active mounds found in the interim should be retreated. Bait and residual insecticides are available for control of fire ants.

The first RIFA infestation in Virginia was detected in 1989. Since that time, infestations have been confirmed in several counties and independent cities, all of which appear to have been introduced via nursery stock or other plant products from infested areas. The movement of certain items is regulated by the USDA to prevent spread of RIFA beyond the established quarantine. Regulated articles include: any life stage of RIFA; soil; plants with roots with soil attached; grass sod; used soil-moving equipment, unless free of all non-compacted soil; hay and straw, including pine straw, that has been stored in direct contact with the ground; honey bee hives that have been in direct contact with the ground, including hive stands containing soil; and logs, pulpwood and stump wood with soil attached. These items can be moved freely within the quarantine area. However, regulated articles must be certified free of RIFA if transported outside of the quarantine area. A map of the RIFA quarantine can be found on the CD of additional source documents included with this plan. More information can be found at the following Web site: <http://www.vdacs.virginia.gov/plant&pest/fireant.shtml>.

3.2.9 Pest Management in Housing

Housing areas on the installation are under a PPV partnership with Lincoln Military Housing. The PPV partner is responsible for providing pest management services and for upholding the agreements set forth in the Partner’s Plan for Pest Control. General pest control and grounds maintenance services are

provided by contract. Certificates for the PPV contract pesticide applicators are located in [appendix E](#). Contractors providing services in the PPV areas must follow all state and local laws.

Pet dogs and cats released or lost by owners on base can become a pest problem. Feral cats and dogs are susceptible to and can carry disease, damage natural habitats, harm protected wild animals, become a vehicle strike hazard, and attack and injure personnel. Pet owners are encouraged to microchip their pets. Microchipping is a permanent pet identification system using a computer chip implant in the skin of the animal. This allows a lost pet to be identified even if the collar tag is missing.

3.2.10 Self-Help Pest Management

Self-help pest control programs on DOD installations are authorized by [DODI 4150.07](#) (section E4.7.7.3) when they are cost-effective and when IPM monitoring indicates the need for control. Self-help pest control allows uncertified personnel to use low-toxicity, ready-to-use (RTU) pesticides for small-scale pest control operations. Examples of self-help programs available are: stinging insect pest control for maintenance personnel, venomous spider control, fire ant control, vegetation control using glyphosate, and barracks/office pest control. Any personnel or departments conducting unauthorized pesticide applications should be directed to immediately cease applications. Requirements for self-help are:

1. The program shall be reviewed and approved by the IPM coordinator and then by the NAVFAC Atlantic PPMC
2. A program manager, who will be responsible for the program and be the primary point of contact, shall be designated
3. All personnel that will be applying pesticide must be trained and their training documented
4. Only RTU pesticides approved for use by the NAVFAC Atlantic PPMC shall be used
5. The area(s) to be treated should be small enough to be practically treated with RTU pesticides
6. All pesticides will be stored in a storage site as described on the pesticide label
7. All pesticide use will be reported.

To request review of a proposed program and submit a statement of need, the IPMC must contact the NAVFAC Atlantic PPMC.

3.2.11 Prohibited Operations and Devices

Several operations and devices are prohibited by DOD and DON regulations.

Prohibited operations and devices include:

1. Occupied spaces—Installations shall not permit liquid spray and dust pesticide formulations in any space occupied by unprotected personnel. However, pesticides contained in gel or paste bait formulation may be applied in occupied spaces ([OPNAV M-5090.1](#), paragraph 24-3.2).
2. Preventive or Scheduled Pesticide Treatments—DOD policy prohibits the use of regularly scheduled, periodic pesticide applications except in situations where the installation pest

management plan clearly documents that no other technology or approach is available to protect personnel or property of high value ([DODI 4150.07](#), section E4.10.3).

3. Electrically-Operated Devices—“Electromagnetic exclusion or control devices, ultrasonic repellent or control devices, and outdoor devices for electrocuting flying insects are not approved for use on DOD installations” ([DODI 4150.07](#), section E4.10.1). This does not apply to indoor use of selected devices, carefully placed, for electrocuting flying insects. Pest surveillance traps and monitoring equipment, such as non-electrocuting mosquito light traps, may also be used by trained personnel.
4. Paints and Coatings Containing Pesticides and Other Biocides—DOD policy prohibits the use of paint containing insecticides on DOD property. This includes interior and exterior paints. Paints containing fungicides as mildew inhibitors and approved marine antifouling compounds or coatings may be applied to protect surfaces of watercraft ([DODI 4150.07](#), section E4.10.2).

3.3 REGULATORY COMPLIANCE

The Department of Defense’s policy is to ensure that DOD pest management programs achieve, maintain, and monitor compliance with all applicable executive orders and applicable federal, state, and local statutory and regulatory requirements. When there is a conflict between federal and local regulations, the installation will comply with the more stringent of the two. This may occur with pesticides limited for use by the state, which are not necessarily restricted by the EPA. In this case, the installation must comply with state regulations.

3.3.1 Pesticide Regulation and Enforcement

The U.S. Environmental Protection Agency (EPA) has the primary authority to regulate pesticides in the United States. The EPA delegates pesticide enforcement authority to states through cooperative agreements. Per [OPNAVINST 6250.4C](#), Navy installations must comply with state and local pesticide use regulations.

The responsibility for compliance and enforcement lies with the installation’s commanding officer. As the installation CO’s pest management advisor, the IPMC shall be familiar with federal, state, and local pesticide use regulations and ensure that all applicators conduct operations in compliance with these regulations. The environmental division should be familiar with these regulations as well due to the environmental hazards of pesticides. Regulatory enforcement for each of the PMSPs is provided.

1. Commercial contractor applicators: PMPARs shall provide assistance by monitoring contract PMSPs for compliance with all applicable regulations as specified in the contract and will recommend appropriate actions to the contracting officer if the contractor does not comply. Preventive medicine technicians conducting sanitation inspections of food service facility pest management programs can also ensure compliance for safe pesticide use and applicator licensing/certification. Inspection guidelines are found in NAVMED P-5010, chapters 1 and 8. The preventive medicine technicians will notify the IPMC of any potential pesticide application violations observed during the course of routine sanitation inspections.
2. DOD applicators: The pesticide applicator’s immediate supervisor, with the assistance of the IPMC, shall also ensure that pesticide use is in compliance. Under the authority of [DODI 4150.07](#) and [DOD Directive 5134.01](#), and per [DODM 4150.07, Volume 1](#), the DOD may deny, suspend, or revoke the certificate of any DOD employee who violates any provision of Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) or falsifies records under [DODM 4150.07, Volume 1](#).

In accordance with [DODM 4150.07, Volume 1](#), the installation CO may initiate a formal review if FIFRA violations are suspected. Violations shall be reported through appropriate command channels to the NAVFAC Atlantic certifying authority for review. The certifying authority shall determine if further action is required. That action may include suspension of the applicator's certification.

Naval Facilities Engineering Command, Atlantic Applied Biology shall provide assistance to the installation IPMC with compliance and enforcement issues and clarification of regulations. The senior pest management consultant is the certifying official for DOD-certified pesticide applicators on the installation.

3.3.2 Pesticide Laws and Regulations

Primary pesticide regulations include:

1. Federal: U.S. Code of Federal Regulations (CFR) at 40 CFR Section E, 152-180: Pesticide Programs (http://www.access.gpo.gov/nara/cfr/waisidx_03/40cfrv21_03.html).
2. DOD and Navy: [DODI 4150.07](#), DOD Pest Management Program; [OPNAVINST 6250.4C](#), Navy Pest Management Programs; [OPNAV M-5090.1](#), Environmental Readiness Program.
3. Virginia: The Virginia Department of Agriculture and Consumer Services, Office of Pesticide Services regulates the pest control industry (<http://www.vdacs.virginia.gov/pesticides>).

3.3.2.1 The Pesticide Label

The primary source of pesticide regulations for the pesticide applicator is found on the pesticide label in accordance with [40 CFR § 156](#). Virginia may add supplementary labels which are regulations that must be complied with in the state. It is a violation of federal and/or state law to use a pesticide in a manner inconsistent with the label. Note, however, that the pesticide label does not provide specific information for each site where the pesticide may be applied. For example, the pesticide label may allow application of an herbicide to unimproved grounds, but if those grounds are within a ringed map turtle habitat, then pesticide use may be restricted under the Endangered Species Act. Pesticide applicators should be aware of environmentally sensitive areas before beginning any new pesticide application and should consult the installation's environmental division. For more on pesticide labels, see <http://www.epa.gov/pesticides/label/>.

Endangered Species Protection Bulletins set forth geographically-specific pesticide use limitations for the protection of endangered or threatened species and their designated critical habitat. If your pesticide label directs you to the EPA Bulletins Live Web site (<http://epa.gov/espp/bulletins.htm>), you are required to follow the pesticide use limitations found in the Bulletin for your county, pesticide active ingredient, and application month.

3.3.2.2 Other Regulations

Other applicable directives, laws, and regulations concerning pesticide applicators and pest management operations are listed and described in [appendix F](#).

3.4 PESTICIDE MANAGEMENT

Chemical control of pests using pesticides can be an integral part of an IPM program. Proper management of pesticides will ensure a safe and cost-effective pest management program. Management of pesticides includes the proper selection of pesticides, pesticide approval, procurement, storage, mixing, use of pesticide application equipment, and clean-up. The pesticide label provides most of the information needed to manage pesticide use and must be affixed to the container at all times.

3.4.1 Pesticide Selection

The following criteria should be used when selecting a pesticide:

1. Determine the need for a pesticide. Is a chemical pesticide really needed? In some situations non-chemical control methods may be more effective or less costly and time-consuming in the long term. Will exclusion or habitat elimination take care of the problem?
2. Choose a pesticide with a low toxicity. Can the pest be sufficiently controlled with a pesticide that has a low toxicity to humans?
3. Choose pesticides and pesticide formulations with minimal environmental impact. Avoid using “Restricted Use” pesticides if possible. The environmental impact of pesticide spills is reduced when using a granular pesticide formulation rather than a liquid. Can attractant bait stations be used instead of broadcast application of a pesticide?
4. Choose pesticides that provide a long-term or sustainable solution. For example, contact insecticides applied to ant trails will only temporarily halt the infestation, and may cause the colony to bud and form new colonies, while baits can kill the entire colony including the queen.

3.4.2 Pesticide Procurement

Pesticides used by contractors are included in the cost of the contract and are procured through commercial sources. Pesticides used by DOD personnel may be purchased through the Federal Stock System. Contractors cannot purchase pesticides through the Federal Stock System. A list of pesticides approved by the DOD and found in the stock system can be found at http://www.acq.osd.mil/eie/afpmb/pest_equiplists.html. These are not the only pesticides that may be used on the installation. Only pesticides listed on the installation’s pesticide AUL ([appendix D](#)) may be purchased. All pesticide products and pest control services procured via government credit cards must also be pre-approved by the NAVFAC Atlantic PPMC according to DON [eBusiness Operations Office Instruction \(EBUSOPSOFFINST\) 4200.1A](#), Department of Navy Policies and Procedures For the Operation and Management of the Government Commercial Purchase Card Program (chapter 6, paragraph 7). For information on requesting new pesticides to the installation pesticide AUL, see [section 2.2](#), Pesticide Approval.

3.4.3 Pesticide Storage

Pesticide storage facilities, retail sales, and vehicles each have specific requirements in regards to pesticide storage.

3.4.3.1 Pesticide Storage Facilities

[DODI 4150.07](#), section E4.5.1, states that pesticide storage facilities “shall comply with all applicable regulatory standards and shall, where feasible, be modified to meet the minimum standards for new pesticide storage facilities.” The Department of Defense standards are described in [AFPMB TG No. 17](#) Military Handbook, Design of Pest Management Facilities. The NAVFAC Atlantic PPMC should be consulted during the design phase of new pesticide storage facilities to ensure that the latest requirements are included.

At a minimum, all existing facilities shall meet the following standards:

1. An active ventilation system that provides a minimum of six air changes per hour
2. Backflow prevention on all water sources used for mixing/filling
3. No floor drains and a surrounding berm that provides containment of any pesticide spills
4. Warning signs
5. Surrounded by a climb-proof fence with access only through doors with locks.

NAVFAC Mid-Atlantic Environmental Services Pest Control maintains a pesticide facility on NASO DNA. The office is located in Building 552. The storage and mixing areas are located in Building 613.

The MWR golf course stores pesticides in a ventilated storage locker near Building 797 and mixes on a concrete mixing pad in its vicinity.

The natural resources department stores pesticides in a shed (Building 115A). Their mixing area is located at the natural resources center (Building 78).

Contractors are not permitted to store pesticides on the installation.

3.4.3.2 Retail Sale Pesticide Storage

Household, pet, and garden pesticides displayed and sold at the commissary and NEX shall be stored in accordance with OPNAVINST 6250.4C and [AFPMB TG No. 45](#) in their original, sealed containers.

3.4.3.3 Vehicles

Pest control vehicles must carry pesticide spill kits in accordance with [OPNAVINST 6250.4C](#) (paragraph 13d). Pesticides shall not be transported in the vehicle’s passenger compartment and pesticide containers shall be secured to vehicles to prevent spillage.

3.4.4 Pesticide Mixing

All pesticide mixing conducted by commercial contractors, with a couple of exceptions, is done off-site. One exception to this is soil treatment for termite prevention during building construction; the contractor must mix the termiticide on-site while the PMPAR or IPMC is there to witness. A second exception is the invasive species contractor which has been authorized to perform mixing on-site at a number of predetermined locations. Pest control operators must mix pesticides in accordance with the pesticide label in appropriate areas that minimize the risk of safety and environmental hazards. Contracted pest control operators must also mix pesticides in accordance with the contract specifications. Persons mixing

pesticides with water shall protect the water supply from back-siphoning of the pesticide mixture. They shall also ensure accurate measurement of concentrated pesticide to ensure proper application rate. Precautions must be taken to minimize the risk of a pesticide spill. See [section 5.3.4](#) for pesticide spill prevention measures. Spill kits must be maintained on pest control vehicles and must be available at the mixing site.

3.4.5 Pesticide Application

All pesticides shall be applied in accordance with federal, state, and label directions. Application of pesticides should be timed to ensure contact with and maximum kill of the pest and to prevent use under adverse weather conditions that can cause drift of the chemical outside the target area. See [section 4.2.2](#) for more information on timing and drift prevention

3.4.5.1 Service containers

Containers other than the original pesticide container that are used for transporting pesticides to the job site must have a copy of the label attached. Service containers used for the application of a pesticide must have the following information on a tag attached to the container: name of party responsible for the container, the identity of the chemical in the container, and the signal word of the chemical. Containers commonly used for food, drink, or household products shall not be used to hold pesticides.

3.4.5.2 Equipment

Only pest control equipment that is in good repair and safe to operate shall be used by PMSPs. The equipment should be in good condition, free from corrosion, clean, and free from leaks. The PMPAR shall inspect equipment used by contract applicators. Applicators shall also ensure that they use equipment suitable to ensure proper application of pesticides.

3.4.6 Pesticide Disposal

All pest control equipment shall be properly cleaned. Contract PMSPs are not allowed to dispose of excess pesticide, used containers, or residues on the installation per contract specifications; they must conduct all cleaning off-site. Spray tanks and pesticide containers must be triple-rinsed prior to storage or disposal. Disposal of pesticide spray tank rinse water should be performed by applying to a site listed on the pesticide label, used for future mixing of the same pesticide, or disposed of as hazardous waste. Rinse water shall not be allowed to enter storm drains.

3.4.6.1 Sprayer Clean-Outs

When cleaned, spray equipment will be triple rinsed in the field using 10 percent of the tank capacity divided into 3 doses. The rinse material will be sprayed on the application site in accordance with the pesticide label.

3.4.6.2 Empty Containers

[OPNAV-M 5090.1](#) (paragraph 24-3.12) requires disposal of pesticide wastes be in accordance with 40 CFR § 262, EPA Regulations for Hazardous Waste Generators. The disposal of pesticides, their containers, and related wastes is strictly regulated. Empty liquid pesticide containers will be triple-rinsed with 10 percent of the container's capacity divided into 3 doses. Disposal of empty containers will be coordinated with the installation's environmental division. Empty containers will not be reused. If possible, pesticide containers shall be returned to the manufacturer for recycling.

3.4.6.3 Rinse Water

Water from rinsing out equipment will be used immediately. If it cannot be sprayed on the application site, rinse water should be stored in marked plastic containers and used as the diluent for the next time the same pesticide is formulated for application. Wastewater formulations that contain pesticides shall not be discharged into any storm or sanitary sewer system.

3.4.6.4 Excess Pesticides

Disposal or redistribution of excess pesticides shall be coordinated through Environmental and the IPMC. Environmental and the Consolidated Hazardous Material Reutilization and Inventory Management Program (CHRIMP) will determine whether the pesticide can be redistributed or if it needs to be disposed of. Excess pesticides shall never be disposed in any storm or sanitary sewer system.

3.5 MINIMUM RISK PESTICIDES

Minimum risk pesticides, such as those marketed under the EcoEXEMPT brand, may be used by pest management service providers (PMSP) as part of their IPM program. According to the EPA, “Minimum risk pesticides are a special class of pesticides that are not subject to federal registration requirements because their ingredients, both active and inert, are demonstrably safe for the intended use.” These pesticides are exempt from federal registration under section 25(b) of the FIFRA and are not labeled with an EPA registration number. Since there is no federal review of these pesticides or their pesticide label, there is no federal review of the instructions for effective use of these products. Although these pesticides are exempt from federal registration, they still need to be approved prior to use on DOD property, primarily for efficacy and safety reasons.

3.6 CANCELED PESTICIDES

The EPA has canceled or restricted several common pesticides.

3.6.1 Organophosphates

Chlorpyrifos (e.g., Dursban, Lorsban) and diazinon were, widely used pesticides that have been canceled. The following actions are allowed with these pesticides:

1. End users (e.g., PMSPs and private, residential users) should check with NAVFAC Applied Biology or state/local regulatory agencies for guidance. Some canceled pesticides are allowed to be used until stocks are depleted, while others are under a stop use order.
2. PMPARs should monitor the use of the pesticides by contractors to ensure that they are not using an increased amount of the pesticides as a means of using up their stock.

Fenamiphos (e.g., Nemaicur), a systemic insecticide/nematicide commonly used for the control of turf nematodes, was canceled by the EPA on May 31, 2008 with an end use date on October 6, 2017. Use any remaining stocks in accordance with the label until the end use date.

3.6.2 Organic Arsenicals

The EPA is also canceling most organic arsenical pesticide registrations, which consist of monosodium methanearsonate (MSMA), disodium methanearsonate (DSMA), calcium acid methanearsonate (CAMA),

and cacodylic acid and its sodium salt. All uses of DSMA, CAMA, and cacodylic acid and its sodium salt were canceled as of September 30, 2009.

All uses of MSMA except cotton, sod farms, golf courses, and highway rights-of-way, were canceled as of September 30, 2009. Use of MSMA on sod farms, golf courses, and highway rights-of-way was to have been prohibited after December 31, 2013, but because the EPA is considering newly-submitted information, these uses remain registered. These uses, in addition to the cotton use, will be considered in the pending registration review process for MSMA. Users can continue to apply MSMA on sod farms, golf courses, and highway rights-of-way until further notice, but thoughtful use and consideration of depleting stocks is highly encouraged. For golf courses and highway right-of-ways, the following restrictions currently apply:

1. For golf courses:
 - a. Spot treatments only (100 square feet per spot), not to exceed 25 percent of the total golf course acreage per year
 - b. One broadcast treatment for newly constructed courses only.
2. For highway right-of-way:
 - a. Two broadcast applications only on highway rights-of-way
 - b. A 100-foot buffer around permanent water bodies.

CHAPTER 4

Health and Safety

4.1 PESTICIDE APPLICATOR SAFETY

To ensure the safe use of pesticides, pesticide applicators shall handle and apply pesticides in accordance with the product's label directions.

4.1.1 Potential Occupational Hazards

The following hazards may be encountered by pesticide applicators or Government representatives that may be exposed while inspecting pest management operations. Occupational safety and health guidance is found in the [OPNAVINST 5100.23G](#), The Navy Occupational Safety and Health Program Manual.

4.1.1.1 Direct Contact Toxic Chemical Exposure

Many chemicals used as pesticides are also harmful to humans. The three routes of exposure to applicators are dermal, inhalation and ingestion. For applicators, the most common route of exposure is dermal and is frequently due to not wearing the appropriate personal protective equipment. Severity of the harmful effects is determined by duration of exposure and toxicity of the chemical. The effects can be acute (rapid onset due to high-dosage, high-toxicity chemicals) or chronic (slow or delayed onset due to long-term exposure to low-dosage, low-toxicity chemicals). The highest risk for severe acute chemical exposure occurs during pouring and mixing of concentrated pesticide resulting in high-dose, rapid-onset chemical poisoning. Chronic exposure can occur when the applicator fails to use appropriate PPE during frequent pesticide applications and the chemical accumulates in the body of the individual over a period of time leading to delayed or gradual onset of illness or injury. Direct chemical exposure can result not only in pesticide poisoning, but also in skin burns due to corrosive chemicals.

4.1.1.2 Heat

The use of protective equipment such as a respirator, goggles, gloves, and coveralls increases the risk of heat injury especially in warm climates. Heat injury can occur during long periods of work outdoors during warm weather or in enclosed spaces where machinery or equipment may generate heat.

4.1.1.3 Noise

Some pesticide application equipment use gas-powered air compressors or pumps that produce noise hazards. Gas-powered backpack sprayers are particularly hazardous due to the proximity of the noise source to the ears.

4.1.1.4 Eye Hazards

Eye hazards may result from chemical splashed into the eyes causing corrosive, toxic, or impact injury. Some pesticides are labeled "Restricted Use" due to their corrosive nature. The highest risk occurs during pesticide pouring, mixing, and application. During pesticide applications, chemicals may enter the eyes

through splash back when applying the chemical under pressure into a crack or crevice or when applying pesticides overhead. Injury may also occur during equipment cleaning.

4.1.1.5 Infectious Zoonotic Disease

Care should be taken when trapping and handling live or dead animals. Hantavirus may be transmitted from rodents to humans through body fluid exposure or when breathing aerosolized rodent excreta. Pest management providers may be exposed when handling rodent carcasses after trapping or handling traps contaminated with rodent urine and feces. Feral dogs, cats, skunks, raccoons, and bats may carry and transmit rabies through a bite.

4.1.1.6 Inhalation Hazards

Many pesticides release hazardous vapors and are particularly hazardous in enclosed spaces. Some pesticides are labeled “Restricted Use” due to the high risk of inhalation injury. Personnel may be exposed during mixing, application, and equipment cleaning.

4.1.1.7 Electrical and Fire Hazards

Spot and crack and crevice applications may require application of a pesticide to areas near motors of refrigerators, compressors, and other machinery where it can become an electrical shock hazard. They may also be applied to areas near pilot lights resulting in an explosion and/or fire hazard.

4.1.1.8 Head Impact and Sharp Hazards

Surveys and pest control procedures may be done in attics, crawl spaces, basements, and other areas with low overheads where head impact hazards exist. Some devices used for bird roosting exclusion and rodent control have sharp edges and can cause cuts, puncture wounds, and abrasions.

4.1.1.9 Trip and Fall Hazards

Trip hazards may occur when applicators are spraying without close attention to where they are stepping. Spraying around buildings where there are various obstacles (e.g., plants, utility boxes, plumbing) in the path of the applicator can be particularly hazardous. Pest control may also need to be performed from ladders, on roofs, in ceilings, and in trees. Wet surfaces on the ground or on elevated surfaces can increase the risk of trips and falls.

4.1.1.10 Exposure to Harmful Animals

Venomous animals such as bees, wasps, rattlesnakes, and spiders are potential hazards when attempting to control them. Some of these are very dangerous due to envenomation and allergic reactions. Feral dogs, cats, coyotes, raccoons, and other large pest animals can inflict serious bites or clawing wounds.

4.1.2 Hazard Abatement

Detecting and reporting unsafe or unhealthful working conditions as early as possible, and then promptly controlling the reported hazards, is essential to a successful safety and occupational health program.

4.1.2.1 Operational Risk Management

Operational risk management (ORM) is a decision-making tool to reduce the risk of mishaps, whether in military contingency or support operations. Pest management operations pose risks to human health and

the environment that affect the installation's mission that can be reduced and minimized through ORM. Pest management ORM uses the following process to minimize hazards:

1. Identify hazards—the hazards may involve the pesticide or the application equipment (see list of hazards in [section 4.1.1](#)).
2. Assess hazards—determine the degree of risk based on the probability and severity of these hazards. For example, the risk may be high if a highly-toxic pesticide is used daily.
3. Make risk decisions—develop risk control options. Decide whether benefits of control outweigh the risks involved.
4. Implement controls
 - a. Engineering controls—e.g., use a less-toxic pesticide for controlling the pest
 - b. Administrative controls—e.g., place warning placards around pesticide vehicles and pesticide storage areas.
 - c. Personal protective equipment—e.g., wear a respirator when an inhalation hazard exists.
5. Supervise—follow-up to determine effectiveness of controls and monitor changes to hazards.

For more information on ORM, go to the Navy Safety Web site at <http://www.public.navy.mil/navsafecen/Pages/ORM/index.aspx>.

4.1.2.2 Training and Education

Pesticide safety is a core requirement for DOD and civilian pesticide applicator certification and licensing programs. Topics included in the DOD training are listed in [DODM 4150.07, Volume 1](#), The DOD Plan for the Certification of Pesticide Applicators. Safety topics are also given during recertification courses. See [section 2.4](#) for specific training information.

4.1.2.3 Read the Pesticide Label

Pesticide labels are found on all pesticide containers used by installation PMSPs. The pesticide label provides directions for mixing, applying, and disposing of pesticides safely. It also includes a list of hazards to humans and first aid treatment. It may also include a list of personal protective equipment that must be worn and user safety recommendations. The label should always be read completely and thoroughly by the applicator before purchasing and using a pesticide. The label is a legal document mandated by FIFRA.

4.1.2.4 Personal Protective Equipment

Personal protective equipment (PPE) should always be used when applying pesticides. The type and level of protection needed will be determined by the toxicity, formulation, and method of application of the pesticide. The pesticide label provides guidance on what PPE to use.

1. Respirator
2. Chemical-resistant gloves

3. Chemical-resistant coveralls or long-sleeve shirt and long pants
4. Chemical-resistant boots
5. Hard hat
6. Goggles
7. Apron
8. Face shield
9. Self-contained breathing apparatus (for fumigation).

Personal protective equipment must be appropriate for the type and application of the pesticide being used. It is the applicator's responsibility to maintain the PPE. Contractors must provide appropriate PPE to their applicators.

4.1.2.5. Pest Control Vehicle Safety Devices

Pest control vehicles should be equipped with safety devices and information.

1. Labels and SDSs for all pesticides in vehicle
2. Emergency medical information including nearest emergency treatment center
3. Fire extinguisher
4. Spill kit
5. First aid kit
6. Cell phone or radio
7. Drinking water supply
8. Rinse water supply for washing pesticide off skin.

4.1.2.6 Pesticides and Equipment

The risk of pesticide exposure can be reduced by selecting the appropriate pesticide and equipment for the job. Applying small amounts of low-toxicity pesticide using appropriate and properly-maintained equipment greatly reduces the risk of harm. Using pesticides that are formulated (e.g., contain emetics) or packaged (e.g., water-soluble packets) to minimize chemical exposure and increase safety should be considered when purchasing pesticides. Pesticide selection is addressed in [section 3.4.1](#). Equipment should be tested with water prior to use to ensure proper application and that it is not leaking. Situational awareness, such as monitoring meteorological conditions and location, may also prevent harmful exposure to pesticides.

4.1.2.7 Protection from Infectious Zoonotic Diseases

Pest control personnel who handle trapped animals or dead animal carcasses should wear gloves to prevent exposure to potentially infectious body fluids. A respirator fitted with a high-efficiency particulate air filter should be worn when entering enclosed spaces with large amounts of rodent feces that might be disturbed and become airborne. Additional protection from hantavirus can be provided by spraying dead rodents and rodent feces with a commercial disinfectant. This will kill hantavirus as well as wet the feces to prevent it from becoming airborne. Detailed guidance on rodent handling is found in [AFPMB TG No. 41](#), Protection from Rodent-borne Diseases with Special Emphasis on Occupational Exposure to Hantavirus.

4.1.2.8 Hazard Communication

All pesticide applicators must receive Occupational Safety and Health Administration (OSHA) Hazard Communication training ([29 CFR § 1910.1200](#)). Contractors must carry safety data sheets (SDSs) in their vehicles or, as appropriate, at their on-base administration office. Applicators must understand all of the hazards associated with the chemicals they will use and be able to communicate those to the customer if necessary.

4.1.2.9 Medical Surveillance Program

Department of Defense pesticide applicators are required to be in a medical surveillance program depending on their hazard exposure. Applicators possibly facing exposure to organophosphate or carbamate pesticides should have their cholinesterase levels tested in accordance with <https://nmcpeh-simweb.med.navy.mil/Content/medMatrix/MedicalMatrix.pdf>, Medical Surveillance Procedures Manual and Medical Matrix. Medical surveillance is conducted by the occupational health clinic in accordance with [Navy Environmental Health Center Technical Manual \(NEHC-TM-OEM\) 6260.96-2](#), Occupational and Environmental Medicine Field Operations Manual.

4.2 PUBLIC SAFETY

By their nature, many pesticides may pose some risk to humans, animals, or the environment because they are designed to kill or otherwise adversely affect living organisms. Safely using pesticides depends on using the appropriate pesticide and using it correctly.

4.2.1 Potential Hazards to the Public

A potential hazard is the risk of harmful effects from pesticides and the level of risk depends on the toxicity of the pesticide and the exposure a human will receive in any situation.

4.2.1.1 Direct Contact with Pesticides

Pesticide exposure can occur through dermal contact with a pesticide on a surface, inhalation of vapors, or ingestion of pesticide through contaminated food or eating utensils. This type of exposure can occur if a pesticide application is done while unprotected building occupants are present, occupants are allowed entry into buildings before the pesticide has dried, or food and food preparation and serving equipment are not properly protected or cleaned after an application.

4.2.1.2 Pesticide Drift

Pesticide drift occurs when a pesticide leaves the target area and affects unprotected persons outside the area. This commonly occurs outdoors when winds can carry the pesticide off-site. Drift can occur indoors

if there is air movement or pesticides are drawn up through ventilation ducts. Pesticide applications that involve small pesticide droplets, such as fogging or ultra-low volume application, or dusts are most susceptible to drift.

4.2.1.3 Contact with Contaminated Water

Some pesticides can move through soil and contaminate groundwater used for drinking. Others, if applied in or close to surface water, can cause contamination of recreational waterways.

4.2.1.4 Injury Due to Animals

The use of an inappropriate pesticide may cause collateral injury due to an insufficient knockdown of the target pest. This can occur with bees and wasps. Some insecticides do not knockdown the insects rapidly and may actually excite them causing them to become more aggressively defensive in behavior. Unprotected persons blocks away from the pesticide application may become the target of their aggression. Injury can also occur when persons get too close to or try to release a trapped animal or try to capture feral animals by themselves.

4.2.1.5 Fumigation Exposure

Fumigants are highly toxic and can cause immediate death upon exposure. Fumigations can be performed in the housing area where it poses a potential hazard to neighbors and pets. During fumigation the chemical is injected into a tarped structure and allowed to remain for 24 hours. The highest risk of injury or death occurs if a person or animal were to enter the tarp during this period or after the tarp is removed, but before the building is completely ventilated. The fumigant, when exposed to air, dissipates rapidly and readily.

4.2.2 Hazard Abatement

Pesticide applicators should continually be aware of the hazards associated with pesticide use in order to protect the public from exposure.

4.2.2.1 Proper Timing of Pest Control Operations

Most indoor application of pesticides should be conducted when building occupants are not present. An exception to this is the application of pesticide baits that are enclosed in a tamper-proof bait station that does not allow exposure to occupants or pets. The building occupants must remain out of the building to allow the liquid pesticide to dry. Some pesticide labels are specific about re-entry times (time after application that occupants are allowed back into the treated building). Some pesticides, such as fumigants, provide specific directions on aeration of spaces to remove pesticide prior to re-entry. Certain operations, such as bee and wasp control or removal, are best conducted after the area has been cleared of unprotected persons. Refer to the product label for specific information.

4.2.2.2 Preventing Pesticide Drift

Pesticide drift from target areas to areas where humans, animals, and plants can be affected can be reduced through the following means (adapted from University of Nebraska publication G1773, Spray Drift of Pesticides).

1. Select low or nonvolatile pesticides.

2. Read and follow the pesticide label. Apply a pesticide only if an application is warranted.
3. Use spray additives that decrease drift within label guidelines. This will increase the droplet sizes and pesticide effectiveness.
4. Use larger spray nozzle orifice sizes. This will give larger droplets and will increase the number of tank refills, but will improve coverage and effectiveness.
5. Avoid high pressure. High pressure creates finer droplets; 45 PSI should be considered maximum for conventional broadcast spraying.
6. Use drift-reduction nozzles. These will produce larger droplets when operated at low pressures.
7. Use wide angle nozzles and low boom heights, and keep the boom stable.
8. Drift is minimal when wind velocity is less than 10 mph. Do not spray when wind is greater or blowing towards sensitive crops, gardens, dwellings, livestock, or water sources.
9. Use shielded spray booms. When banding, use shroud covers to keep chemical from drifting.
10. For indoor applications, turn off ventilation and close doors to prevent air currents.

4.2.2.3 Prevent Tampering with Animal Traps

Caged animals can be very aggressive. Traps should be placed in areas where they will not be tampered with by humans or pets. Warning signs can be placed on the traps and area occupants can be warned of the risk of injury. Live and dead rodents in traps can also be a hazard for hantavirus. Traps should be placed in areas where humans or domestic animals will not be exposed to the rodents.

4.2.2.4 Protection of Fumigation Sites

Warning signs should be posted at the fumigation site warning of the hazards. Some installation contracts require the contractor to provide a 24-hour roving watchperson to patrol the fumigation site to prevent entry by unauthorized personnel.

4.2.3 Special Safety Considerations

Certain areas require special considerations due to the sensitive nature of the area or the people contained in that area.

4.2.3.1 Child Development Center

Children can be sensitive to pesticides and other chemicals. Parents are also concerned about potential hazards that their children may be exposed to and have a right to know about these hazards. Best practice is to minimize pesticide use in and around child development centers and schools, use only enclosed baits and low-toxicity pesticides, do not apply pesticides when people are present, and inform staff and parents of any pesticides used on the property. Integrated pest management methods should be used to reduce the health risks of pesticides to children.

4.2.3.2 Branch Clinic

Persons undergoing medical treatment may be highly sensitive to pesticides and pesticide odors in the environment. Additionally, medical equipment and supplies may be contaminated during pesticide applications. Alternative IPM methods must be considered prior to using pesticides in medical treatment areas. If pesticides must be used, then only crack and crevice treatments with low toxicity pesticides or enclosed baits can be used. Application of any liquid or dust formulation must only be done when the area is unoccupied. Guidance for pest management operations in medical treatment facilities can be found in [AFPMB TG No. 20](#), Pest Management Operations in Medical Treatment Facilities.

4.2.3.3. Food Service Areas

Food contaminated with pesticides can lead to pesticide poisoning. Sanitation and exclusion should be the primary means of preventing and reducing pest infestations. Pesticide use in food service areas should be limited to low-toxicity pesticides, applied to cracks and crevices, and baits. The area should be properly prepared for treatment by putting away utensils and equipment and covering food preparation services. After treatment, the area should be thoroughly cleaned to prevent contamination.

4.3 PEST CONTROL ACCIDENTS

In the case of a pest control accidents, applicators should be trained in first aid procedures and identify the nearest medical services.

4.3.1 First Aid

First aid for pesticide accidents is included on the pesticide label. The applicator should be familiar with first aid procedures required for the pesticide they are using. A copy of the label must be available at the application site. For some pesticides, immediate first aid and medical treatment may be required.

4.3.2 Medical Emergencies

Pesticide applicators experiencing an acute exposure to hazardous pesticides or significant injuries sustained in control operations should immediately go to the nearest emergency room capable of treating their emergent condition. Pesticide applicators that are government employees enrolled in a medical surveillance program with the occupational health department should schedule a follow-up appointment after their condition has subsided. The name, address, and telephone number of an emergency medical care facility should be posted in the commercial applicator's vehicle. For pesticide poisonings, a copy of the pesticide label should be given to the medical first responders or taken to the emergency medical facility. If cholinesterase-inhibiting pesticides (e.g., malathion) are used, the proper antidotes include atropine and 2-pam chloride.

CHAPTER 5

Environmental Considerations

5.1 ENVIRONMENTAL MANAGEMENT SYSTEM FOR PESTICIDES

This IPMP puts pesticide management within the framework of the DOD and the Navy Environmental Management System (EMS). This plan provides the tools and products to include pesticide management in the installation's overall EMS program.

5.1.1 Department of Defense Policy

Department of Defense policy states, "The Department of Defense shall integrate EMS into missions, activities, functions, contracts, and installation support agreements as a business practice for improving overall performance. EMS is a vital supporting component of the DOD mission and is therefore the responsibility of all DOD personnel. It is not just an environmental function responsibility, but requires active participation from all functions and organizations." The remainder of this policy and details on the EMS program are found in [DODI 4715.17](#), Environmental Management Systems.

5.1.2 Definition of an Environmental Management System

According to the Council on Environmental Quality, Instructions for Implementing Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management, March 29, 2007, "Environmental Management System means a set of processes and practices that enable an organization to increase its operating efficiency, continually improve overall environmental performance and better manage and reduce its environmental impacts, including those environmental aspects related to energy and transportation functions. EMS implementation reflects accepted quality management principles based on the "Plan, Do, Check, Act," model found in the ISO 14001:2004(E) International Standard and using a standard process to identify and prioritize current activities, establish goals, implement plans to meet the goals, evaluate progress, and make improvements to ensure continual improvement."

5.1.3 Conformance of the Pest Management Program to the Environmental Management System

An EMS is composed of five basic components. The components and how the pest management program conforms to these components are:

5.1.3.1 Policy

The installation has established an environmental policy to support "mission readiness through environmental stewardship." Pest management environmental objectives to meet this policy are:

1. Reduce pesticide pollution that affects the installation's neighbors through the use of IPM to prevent adverse impact on air, water, and land resources

2. Use IPM to preserve aspects of the natural environment by managing and controlling invasive and nuisance pests and preventing pesticide pollution
3. Ensure and maintain the competence of pest management personnel through certification and training to ensure that effective operations and technologies are used to control pests that minimize waste, prevent air and water pollution, minimize health and safety risks, and dispose of waste safely and responsibly
4. Enable the IPMC to maintain effective oversight and coordination of the program and liaison with local agencies in order to ensure regulatory compliance.

5.1.3.2 Planning

This IPMP is the installation's primary planning document. Specific planning items included in the IPMP are:

1. Legal and other requirements as identified in [section 3.3](#), [appendix F](#), and throughout the plan.
2. General objectives and targets as included in [section 1.3.2](#) and specific pest management objectives included in the IPM sheets in [chapter 8](#).

5.1.3.3 Implementation

Implementation of the EMS is addressed in the following sections of the IPMP:

1. Roles and responsibilities—[section 2.1](#).
2. Pest management personnel training and awareness—[section 2.4](#).
3. Program documentation includes record keeping, reporting, and IPMP updates—[sections 2.3](#) and [1.1.4](#).
4. Operational requirements—[section 1.3.3](#). Operational control is the responsibility of the pest management service providers and is maintained through their contract. Integrated pest management is the operation used for reducing environmental impacts and supporting mission priorities.
5. Safety considerations—[chapter 4](#).

5.1.3.4 Checking and Corrective Action

The success of an EMS depends on the ability of an installation to assess and correct itself. The self-assessment checklist ([appendix C](#)) provides the basis for a self-assessing and self-correcting system.

5.1.3.5 Management Review

The review of the program is conducted during environmental audits by Commander, Navy Installations Command (CNIC).

5.1.3.6 Emergency Management System Definitions

The following are common terms used in EMS:

1. Practice—any activity conducted by an installation or its tenants in performing their missions that has an actual or potential impact on the installation’s assets. The term practice includes equipment, processes, and facilities. It includes both business and management practices.
2. Practice owner—the person, unit, or organization that operates, conducts, controls, or is otherwise responsible for a practice.
3. Environmental aspects—elements of an organization’s activities, products, or services which can interact with the environment.
4. Impact—the positive or negative effects on assets of conducting business and management practices.
5. Vulnerable assets—A resource on which the installation depends or for which it has some responsibility, and which may be impacted by the conduct of practices. Vulnerable assets may include environmental, historical, and cultural areas on and off the installation; personnel health and safety; mission effectiveness; military training lands; real property; financial resources; and public relations status.

5.2 ENVIRONMENTAL CONSIDERATIONS ON THE PESTICIDE LABEL

If the pesticide is potentially harmful to the environment, information will be provided in the following sections of the label:

1. Directions for Use—If pesticide drift is a potential environmental hazard, the directions may require certain application equipment and/or the addition of an anti-drift agent to the tank mix.
2. Environmental Hazards—This section may indicate the pesticide is particularly hazardous to specific animals (e.g., bees, fish). It will also provide information on how to avoid environmental damage.

5.3 MANAGING ENVIRONMENTAL IMPACT

Air, water, and soil risk contamination from pesticides. Pesticide drift to outside the target application area is the primary reason for contamination. Pesticides that pose the highest risk of contamination are herbicides applied to improved and unimproved grounds. Despite being applied in water, pesticides to control mosquito larvae pose a minimal risk due to the target-specific nature of the pesticide (e.g., the biopesticide, *Bacillus thuringiensis israelensis* (Bti), and insect growth regulators). Many procedures to reduce the impact of pest management practices on vulnerable assets are already in place.

5.3.1 Pesticide Pollution

5.3.1.1 Synthetic Pyrethroids

Pyrethroids are insecticides that are widely used for household, garden, and agricultural pest control. Most were replacements for more toxic and environmentally-hazardous organophosphate and carbamate insecticides. Surveys have indicated that some pyrethroids are being detected in urban stream sediment and at least one chemical has been shown to be toxic to sediment dwelling organisms. Specific pyrethroids of concern include:

1. Bifenthrin (i.e., Talstar)

2. Cyfluthrin (i.e., Cykick, Tempo)
3. Beta-Cyfluthrin (i.e., Tempo Ultra)
4. Cypermethrin (i.e., Demon, Cynoff)
5. Deltamethrin (i.e., Deltadust)
6. Lambda-Cyhalothrin (i.e., Demand)
7. Permethrin (i.e., Permanone)
8. Tralomethrin

Outdoor operations pose the greatest risk for pyrethroid contamination of surface water and stormwater runoff. Increased risk operations that may use pyrethroids include landscape plant insect control, agricultural insect control, and uniform repellent treatment.

5.3.1.2 Pollinator Protection from Pesticides

Pollinators, such as bees, bats, birds, and butterflies, are essential to the majority of the flowering plants in the environment and to the production of more than 130 different food crops. Protection of both managed bee colonies that are used in the agricultural outleasings and feral bees must be considered in pest management operations. Pollinators are highly sensitive to many pesticides, especially insecticides. Best management practices to protect pollinators include:

1. Read the pesticide label for any precautions for bees and apply the product in a manner consistent with the label directions.
2. Use less hazardous insecticides. Certain classes of insecticides are highly toxic to bees. These are organophosphates, carbamates, and neonicotinoids (i.e., imidacloprid).
3. Choose the least hazardous insecticide formulation if possible. Granules are the least hazardous. Dusts are the most hazardous because they are similar in size to pollen, stick readily to the hairs on the insect, and can be carried back to the nest.
4. Use insecticides with short residuals. The label will include a residual toxicity (RT) time that is the time after application until there is minimal toxic effect on bees.
5. Avoid applying any bee-toxic pesticides on blooming plants that attract bees.
6. Do not apply insecticides when temperatures are forecast to be unusually low or when the evening forecast is for dew. These conditions extend the period in which the insecticide residue remains toxic.
7. Apply pesticides that are toxic to bees at night when most honeybees have stopped foraging and returned to their hives.
8. Use ground applications instead of aerial applications to reduce pesticide drift out of the target area.

Efforts should be made to conserve bee colonies. If the situation allows, bee swarms and hives should be removed and relocated rather than destroyed. For more on protecting bees and other pollinators from pesticides go to the EPA Pollinator Protection Web site: <http://www2.epa.gov/pollinator-protection>.

5.3.1.3 Pollution Prevention

The following pollution prevention best practices should be used on the installation:

1. Determine the need for pesticide use by conducting surveillance.
2. Apply pesticides and clean equipment away from storm drains to prevent storm water contamination.
3. Do not pour pesticide container rinsate into drains. Apply rinsate to a site listed on the pesticide label, store rinsate to use for future pesticide mixing, or dispose of according to local regulations.
4. Use less-toxic and target-specific pesticides.
5. When applying permethrin repellent to uniforms outdoors, do not mix or apply near storm drains or where water run-off will result in storm water contamination, avoid overspray of pesticide onto the ground, and apply spray tank rinsate to uniforms.
6. Minimize outdoor applications of pyrethroid pesticides.
7. Use targeted spot spraying or crack and crevice applications rather than broadcast or baseboard spraying.
8. Minimize pesticide storage on the installation through proper inventory management and by not allowing contractors to store pesticides on the installation.
9. Use rodent traps rather than rodenticides.

5.3.2 Natural and Cultural Resources Protection

Natural resources on the installation have the potential to be impacted by pest management operations or have an impact on these operations. These pest management operations include, but are not limited to, surveys, trapping, weeding, biological control, and pesticide use. The installation's Integrated Natural Resources Management Plan (INRMP) provides detailed information on the natural resources found on the installation. The INRMP also lists management objectives and recommendations to protect and enhance the installation's natural resources programs.

Any archeological sites on the installation are at low risk for damage due to pest management operations. Certain historical buildings may require special treatment depending on the pest management activity. The installation's ICRMP provides detailed information on the cultural resources found on the installation.

5.3.2.1 Environmentally-Sensitive Areas

Sensitive habitats are declared in the installation INRMP. The IPMC is responsible for knowing the boundaries and restrictions of sensitive habitat(s) on their respective site and communicating this information to any pest control or grounds contractors via the PMPAR. Although the IPMC should have a general knowledge of these areas, any proposed application of pesticides in any of these areas must first

be coordinated and approved by the INRM. Applications of pesticides to wetlands or other environmentally sensitive sites, such as tidal marshes and beaches, or around these areas should be carefully planned. Strict adherence to both the pesticide label and the clearances described in the INRMP are required.

5.3.2.3 Invasive Species Prevention

Invasive species can cause damage to native habitats and introduce diseases to native plants and animals. All military vehicles and materials that have been in contact with foreign soil and returning from foreign locations including Hawaii are required to be cleaned by the deployed unit and inspected by the U.S. Department of Agriculture Plant Pest Quarantine Officers prior to disembarkation onto U.S. soil per [SECNAVINST 6210.2A](#), Quarantine Regulations of the Armed Forces. The purpose of these inspections is to prevent the introduction of disease causing organisms and plant pests. Although the inspections are generally thorough, the equipment of recently redeployed units should be monitored to ensure that any introduced pests are destroyed properly. Any pests found on this equipment should be reported to the environmental division.

5.3.2.4 Threatened and Endangered Species

Section 7(a) of the Endangered Species Act (ESA) ([16 U.S.C. § 1536\(a\)-\(d\)](#)), as amended, requires federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat. Regulations governing this interagency cooperation are included in [50 C.F.R. § 402](#).

A comprehensive list of endangered and threatened species is listed on the [U.S. Fish and Wildlife Service](#) Web site. Listed species habitats are also protected as critical habitat under the ESA. Critical habitat information can be found through species information found at the USF&WS Web site.

Most species of mammals (including bats, raccoons, and skunks) and all but a few birds are protected by state or federal law. Federally-protected species, their nests, or their eggs may not be taken without obtaining permits from the U.S. Fish and Wildlife Service. Control of state-protected species may require permits from the state. All attempts shall be made to solve the problem through habitat alteration, exclusion, fright techniques, or similar approaches before lethal control is attempted.

No individuals of federally-listed threatened or endangered species of plant or animal are known to be found on NASO or NALFF. Six plants considered rare in Virginia and three state listed wildlife species are known to occur on NASO and NALFF. A number of plant and animal species that are considered rare or are listed as threatened or endangered in Virginia are known to occur or have the potential to occur on NASO DNA, including several federally listed species. Detailed information concerning threatened and endangered species on the installation can be found in the installation INRMPs. Lists of special plants, animals, and ecological communities of Virginia may be accessed online at: http://www.dcr.virginia.gov/natural_heritage/infoservices.shtml.

5.3.2.5 Cultural Resources

Pest control operations should be checked for consistency with the Integrated Cultural Resources Management Plan (ICRMP). Pest management operations requiring alteration of the historical structure, including exclusion modifications and significant changes in landscape, will require consultation with the cultural resources program manager (CRPM) through the IPMC.

Termites damage wooden structures and incidental wood in steel and concrete buildings, such as trim or molding, paneling, or door and window frames. Annual termite inspections detect termite infestations before significant damage occurs. Any termite inspections of historical buildings should be documented using DD Form 1070 and reported to the CRPM.

As of 1996, no NRHP-eligible resources had been identified at NASO, with the exception of the Bell-Taylor house built circa 1819-1820. The Bell-Taylor house was transferred from the Navy to the PPV partner.

5.3.3 National Pollutant Discharge Elimination System

Water pollution degrades surface waters making them unsafe for drinking, fishing, swimming, and other activities. As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. In Virginia, the NPDES permit program is administered by the Commonwealth under VPDES (Virginia Pollutant Discharge Elimination System). The permit is available to operators who discharge to waters of the United States from the application of either biological pesticides or chemical pesticides that leave a residue when application is for one of four use patterns:

1. Mosquito and other flying insect pest control
2. Weed and algae pest control
3. Animal pest control
4. Forest canopy pest control
5. Intrusive vegetation pest control.

If pesticide applications for the above use patterns are expected to exceed thresholds, a Notice of Intent (NOI) and preparation of a Pesticide Discharge Management Plan (PDMP) (PDMP template included in [appendix G](#)) may be required. Practicing integrated pest management, recordkeeping, and monitoring are also requirements under the VPDES permits.

The Virginia General Permit to Discharge Pesticides in Water is included on the CD of supporting documents included with this plan. The Hampton Roads Regional Pesticide Discharge Management Plan, which covers mosquito control and aquatic weed control use patterns for all of the Hampton Roads Navy Installations, is also included on the CD.

5.3.4 Spill Prevention and Management

Installation spill prevention guidelines shall be followed. The following spill prevention actions shall be taken:

1. Spill kits shall be readily accessible in all pest management vehicles, mixing sites, and pesticide storage facilities.
2. Pesticides shall only be stored in an area with containment to hold a spill and without a floor drain.

3. Portable mixing pads shall be used when appropriate.
4. All pesticide applicators shall be familiar with the installation spill contingency plan, if available.

All pesticide applicators are trained on spill response procedures as part of their initial pest management certification/licensing training. Spills will be managed as described in the installation spill contingency plan. Further information on preventing and controlling pesticide spills is contained in the [AFPMB TG No. 15](#), Pesticide Spill Prevention and Management.

5.3.5 Hazardous Materials and Hazardous Waste Management

Pesticides, being hazardous materials, shall be managed in accordance with the installation's Hazardous Material Management Plan. Proper inventory management and planning will prevent waste generation. The appropriate use of pesticides produces very little hazardous waste. Rinse water containing pesticide residues usually has very small quantities of chemical and is often applied to the target pest site. Not permitting contractor storage of pesticides and on-site disposal of pesticide waste eliminates the need for hazardous material and waste management. In general, pesticides that are not applied must be disposed of as hazardous waste. Large quantities of hazardous waste may be produced when a pesticide is not used by its expiration date. It may also be produced if a pesticide is not used up before the registration for that pesticide is canceled and the stop-use date has occurred. These pesticides may be disposed of as universal waste only when allowed by the standards for universal waste management found in [40 CFR § 273](#). Any excess pesticides or absorbent material used for spill clean-up requiring disposal requires evaluation by the hazardous waste coordinator in the environmental division to ensure proper disposition.

5.4 PUBLIC PERCEPTION

The misuse of pesticides that lead to animal or human injury can lead to negative publicity for the installation. This is also the case with accidental pesticide spills, especially if they occur off-base or cause contamination of a local natural or cultural resource.

CHAPTER 6

Emergency Pest Management

6.1 PUBLIC HEALTH EMERGENCIES

Pests create a public health emergency when the pests increase in number and/or are found to carry human disease pathogens. A public health emergency, or potential emergency, requiring pest management action may be indicated in several ways. See the Emergency Disease Vector Control Plan (EDVCP) for more information ([appendix H](#)).

6.1.1 Natural or Manmade Disaster

Usually pest problems do not develop immediately after a disaster, such as earthquakes, wildfires, floods, vehicle accidents and terrorist attacks. Public health pest problems may be the result of increased amounts of refuse, collapse of local infrastructure (e.g., lack of garbage pick-up), decay of human and animal bodies, and accumulation of standing water. The potential pest-related consequences are vector-borne or zoonotic disease outbreaks and increased contact with rodents and feral animals that may cause injury.

6.1.2 Vector-Borne or Zoonotic Disease

The report of human cases of vector-borne or zoonotic disease or the detection of infected mosquitoes or sentinel animals is an indicator of a public health emergency or potential emergency and often warrants an increase in pest management activities.

1. Reports of human cases—Many human cases of vector-borne and zoonotic disease identified in local medical facilities are reportable to the local and/or state health agencies. A report of a human case of West Nile virus or other vector-borne disease may initiate an investigation and result in alerts going out to other hospitals and clinics if it appears that the case was locally acquired. Immediate vector control may be necessary to prevent further transmission.
2. Detection of infected mosquitoes or sentinel animals—Routine surveillance for mosquito-borne diseases are conducted by local and State health agencies. These agencies report testing results through the public health system. This surveillance program is an early warning system that indicates when vector control should be initiated or increased to prevent human disease. The CDC's ArboNET Maps, <http://diseasemaps.usgs.gov/mapviewer/> provide mosquito-borne disease information by state.

6.1.3 Animal Attack

Attacks on humans by vertebrate animals almost always require an emergency medical response. If a person is bitten or scratched by a mammal such as a dog, cat, skunk, coyote, fox, raccoon, opossums, or bat, they are at risk of contracting rabies and should begin a treatment program. If the animal that was involved can be positively identified and safely captured, it should be held for testing to determine if it is infected with rabies or other zoonotic diseases.

Bites by venomous snakes are always emergencies, and the victim should be immediately transported to the nearest medical treatment facility. If the snake can be identified or killed/captured, it may help in the selection of the proper antivenin for treatment.

Certain ants, bees, and wasps can cause painful stings and, in some cases, severe allergic reactions. The local fire department is usually the primary responder to bee sting incidents. Fire department personnel have been trained to protect and manage bee sting victims. A stinging incident is not considered a pest control response issue, but rather, an emergency response and any and all appropriate bee control measures can be used. If fire department response is delayed, installation first responders should be trained how to protect themselves and victims from bee stings.

6.2 AGRICULTURAL EMERGENCIES

Agricultural emergencies are the result of the introduction of insects or other animals that can cause extensive damage to agriculture or forestry in the state. Examples of introduced agricultural pests include the Mexican fruit fly and gypsy moth. Military installations can be a conduit for the introduction of these pests due to the movement of military equipment and personnel in and out of the state and the country. The military's role in preventing introduction of these pests is described in [OPNAVINST 6210.2](#), Quarantine Regulations of the Navy and [SECNAVINST 6210.2A](#), Quarantine Regulations of the Armed Forces. Inspections to prevent importation of pests are normally conducted at the port of debarkation in the foreign country.

6.3 EMERGENCY PEST MANAGEMENT RESOURCES

Installation PMSPs maintain pesticides and equipment to manage most emergencies. Contract PMSPs can be used for emergencies if it is written in the contract specifications. The Navy Environmental and Preventive Medicine Unit Two developed a regional Emergency Disease Vector Control Plan (EDVCP) to manage public health emergencies ([appendix H](#)). It includes additional Navy and local government contingency vector surveillance and control resources.

CHAPTER 7

Program Resources

Naval Air Station Oceana has access to the following support agencies and organizations for pest management assistance. Contact information specific to the installation is included in appendix B.

7.1 NAVAL FACILITIES ENGINEERING COMMAND, ATLANTIC APPLIED BIOLOGY

Naval Facilities Engineering Command, Atlantic Applied Biology is currently staffed by six full-time, civilian DOD professional pest management consultants certified in DOD pesticide applicator categories 3, 5, 6, 7, 8, and 11. These personnel are assigned the following responsibilities:

1. Review and approve installation IPMPs in accordance with DOD and Navy policies
2. Provide technical assistance to the installation IPMCs, environmental managers, safety officers, medical officers, and other regional and installation personnel regarding pest management and pesticide regulatory compliance
3. Review and approve or reject pesticides and equipment to be used on installations
4. Conduct on-site program reviews and environmental compliance program external assessments to ensure compliance with the regulations and IPMPs
5. Compile and report actual pesticide use and pest management operations to appropriate DOD agencies
6. Provide IPM recommendations and pest identification;
7. Assist installations with writing or re-writing IPMPs
8. Provide recertification training for DOD-certified applicators as well as initial and recertification training for PMPARs/IPMCs.

The NAVFAC Applied Biology Web site is at:

<https://hub.navy.mil/webcenter/portal/ev/EV+Divisions/EV2+Planning+and+Conservation/Applied+Biology>. This site is on the Naval Facilities Engineering Command intranet and is only available to NAVFAC, CNIC, and U.S. Marine Corps personnel who have an account. To request an account, personnel must have a sponsor with access approve the request through the initial single sign-on (SSO) page.

7.2 NAVY ENTOMOLOGY CENTER OF EXCELLENCE

Navy Entomology Center of Excellence (NECE) is a subordinate command of Navy and Marine Corps Public Health Center and is staffed by full-time, active duty U.S. Navy entomologists. The entomologists

are certified in DOD pesticide applicator categories 3, 5, 6, 7, 8, and 11. The unit's Vector Control Department provides the following products and services:

1. Act as BUMED's professional pest management consultants to provide BUMED review of IPMPs
2. Provide technical assistance on the surveillance and control of vectors on installations
3. Provide vector-borne disease risk assessments and disease prevention recommendations when requested
4. Provide disease vector management consultation and identification services
5. Provide contingency pest management in the event of a disaster or disease outbreak (see the Emergency Disease Vector Control Plan in appendix J)
6. Provide initial certification for DOD-certified pesticide applicators

The Navy and Marine Corps Public Health Center Web site is at:

<http://www.med.navy.mil/sites/nmcphc/nece/Pages/default.aspx>.

7.3 NAVY ENVIRONMENTAL AND PREVENTIVE MEDICINE UNIT TWO

The Navy Environmental and Preventive Medicine Unit Two (NEPMU-2) is staffed by three full-time, active duty Navy entomologists. The entomologists are certified in DOD pesticide applicator categories 3, 5, 6, 7, 8 and 11 and are assigned the following responsibilities:

1. Acts as BUMED's professional pest management consultants to provide BUMED review of Emergency Disease Vector Control Plans
2. Provides technical assistance on the surveillance and control of vectors on installations
3. Provides vector-borne disease risk assessments and disease prevention recommendations when requested
4. Provides disease vector management consultation and identification services
5. Provides contingency pest management in the event of a disaster or disease outbreak.

The NEPMU-2 Web site is at: <http://www.med.navy.mil/sites/nepmu2/Pages/default.aspx>.

7.4 VIRGINIA COOPERATIVE EXTENSION

The Virginia (Virginia Tech, Virginia State University) Cooperative Extension responds to the needs of individuals and organizations in Virginia by providing information and guidance in the areas of agriculture, natural resources, and consumer sciences.

The Web site is at: <http://www.ext.vt.edu/>.

The City of Virginia Beach office of Virginia Cooperative Extension is the local extension office that serves the county where NASO is located. Pest management service providers can obtain soil sample kits

from the office and send them in for analysis. Extension agents can also visit the base to help in diagnosing problems.

The City of Virginia Beach office of Virginia Cooperative Extension Web site is at: <http://offices.ext.vt.edu/virginia-beach/>. The office can be contacted at (757) 385-4769 or via their Web site.

7.5 VIRGINIA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES

Personnel from the Virginia Department of Agriculture and Consumer Services Office of Pesticide Services are the pesticide regulatory officials for the state. The main office is located in Richmond and is staffed with personnel that can provide information regarding state and local pesticide regulations.

The VDACS Web site is at: <http://www.vdacs.virginia.gov/>.

7.6 VIRGINIA DEPARTMENT OF HEALTH

Public health biologists provide vector surveillance and control assistance, primarily to jurisdictions in Virginia that do not have a vector surveillance program

The VDH Environmental Epidemiology Web site is at: <http://www.vdh.virginia.gov/environmental-epidemiology/>.

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CHAPTER 8

Integrated Pest Management Sheets

The following sheets provide guidance for control of common pests. They should be used as a basis for pest management action, but should not be considered “regulations” for the job. Management sheets should be used as guidelines to help implement reasonable, cost effective, safe, environmentally responsible control of pests. The integrated pest management coordinator (IPMC) or other pest control personnel may choose to establish different thresholds and use IPM methods that are more appropriate to their local circumstances. Write in any new ideas or programs to maintain a document that will remain applicable over time. Any suggested pesticides from these sheets are required to be approved before use. The following IPM sheets represent the more common pests that occur in Virginia and not necessarily all pests covered by contract.

NUISANCE PESTS

American Cockroaches

Cockroaches in Food Preparation Areas

Drain Flies

Fruit Flies

Nuisance Ants

Stored Product Pests in Food Storage Areas

HEALTH-RELATED PESTS

Bed Bugs

Filth Flies

Fleas In and Around Buildings

Mites

Mosquitoes, Adult Control

Mosquitoes, Larval

Spiders

Stinging Insects

Ticks

STRUCTURAL PESTS

Drywood Termites

Subterranean Termites

TURF AND ORNAMENTAL PESTS

Fire Ants

Ornamental Plant Pests

Snails and Slugs

VERTEBRATE PESTS

Bats

Nuisance Birds

Feral Cats

Raccoons

Rodents

VEGETATION MANAGEMENT

Invasive Weeds in Natural Areas

Terrestrial Weeds

Weeds in Right of Ways

Nuisance Pests

American Cockroaches

Cockroaches in Food Preparation Areas

Drain Flies

Fruit Flies

Nuisance Ants

Stored Product Pests

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American Cockroaches

TARGET PEST	
TARGET PEST(S)	American cockroaches (<i>Periplaneta americana</i>)
TARGET SITE(S)	Office buildings, warehouses, residences, storm sewers
PURPOSE	Control cockroaches that may cause damage through food contamination, affect human health through allergic reactions or “entomophobia”, or be an aesthetic or morale nuisance.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>All Personnel</u>: Ensure proper sanitation in all living and working spaces. • <u>Preventive Medicine Technicians</u>: Conduct facility sanitation inspections, enforce food-handling regulations, and provide pest management recommendations. • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control pest infestations. • <u>Integrated Pest Management Coordinator</u>: Oversee all pest management operations and ensure the use of IPM. • <u>Pest Management Performance Assessment Representative</u>: Ensure contracted PMSPs perform work in accordance with contract specifications. • <u>Facilities Maintenance Provider</u>: Perform facility repairs and improvements that prevent and minimize pest infestations as requested.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual inspections (visual surveys of low to moderate infestations may require visiting the facility at night) <ul style="list-style-type: none"> ○ Observation of pests in harborages ○ Inspect floor drains ○ Inspect areas with heat and moisture • Application of a flushing agent to suspected harborages • Sticky trap surveys • Vacuum surveys of harborages • Personnel complaints: including information on when, where, and how many pests were observed • Conduct pre- and post-treatment surveys to determine whether control operation was effective
FREQUENCY	<ul style="list-style-type: none"> • Daily observation by building occupants • Monthly observation and/or sticky trap monitoring by cognizant pest management or preventive medicine personnel

RECOMMENDED ACTION THRESHOLD	<ul style="list-style-type: none"> • Visual sighting of one or more cockroaches (all life stages) per room per survey—flushing agents or sticky traps may be used • Sighting of one egg capsule per survey
NONCHEMICAL CONTROL	
SANITATION	<ul style="list-style-type: none"> • Thoroughly clean potential food sources in buildings, especially coffee messes and food preparation areas. • Clean spills up as soon as possible. • Clean out floor drains by rinsing with hot water or using cleaners specifically designed to remove sludge from pipes. • Store food in pest-proof containers. • Empty trash cans daily or avoid putting food items in trash. • Do not eat at desk; eat in a designated coffee mess or dining area.
ELIMINATE HARBORAGE	<ul style="list-style-type: none"> • Seal cracks and crevices with caulk. • Remove corrugated cardboard and other materials that can serve as harborage.
ELIMINATE STANDING WATER	<ul style="list-style-type: none"> • Fix leaking plumbing especially around sinks, faucets, and dishwashers. • Remove standing water from floors after daily cleaning.
PREVENTION	Inspect food boxes before bringing them into a building.
MECHANICAL REMOVAL	Vacuum cockroaches from their harborages. Use a wet/dry vacuum cleaner filled with water or empty and dispose of vacuum bag immediately.
PEST PROOFING	<ul style="list-style-type: none"> • Seal holes in walls and ceilings and other areas that may serve as cockroach harborage as required. Request support from facilities maintenance provider if necessary. • Screen floor drains if possible.
EDUCATION	Proper storage of food and sanitation to prevent infestations.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Pyrethroids, fipronil, hydramethylnon, indoxacarb, imidacloprid, abamectin, boric acid, insect growth regulators.
METHODS	<ul style="list-style-type: none"> • <u>Flushing Agents</u>: The pest management service provider may use aerosol contact pesticides directed into potential harborage areas to flush out and kill pests as needed. • <u>Crack and Crevice/Spot Treatment Residuals</u>: The pest management service provider may apply a residual pesticide spray to all known or suspected harborages, feeding sites, or passageways (such as under dishwashers and refrigerators or behind stoves). • <u>Baits</u>: Cockroach baits (station containing solid bait or injectable style gel baits) will be used as much as possible. Gel bait can be applied to a sheet of hardware cloth and hung in manholes. Proper bait placement is critical to the success of treatment. Do not apply other insecticides around bait treatment areas. • <u>Dusts</u>: Boric acid dust is an effective low-toxicity insecticide that can be applied to wall voids and into manholes of storm sewers. The treatment area should remain dry after the application to avoid washing the dust away. • <u>Growth Regulators</u>: Affect the growth of the insect and prevents them from developing into egg-laying adults. Insect growth regulators will always be mixed with knock-down pesticides.

CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Exposed food products, food containers, counter tops, any surface where food may be stored or prepared, or any food storage area. • Minimize application of pesticides directly into drains. • Use care in selecting pesticides for use in storm sewers as this can lead to storm water pollution problems. Applications should be made when dry and storm water is not anticipated within a week.
PROHIBITED PRACTICES	<ul style="list-style-type: none"> • Do not do preventive baseboard spraying in the absence of a pest. • Do not apply liquid or dust formulations to occupied spaces or in the presence of exposed food. • In food service areas, use only insecticides specifically labeled for those areas.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Most insecticides used for indoor pest control are low in toxicity (signal word “Caution”), but care should be taken to prevent exposure to humans and domestic animals. • Outdoor treatments with pyrethroids are susceptible to runoff and contamination of storm water. • Disposing of pesticides in a drain or storm drain is strictly prohibited.

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Cockroaches in Food Preparation Areas

TARGET PEST	
TARGET PEST(S)	Cockroaches (primarily German cockroach, <i>Blattella germanica</i>)
TARGET SITES(S)	<ul style="list-style-type: none"> • Food service facilities • All government dining facilities including galleys, sculleries, bakeries, storage, and mess decks. • All MWR facilities including clubs, restaurants, and storage. • All commercial lessees. • Coffee messes and snack bars in administrative areas.
PURPOSE	Control cockroaches that may cause food contamination, allergic reactions, or a nuisance.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Food Service Personnel</u>: Ensure compliance with food handling regulations that prevent pest infestations. • <u>Installation Preventive Medicine Technicians</u>: Conduct food service inspections, enforce food handling regulations, provide quality assurance for pest control, and provide pest management recommendations. • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control infestations. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Facilities Maintenance Provider</u>: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual inspections <ul style="list-style-type: none"> ○ Observation of pests in harborages ○ Application of a flushing agent • Sticky trap surveys • Vacuum surveys of harborages • Personnel complaints: including information on when, where, and how many pests were observed. • Conduct pre- and post-treatment surveys to determine whether control operation was effective. • Surveys should identify environmental conditions conducive to infestation.
FREQUENCY	<ul style="list-style-type: none"> • Daily observation by food service personnel. • Monthly observation and/or sticky trap monitoring by cognizant preventive medicine personnel.

ACTION THRESHOLD	<ul style="list-style-type: none"> • Visual sighting of 3 or more cockroaches (all life stages) per room per survey. Flushing agents or sticky traps may be used. • Sighting of 1 egg capsule per survey.
NONCHEMICAL CONTROL	
SANITATION	<ul style="list-style-type: none"> • Cleaning of floors and all surfaces to include debris and grease removal. • Clean up spills. • Store food in sealed containers. • Remove cardboard boxes from storage areas. • Keep garbage in containers with tight-fitting lids and use liners.
ELIMINATE STANDING WATER	<ul style="list-style-type: none"> • Fix leaking plumbing especially around sinks, faucets, and dishwashers. • Remove standing water from floors after daily cleaning.
MECHANICAL REMOVAL	Vacuum cockroaches from their harborages. Use a wet/dry vacuum cleaner filled with water or empty and dispose of vacuum bag immediately.
PEST PROOFING	Seal holes in walls, ceilings, and other areas that may serve as cockroach harborage as required. Request support from facilities maintenance provider if necessary.
EDUCATION	<ul style="list-style-type: none"> • Proper storage of food and sanitation to prevent infestations and increase effectiveness of pesticide applications • Understanding of how baits work
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Fipronil, hydramethylnon, boric acid, indoxacarb, imidacloprid and abamectin baits; boric acid dust; pyrethroids
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • <u>Flushing Agents</u>: The pest management service provider may use aerosol contact pesticides directed into potential harborage areas to flush out and kill pests as needed. • <u>Crack and Crevice Residuals</u>: The pest management service provider may apply (by crack and crevice technique) a residual pesticide spray to all known or suspected harborages, feeding sites, or passageways. • <u>Spot Treatment Residuals</u>: A residual pesticide may be applied as a spot treatment to indicated areas (such as under dishwashers and refrigerators or behind stoves). • <u>Baits</u>: Cockroach baits (station or injectable style gel baits) will be used as much as possible. Gel baits can be more effective than dry baits due to the moisture in the bait and because it can be applied to more areas. • <u>Growth Regulators</u>: Insect growth regulators will always be mixed with knock-down pesticides.
RESTRICTIONS/ REGULATIONS/ PERMITS	<ul style="list-style-type: none"> • Do not do spot treatments indoors. • Do not apply to baseboards as a preventive residual spray. • Do not apply liquid or dust formulations of insecticides in occupied spaces.
CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Exposed food products, food containers, counter tops, any surface where food may be stored or prepared, or any food storage area. • Ensure that insecticides do not enter drains, streams, lakes, or other surface water.

<p>PROHIBITED PRACTICES</p>	<ul style="list-style-type: none"> • Do not use ultrasonic pest repelling devices. • Do not use aerosols, dusts, and other insecticide formulations that can become airborne in occupied spaces or when food is exposed; baits may be applied when spaces are occupied • Do not do preventive baseboard spraying in the absence of a pest.
<p>SAFETY AND ENVIRONMENTAL PRECAUTIONS</p>	<ul style="list-style-type: none"> • Allow for ventilation of spaces after liquid insecticides have been applied. • Clean food preparation surfaces after treatment. • Applicators must wear personal protective equipment as required by the product label. • Environmental impact is minimal since applications are performed indoors

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Drain Flies

TARGET PEST	
TARGET PEST(S)	Drain flies (<i>Psychoda</i> sp.); sometimes called moth flies, sewage flies, or filter flies.
TARGET SITES(S)	Buildings where adult flies may become a nuisance. These flies may be very common around sewage treatment facilities, where they are considered beneficial decomposers of organic matter.
PURPOSE	Control flies that may be both a nuisance and a health hazard due to respiratory problems that can be associated with the inhalation of fly hairs and body parts. Drain flies are also able to mechanically transfer bacteria and other microorganisms from their breeding sites to places where humans live and work.
RESPONSIBILITIES	<ul style="list-style-type: none"> • <u>All personnel</u>: Ensure proper sanitation in all living and working areas to avoid conditions that are attractive to flies. • <u>Facilities Maintenance Service Provider</u>: Periodically clean drain pipes to prevent buildup of organic matter where drain flies breed. • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control infestations. • <u>Pest Management Performance Assessment Representative</u>: Ensure contracted pest management service provider performs work in accordance with contract specifications.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • <u>Visual sighting</u>: Adult drain flies will congregate on walls and windows of rooms containing drains where drain flies are breeding. Adults are weak fliers, and usually make a series of short, erratic flights to move from one area to another. The body and wings are hairy, and the wings are held roof-like over the body when at rest, giving the fly a moth-like appearance. Adult coloration is yellow, gray, or black. • <u>Source drain</u>: An attempt should be made to locate the drain(s) from which flies are emerging so that the breeding sites can be targeted. Sealing the suspected drain opening with a glue board, masking tape, or inverted plastic cup overnight should trap adult flies if they are present.
FREQUENCY	Scheduled surveys are not typically required. The presence of flies resting on walls in restrooms and other areas with drains will typically prompt a request for pest control.
ACTION THRESHOLD	Sufficient numbers of flies to constitute a nuisance indicate the need for treatment.

NONCHEMICAL CONTROL	
HABITAT REMOVAL	<ul style="list-style-type: none"> • <u>Drain cleaning</u>: Drain flies breed in accumulated organic matter inside drainpipes. This material may be removed with over-the-counter drain cleaners. A stiff brush may be necessary to remove heavy buildup. • <u>Bacterial drain cleaners</u>: Products containing a specialized complex of bacteria can be used to digest the organic matter in which drain fly larvae breed and should then be followed by rinsing with very hot water. These products cannot be used in conjunction with other cleaning products, and are only available to pest control operators.
EDUCATION	<ul style="list-style-type: none"> • Educate building occupants on sanitation, and proper food disposal.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Pyrethrum-based
METHOD OF DISPERSAL	Pyrethrum-based aerosols may be used to kill adult flies. However, the breeding site must be eliminated to prevent additional flies from emerging.
RESTRICTIONS/REGULATIONS/PERMITS	Do not apply liquid or dust formulations in occupied spaces.
CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Chemical pesticide use inside hospitals should be minimized as much as possible to avoid exposing patients. Control should focus on drain cleaning, which will provide better control and reduce the health risks associated with pesticides. • Ensure that insecticides do not enter drains, streams, lakes and other surface water.
PROHIBITED PRACTICES	<ul style="list-style-type: none"> • Do not use ultrasonic pest repelling devices. • Do not apply aerosols, dust, and other insecticide formulations that can become airborne to occupied spaces or when food is exposed.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Allow for ventilation of spaces after liquid insecticides have been applied. • Clean food preparation surfaces after treatment. • Applicators must wear personal protective equipment as required by the product label. • Minimal



Fruit Flies

TARGET PEST	
TARGET PEST(S)	Small flies in the family Drosophilidae, commonly called fruit flies or vinegar flies.
TARGET SITES(S)	Refuse containers, offices with windows facing the loading docks, galleys, and other areas that may have ripening fruit.
PURPOSE	Control flies that reduce the quality of life.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>All Personnel</u>: Ensure proper sanitation in all living and working areas to avoid conditions that are attractive to flies. • <u>Janitorial Personnel</u>: Ensure that refuse containers are emptied daily. Also, periodically clean refuse containers to prevent the buildup of organic matter where flies breed. • <u>Facilities Maintenance Provider</u>: Provide necessary building repairs and modifications needed for pest exclusion. • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control infestations. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Flies are attracted to ripening and rotting fruit, as well as other decaying organic matter. • Flies can be seen hovering around refuse containers and resting on walls and cabinets near refuse containers. Fruit flies can be distinguished from other small flies by their tan or yellow colored bodies and red eyes.
FREQUENCY	<ul style="list-style-type: none"> • Scheduled fly surveying is generally not necessary. • Scheduled sanitation should prevent infestations.
ACTION THRESHOLD	The presence of flies in numbers constituting a nuisance for personnel indicates a need for control.
NONCHEMICAL CONTROL	
SANITATION	<ul style="list-style-type: none"> • <u>Refuse removal</u>: Waste baskets and other refuse containers should be emptied daily to prevent the buildup of decaying matter that will attract flies. • <u>Refuse container sanitation</u>: Fruit flies are attracted to moist fermenting foods. All they need for breeding is a moist film of decaying organic matter. They will lay their eggs in garbage disposals, empty bottles and cans, trash containers, mops and cleaning rags. Keep all these items clean. Over time organic debris builds up on the bottom and sides of waste containers,

	particularly large dumpster and other trash bins. Refuse containers should be periodically steam-cleaned or washed to remove organic matter.
ELIMINATE FOOD SOURCES	<u>Fruit bowls</u> : Fruit flies are attracted to volatiles produced by ripening fruit. Store fruit in the refrigerator in order to avoid attracting fruit flies and other pests.
PEST PROOFING	<u>Exclusion</u> : Flies may migrate indoors from breeding sites located outdoors. Tight fitting screens and weather proofing around doors and windows (caulking, weather stripping, etc.) may delay entrance.
CHEMICAL CONTROL	
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • For chemical controls to work, all breeding sites must be found and cleaned first. Potential breeding sites which are inaccessible (e.g., garbage disposals and drains) can be inspected by taping a clear plastic food storage bag over the opening overnight. If flies are breeding in these areas, the adults will emerge and be caught in the bag. • Adults may be killed with pyrethrum-based aerosol insecticides applied as a space spray or surface residual.
CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Fruit fly infestations often occur in food-preparation areas. Ensure that the insecticide is labeled for use in food preparation areas, and that foods are not contaminated during application. • Ensure that insecticides do not enter drains, streams, lakes, and other surface water.
PROHIBITED PRACTICES	<ul style="list-style-type: none"> • Do not use ultrasonic pest repelling devices. • Do not use aerosols, dusts, and other insecticide formulations that can become airborne in occupied spaces.



Nuisance Ants

TARGET PEST	
TARGET PEST(S)	Pharaoh ants, Argentine ants, black ants, crazy ants, and other nuisance species that invade structures
TARGET SITE(S)	Offices, food preparation and storage areas, living spaces, playgrounds, patios, barracks, medical treatment facilities, and other spaces invaded by ants
PURPOSE	Control ants that are a nuisance in offices, eat and contaminate food, and can make spaces uninhabitable or unusable.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>All Personnel</u>: Ensure proper sanitation in all living and working spaces. • <u>Preventive Medicine Technicians</u>: Conduct facilities sanitation inspections, enforce food-handling regulations, and provide pest management recommendations. • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control pest infestations. • <u>Integrated Pest Management Coordinator</u>: Oversee all pest management operations and ensure the use of IPM. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor PMSP performs work in accordance with contract specifications. • <u>Grounds Maintenance Provider</u>: Control aphids and similar insects on ornamental plants that attract and feed ants. • <u>Facilities Maintenance Provider</u>: Perform facility repairs and improvements that prevent and minimize pest infestations as requested.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual inspections <ul style="list-style-type: none"> ○ Observation of foraging scout ants or ant trails ○ Follow ant trails to building entryways and to food source ○ Follow ant trails to nests • Personnel complaints: including information on when, where, and how many pests were observed. • Conduct pre- and post-treatment surveys to determine whether control operation was effective
FREQUENCY	<ul style="list-style-type: none"> • Daily observation by building occupants • Monthly inspections outdoors around buildings to identify ant nests

RECOMMENDED ACTION THRESHOLD	<ul style="list-style-type: none"> • Visual sighting of ants indoors • Food service areas: 3/room • Living areas: 5/room • Medical treatment facilities: 1/room • Grounds: 2 mounds/yard
NONCHEMICAL CONTROL	
SANITATION	<ul style="list-style-type: none"> • Thoroughly clean potential food sources in buildings, especially coffee messes and food preparation areas. • Thoroughly clean food preparation surfaces, countertops, and stoves. • Remove and discard food that is attractive to ants. • Clean up food and drink spills as soon as possible. • Do not leave dirty dishes on countertops or in sinks. • Some ants are attracted to moisture. Fix leaky plumbing and remove other sources of water.
MECHANICAL REMOVAL	<ul style="list-style-type: none"> • Use a wet sponge or cloth to wipe up ants. • Spray ant trail with household cleaner or soap water then wipe up.
PEST PROOFING	<ul style="list-style-type: none"> • Put food in tightly sealed containers. • Seal holes in walls with caulk or, temporarily, with petroleum jelly.
CONTROL OF PLANT INSECTS	<ul style="list-style-type: none"> • Ants live in cooperation with some plant-infesting insects such as aphids. • These insects produce sugars that are food for the ants, while the ants provide protection for the plant-sucking insects. • Control aphids and other plant-sucking insects on plants
EDUCATION	<ul style="list-style-type: none"> • Proper storage of food and sanitation to prevent infestations. • Use of soapy water to control ants indoors.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	<ul style="list-style-type: none"> • Arsenic trioxide, abamectin, borate-based products, fipronil, hydramethylnon, sulfuramid; pyrethroids (e.g., bifenthrin, lambda cyhalothrin)
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • <u>Baits</u>: Bait stations can be used indoors or outdoors. Granular baits can be applied outdoors near nests. Baits are very specific to the species of ant, and effective in killing the egg-producing queen of the colony, but may require 2–3 days for complete control. • <u>Barrier Spraying</u>: Application of a residual outdoors around a building may be necessary if there are many nests and entryways into the building. May also be necessary if nests are difficult to find. Usually requires periodic reapplication if ant nests are not destroyed. • <u>Dusts</u>: Boric acid dust is an effective low-toxicity insecticide that can be applied to wall voids where ants may be nesting. The treatment area should remain dry after the application to avoid washing the dust away. • <u>Granular insecticide</u>: Acute toxicant in granular form. Only effective if applied directly to the nest.
CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Exposed food products, food containers, counter tops, on any surface where food may be stored or prepared, or any food storage area. • Outdoors where children or pets may be exposed to pesticides. • Medical treatment facilities. • Streams, lakes, and other water sources. Avoid stormwater runoff of insecticides and do not apply directly to water. Many insecticides are highly toxic to aquatic organisms.

PROHIBITED PRACTICES	<ul style="list-style-type: none"> • Do not do spot treatments indoors. • Do not do preventive baseboard spraying in the absence of a pest. • Do not apply liquid or dust formulations of insecticides in occupied spaces.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Liquid and dust insecticides should not be applied to occupied spaces or when food is exposed; baits may be applied when spaces are occupied. • Allow for ventilation of spaces after liquid insecticides have been applied. • Clean food preparation surfaces after treatment. • Applicators must wear personal protective equipment as required by the product label. • Pyrethroid insecticides can be highly toxic to aquatic organisms.

COMMENTS:

For most people, ants become a problem and require action when they enter a building. Sometimes ants may nest in walls, especially if there is moisture in those areas; particularly bathrooms and kitchens. Surveys need to determine if the source of the infestation is indoors or outdoors. Control of ant nests outdoors during the spring and early summer may reduce ant problems later in the season. The most effective ant baits are slow acting to give worker ants enough time to carry small amounts of bait back to the nest where they will feed other ants and eventually kill the entire colony. For this reason, it may take several days to see results.

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Stored Product Pests in Food Storage Areas

TARGET PEST	
TARGET PESTS	Beetles and moths that infest food products
PURPOSE	Control stored product pests (SPPs) that may cause food contamination, medical problems, or be unsightly.
RESPONSIBLE PARTY	<ul style="list-style-type: none"> • <u>Food Service Personnel</u>: Ensure compliance with food handling regulations that prevent pest infestations; report infested food items to appropriate authority. • <u>Installation Preventive Medicine Technicians</u>: Conduct food service inspections, enforce food handling regulations, and provide pest management recommendations. • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control infestations. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>U.S. Army Veterinary Services</u>: Perform food quality inspections of storage facilities including surveys for SPPs.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual inspections of food items before and during storage. Conduct in accordance with MILSTD 904B. • Attractant traps may be used to monitor movement and spread of SPPs in storage areas. They are inefficient as a means of control. Guidelines for the use of traps are found in AFPMB TG 27, Stored Product Pest Monitoring Methods • Personnel complaints
FREQUENCY	<ul style="list-style-type: none"> • Particular attention should be given to animal feed which are a common source of infestation. • Daily observation by food service personnel • Monthly observation by cognizant preventive medicine personnel. • Routine food inspections by US Army veterinary technicians.

ACTION THRESHOLD	<ul style="list-style-type: none"> • Observation of any number of SPP (whole insect, webbing, droppings, skins) inside or immediately outside of package. This should initiate a more thorough survey and control if necessary. • Observation of one SPP on a monitoring trap.
NONCHEMICAL CONTROL	
SANITATION	<ul style="list-style-type: none"> • Maintain thorough sanitation of food storage area • Clean up all spills immediately
PACKAGING AND STORAGE	<ul style="list-style-type: none"> • Ensure all packages are intact. Place in sealed insect proof containers if available • Repair any torn packages • Rotate food items: “first-in-first-out”; do not allow food to remain stored for long periods of time • Store on pallets off the floor. • Maintain adequate ventilation and lighting in storerooms.
ISOLATION	Remove infested items from the storeroom if they can’t be disposed of immediately.
MECHANICAL REMOVAL	Vacuumping, sweeping, mopping of floors on which SPPs are found may be used. Ensure that a wet/dry vacuum filled with water is used or remove, empty, and dispose of vacuum bag immediately.
FREEZING/ HEATING	SPPs may be killed by freezing or cooking. Insects can be removed from food item by sifting
SURVEY (DISPOSAL)	Dispose of infested food items (see MIL-STD-904C, Detection, Identification, and Prevention of Pest Infestation of Subsistence for guidance)
CHEMICAL CONTROL	
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • Since many infestations are confined to the food packages, nonchemical methods are the preferred control method. • <u>Crack and Crevice Applications</u>: The pest management service provider may apply (by crack and crevice technique) a contact or residual pesticide spray to areas in storerooms where insects may be found after leaving infested packages. • <u>Insect Growth Regulators</u>: Insect growth regulators (IGR) prevent immature insect larvae from developing into mature adults. IGRs may be useful for chronic SPP problems, but cannot be applied to food or cause immediate kill of the pest. It must be used in conjunction with other forms of control. • <u>Fumigation</u>: Consult a NAVFAC pest management consultant before considering fumigation. Fumigation can be performed on pallets of food items. It will penetrate most materials to kill insects inside the food without harming or making inedible the food item.
CONSIDERATIONS	
PROHIBITED PRACTICES	<ul style="list-style-type: none"> • Do not use aerosols, dusts, and other insecticide formulations that can become airborne in occupied spaces. • Do not do preventive baseboard spraying in the absence of a pest.
SENSITIVE AREAS	<ul style="list-style-type: none"> • Exposed food products, food containers, counter tops, on any surface where food may be stored or prepared, or any food storage area. • Ensure that insecticides do not enter drains, streams, lakes and other surface water.

COMMENTS:

Review TG 29, Integrated Pest Management In and Around Buildings or view the Department of Defense Armed Forces Pest Management Board web site at

<http://www.acq.osd.mil/eie/afpmb/docs/techguides/tg29.pdf>

Review TG 27, Stored Product Pest Monitoring Methods at

<http://www.acq.osd.mil/eie/afpmb/docs/techguides/tg27.pdf>

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HEALTH-RELATED PESTS

Bed Bugs

Filth Flies

Fleas In and Around Buildings

Mites

Mosquitoes, Adult Control

Mosquitoes, Larval

Spiders

Stinging Insects

Ticks

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Bed Bugs

TARGET PEST	
TARGET PESTS	Bed Bugs (<i>Cimex</i> spp.)
PURPOSE	Control bed bugs that can cause bites or allergic reactions, be a nuisance, and affect morale and quality of life. Can be carried on board ship from infested barracks.
RESPONSIBLE PARTY	<ul style="list-style-type: none"> • <u>Berthing Quarters Managers</u>: <ul style="list-style-type: none"> ○ Establish rules and regulations to prevent establishment and propagation of pests. ○ Prevent movement of furniture between rooms if bedbugs are identified • <u>Berthing Quarters Residents</u>: <ul style="list-style-type: none"> ○ Comply with quarter's rules and regulations. ○ Maintain sanitation and cleanliness of personal items such as bedding. • <u>Cognizant Military Unit Leadership</u>: The command leadership, from the commanding officers to the non-commissioned officers, is responsible for their personnel and must enforce public health measures to protect their health and well-being. Sanitation and other pest prevention measures should be enforced through room inspections if necessary. • <u>Installation Preventive Medicine Technicians</u>: <ul style="list-style-type: none"> ○ Conduct berthing inspections ○ Enforce berthing regulation per NAVMED P-5010 ○ Provide informal quality assurance for pest control ○ Provide pest management recommendations • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control infestations. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Facilities Maintenance Provider</u>: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.

SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Personnel complaints: Complaints are commonly received when a patient goes to medical complaining of itching or dermatitis due to bites. • Visual inspections <ul style="list-style-type: none"> ○ Look for pests in mattresses, box springs, bed frames, and headboards. Less commonly found on baseboards and on walls behind furniture. ○ Application of a flushing agent to cracks and crevices • Sticky trap surveys • Vacuum surveys of harborages • Conduct pre- and post-treatment surveys to determine whether control operation was effective • Dry ice/CO₂ attractant traps • Bed-bug sniffing dogs are available.
FREQUENCY	<ul style="list-style-type: none"> • Daily observation by residents. • Observation during zone inspections by unit command leadership personnel. • Monthly observation and/or sticky trap monitoring by PMT of spaces post-treatment. • In visitor's quarters, lodges and other hotel rooms, housekeeping should perform inspections during cleaning.
ACTION THRESHOLD	Detection of 1 bed bug, cast skins, or fecal stains should initiate survey and control.
NONCHEMICAL CONTROL	
SANITATION	<ul style="list-style-type: none"> • Thorough cleaning (field day) shall be performed in each room. • Remove all clutter particularly from under and around beds to reduce harborage. Removal of clutter also enables easier inspection of furniture and mattresses. <p>Note: When removing materials from an infested room, either treat the material or place in bags then seal before taking out of room to prevent spread of the bugs.</p>
WASHING/ CLEANSING	<ul style="list-style-type: none"> • Thoroughly wash bedding • Clean mattresses, box springs, frames, headboards with soap and water.
MECHANICAL REMOVAL	Vacuum bedbugs from their harborages on mattresses, headboards and other surfaces where they are found. Use a wet/dry vacuum cleaner filled with water or empty and dispose of vacuum bag immediately.
ISOLATION AND EXCLUSION	<ul style="list-style-type: none"> • Prevent removal of furniture from rooms found to be infested until they are cleaned. • Remove debris from around outside of buildings • Repair cracks in walls • Caulk windows and doors • Caulk cracks and crevices in bed frames and furniture • Specially designed mattress encasements without seams will prevent bed bugs from getting on mattresses and leaving mattresses to infest other areas.

HEAT	<ul style="list-style-type: none"> Heat infested articles and/or areas through to at least 113 °F (45 °C) for at least one hour. The higher the temperature, the shorter the time needed to kill bed bugs at all life stages. A pesticide barrier around doorways may be necessary to prevent spread of fleeing bed bugs to adjacent spaces. Infested bedding and clothing can be placed in a clothes dryer on high heat. <p>Note: Heat may damage sprinkler systems and will require protective measures before treatment of rooms.</p>
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	<ul style="list-style-type: none"> Pyrethrin, pyrethroids (cyhalothrin, bifenthrin, deltamethrin), hydroprone (IGR), chlorfenapyr, dichlorvos strips, silica gel, boric acid Chemicals that leave a residual are preferred.
METHOD OF DISPERSAL	<p>Chemical control using insecticides alone will not control/prevent a bed-bug infestation.</p> <ul style="list-style-type: none"> <u>Flushing Agents</u>: The pest management service provider may use aerosol contact pesticides directed into potential harborage areas to flush out and kill pests as needed. <u>Crack and Crevice Residuals</u>: The pest management service provider may apply (by crack and crevice technique) a residual pesticide spray to all known or suspected harborages. <u>Spot Treatment Residuals</u>: A residual pesticide may be applied as a spot treatment to indicated areas. <u>Mattress Treatment</u>: Infested mattresses can be treated. Using a residual insecticide will prevent future infestations. <u>Slow-release vapor strips</u>: A plastic strip impregnated with Dichlorvos slowly releases an insecticide vapor that will control flying and crawling pests. Treatment times are 48–72 hours for adults and nymphs and 7–14 days for eggs. Any room/area where strip is placed must be vacated by people and pets during the treatment. This can also be placed in containers or bags to treat infested materials. <u>Insect Growth Regulators (IGRs)</u>: Affect the development and reproduction of predators. When properly applied, IGRs have essentially no effect on vertebrate metabolism because of their mode of action and low application rates, but they have a significant impact on bed-bug molting, fertility, and egg hatching success.
RESTRICTIONS	<ul style="list-style-type: none"> Insecticide resistance may cause treatment failure Use of aerosols, dusts, and other insecticide formulations that can become airborne shall not be applied in occupied spaces. Spaces must be vacated before treatment and then ventilated and the insecticide allowed to dry before personnel are allowed to occupy the space.
CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> Some persons may be sensitive to some pesticides. Pesticide applications should be avoided if possible and be made only to areas where pests have been observed. The insecticide on treated mattresses should be allowed to dry and then should be covered with a mattress cover before use. Ensure that insecticides do not enter drains, streams, lakes, or other surface water.

PROHIBITED PRACTICES	<ul style="list-style-type: none"> • Do not use ultrasonic pest repelling devices. Do not apply aerosol, dust, or other insecticide formulations that may become airborne in occupied spaces. • Do not do preventive baseboard spraying in the absence of a pest.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	Minimal

ADDITIONAL INFORMATION:

Treatment failure may be due to incomplete surveys for the pest, improper application, and insecticide resistance. Follow-up inspections and control are crucial to eliminating the bugs.



Filth Flies

TARGET PEST	
TARGET PEST(S)	House flies (<i>Musca domestica</i>), face flies (<i>Musca autumnalis</i>), stable flies (<i>Stomoxys calcitrans</i>), little house flies (<i>Fannia</i> spp.), and other fly species that breed in garbage, compost, manure, or other organic debris.
TARGET SITES(S)	<ul style="list-style-type: none"> • Animal kennels or stables • Refuse storage areas • Any places where organic debris may accumulate • Dumpsters • Garbage dumps and recycle centers
PURPOSE	Reduce populations of flies that are a nuisance and may mechanically transmit pathogens.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Food Service Personnel</u>: Ensure compliance with food handling regulations that prevent pest infestations • <u>Installation Preventive Medicine Technicians</u>: Conduct food service inspections, enforce food handling regulations, provide quality assurance for pest control, and provide pest management recommendations • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control infestations. • <u>Janitorial Personnel</u>: Ensure that refuse containers are frequently emptied and sanitized. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Facilities Maintenance Provide</u>: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.
SURVEILLANCE	

METHODS	<ul style="list-style-type: none"> • Visual sighting <ul style="list-style-type: none"> ○ Flies that enter buildings will congregate around windows. ○ Flies may be seen crawling on or flying around organic debris. ○ Flies are active during the daytime in warm weather. ○ Flies may be seen flying and landing on dumpsters and trash cans. ○ Visual surveys of adult flies should also identify where flies are entering a building and where they are breeding. • Bites <ul style="list-style-type: none"> ○ Adult stable flies will painfully bite humans, dogs, and livestock. ○ Stable flies may be surveyed by counting the flies on all four legs of livestock animals. ○ Most filth flies do not bite. • Trapping <ul style="list-style-type: none"> ○ <u>Light traps</u>: traps can be used to control adult flies as well as monitor populations. Flies are attracted to ultraviolet light and trapped on a sticky pest strip. ○ <u>Sticky traps</u>: Traps can be placed around areas where filth flies are known to be a problem. Many types contain visual lures. ○ <u>Pheromone traps</u>: Use a fly pheromone (muscamone) to attract flies to a container. Directions for constructing a baited jug trap can be found at http://ohioline.osu.edu/b853/b853_4.html. • Spec counts <ul style="list-style-type: none"> ○ Index cards (3×5) may be placed around areas to be monitored. Flies that land on the cards will leave vomit or fecal specs that can be counted. Though inexpensive and simple, this technique gives no indication of fly species and may overestimate fly numbers since a single fly may leave multiple specs. <p>Note: Identification of adult flies is important in determining where flies are breeding in order to target control at the source of the infestation. If you can't find the breeding locations of the flies, then collect some flies and identify or send to an entomologist for identification.</p>
FREQUENCY	<ul style="list-style-type: none"> • Visual observations should be made around likely breeding sites (e.g., dumpsters). • Traps should be inspected weekly. More frequent inspection may be necessary if sticky traps are placed in areas where they will quickly become covered with dust, insects, or other debris. • Counts of flies on animals should be conducted weekly.
ACTION THRESHOLD	<ul style="list-style-type: none"> • The presence of biting flies in numbers constituting a nuisance for people or animals indicates a need for control within 24 hours if the presence is interfering with the mission or activities. • For counts on livestock, an average of 10 stable flies per animal indicates a need for control. • For counts on sticky traps, 100 flies per week indicates a need for control.

NONCHEMICAL CONTROL	
BIOLOGICAL CONTROL	<ul style="list-style-type: none"> • Several species of parasitic wasps can be purchased for use against filth flies. • Biological control agents do not kill adult flies. Wasps lay their eggs in fly pupae, where the wasp larvae consume the developing fly, preventing it from emerging. • Biological control agents will not sting or otherwise harm humans or animals. • Biological control agents are not compatible with chemical insecticides. • Release timing, climatic conditions, release frequency, and number of agents released are all critical for biological control success. • Contact pest management consultants for additional information before instituting a biological control program.
TRAPPING	<ul style="list-style-type: none"> • Ultraviolet light traps may be used to reduce adult fly populations in buildings invaded by flies. • Exercise caution when placing traps; if the trap is visible from outside the structure, it may attract flies into the building. • Traps by themselves are unlikely to control heavy fly infestations. • Do not use bug zappers that electrocute flies in food-preparation areas or eating facilities. Use attractant light traps that collect flies on sticky traps.
SANITATION TO ELIMINATE BREEDING SITES AND FLY ATTRACTANTS	<ul style="list-style-type: none"> • Eliminating breeding sites is critical for effective filth fly control. • Filth flies often breed in neglected refuse containers. • Cover outdoor trash containers with tight-fitting lids. • Empty trash containers frequently. • Sanitize trash containers that have accumulated organic material. • Steam clean dumpsters regularly. • Do not allow animal manure to build up. • Maintain compost piles to promote rapid decay of organic material. • Do not place compost piles near areas where flies are likely to become a nuisance. • Hydrated lime may be applied to stable floors to speed manure decomposition and render stables less suitable for fly breeding.
PEST PROOFING	<ul style="list-style-type: none"> • Seal cracks and other openings around doors and windows. • Use tight-fitting screens. • Air-screens/air-curtains may be installed in commercial facilities.
EDUCATION	<ul style="list-style-type: none"> • Educate building occupants on sanitation, excluding flies by closing doors and maintaining screens, and proper food storage.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Pyrethroids, dichlorvos (in insecticide strips), methomyl, and others

METHOD OF DISPERSAL	<ul style="list-style-type: none"> • <u>Non-residual space spray or aerosol</u>: may temporarily control adult fly populations in buildings; will not provide long-term control unless breeding sites are eliminated. • <u>Residual insecticides</u>: may be applied to areas outside where adult flies rest; will not provide long-term control unless breeding sites are eliminated. • <u>Baits</u>: may be used around refuse containers and other places to which flies are attracted. Do not use baits indoors or in other areas where flies are not already present. Baits may attract flies to an otherwise fly-free area. • <u>Impregnated strips</u>: Plastic/paper strips impregnated with insecticides will kill adult flies that contact the strips. Useful when placed inside trash cans or other unoccupied spaces. • <u>Insect repellents</u>: may be used on humans or animals for temporary prevention of stable fly bites. Will not provide long-term control of fly populations, and must be frequently re-applied. • <u>Oral larvicides</u>: may be administered to livestock; will render manure unsuitable for fly breeding.
RESTRICTIONS/ REGULATIONS/ PERMITS	<ul style="list-style-type: none"> • Do not apply liquid or dust formulations in occupied spaces. • Dichlorvos is a carcinogen and cannot be placed in occupied spaces.
CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Filth fly infestations often occur in food-preparation areas. Ensure that the insecticide is labeled for use in food preparation areas, and that foods are not contaminated during application. • Emphasize nonchemical control in areas frequented by children (e.g., child development centers). • Ensure that insecticides do not enter drains, streams, lakes, and other surface water.
PROHIBITED PRACTICES	<ul style="list-style-type: none"> • Do not use ultrasonic pest repelling devices. • Do not use aerosols, dusts, and other insecticide formulations that can become airborne in occupied spaces.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Take precautions when using pesticides around food service areas and the child development center. • Applicator should use personal protective equipment as required by the product label. • Avoid contaminating water with pesticides. • Space spraying outdoors can result in drift and have impact on non-target organisms.

COMMENTS:

The numbers of products available for filth fly monitoring and control is overwhelmingly large. The efficacy of a given product often depends on local climatic characteristics, the severity of the infestation, the species comprising the infestation, and other localized conditions. Also, many products are available that do not work or whose efficacy is unproven. Pest management consultants or county or state extension personnel can assist with choosing fly control methods that are most appropriate for a given area.



Fleas In and Around Buildings

TARGET PEST	
TARGET PESTS	Dog, cat, and rodent fleas
TARGET SITES(S)	Military family housing, administrative and industrial buildings that harbor feral cats and other animals, and dog kennels
PURPOSE	Control fleas that are a biting nuisance and pose the potential for transmission of diseases such as murine typhus.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Veterinary Services</u>: Prescribe pet treatments for flea control • <u>Pet owner/Dog handlers</u>: Treat animals for flea infestations. • <u>Installation Preventive Medicine Technicians</u>: Conduct surveys and inspections of pests of public health importance to assess health risk. • <u>Pest management service provider</u>: Conduct integrated pest management to control infestations. • <u>Pest Control Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Facilities Maintenance Provider</u>: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Observe for fleas on pets or while grooming and washing pets • Walk around a room with light colored pants • Pull a white cloth across the floor • Concentrate on areas where pets animals frequent or rest • Survey for feral cats and buildings under which they may be harboring; survey in crawl spaces
FREQUENCY	Flea infestations are usually reported by housing residents or building occupants. Survey should be conducted by the PMSP to determine where to treat.
ACTION THRESHOLD(S)	<ul style="list-style-type: none"> • One flea per room • One flea-infested animal in or under a building

NONCHEMICAL CONTROL	
VACUUMING	Using a vacuum cleaner with a rotating brush on an infested carpet will remove a majority of the adults, larvae, and eggs. Should be done even if an insecticide will be applied. Hard surfaces should also be vacuumed if they contain cracks and crevices.
CARPET CLEANING	Steam cleaning or cleaning with a carpet cleaner, especially after vacuuming, may be sufficient to remove remaining fleas from carpet.
CLEAN PET BEDDING	Launder in soap and water all pet bedding and any other materials upon which dogs or cats sleep
CONTROL AND EXCLUDE FERAL CATS	<ul style="list-style-type: none"> • Feral cats are a common source of fleas in industrial and office buildings and are often encouraged by uninformed cat lovers to harbor under buildings. • DOD policy requires removal of feral animals from installations; neutered cats still carry fleas. • Cat harborage under buildings should be cleaned and treated with an insecticide. • Openings to crawl spaces should be sealed to exclude animals.
GROOM AND WASH PETS	<ul style="list-style-type: none"> • Flea combs can be used on pets to extract fleas. • Washing pet with soap and water is very effective at killing fleas.
EDUCATION	<ul style="list-style-type: none"> • Teach pet owners about ways to prevent fleas and treat pets for fleas • Provide awareness to installation personnel about the risk of flea infestations caused by feral cats. • Pre-treatment awareness of the need to clean/treat pets and pet bedding concurrently with the PMSP's insecticide treatment of the premises.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Pyrethroids, methoprene and pyriproxyfen (insect growth regulators), fipronil, imidacloprid, lufenuron, spinosad, and others
METHODS OF DISPERSAL	<ul style="list-style-type: none"> • <u>On-pet Treatments</u>: <ul style="list-style-type: none"> ○ Spot-on treatments, such as Frontline (fipronil) and Advantage (imidacloprid) are convenient and easy to use and very effective at preventing fleas when monthly treatments are maintained throughout the season (late spring to early fall). ○ Oral treatments, such as Program (lufenuron) are effective and useful on pets that frequently swim or are bathed frequently. • <u>Indoor Treatment</u>: These treatments target areas where pets rest or on carpets and other surfaces that might hold adult and immature fleas. The most effective treatments contain IGRs which are often mixed with a contact insecticide (such as a pyrethroid). The contact insecticide will kill any existing adult fleas while the residual IGR will prevent larvae from becoming biting adults. • <u>Outdoor Treatment</u>: This is rarely necessary in residential situations if indoor and on-pet treatment is done correctly. Outdoor dog kennels and crawl spaces where feral cats were harboring should be treated if infested. Again, an IGR / contact insecticide treatment is most effective.
CONSIDERATIONS	
SENSITIVE AREAS	Medical treatment facilities, child development centers

PROHIBITED ITEMS	Do not use ultrasonic pest repelling devices.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	Applicators should use personal protective equipment as required by the product label.

ADDITIONAL INFORMATION:

Successful control of fleas in a building requires room cleaning (vacuuming and carpet cleaning, cleaning pet bedding), pet treatment or washing, and insecticide treatment be done within 12 hours of each other. Some of the products and devices that aren't effective for flea control are indoor aerosol foggers, (otherwise known as bug bombs), ultrasonic devices, herbal collars, vitamin B1, brewer's yeast, and flea repellents.

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Mites

TARGET PEST	
TARGET PESTS	Mite parasites of animals (especially birds and rodents)
TARGET SITES(S)	Office buildings, industrial buildings, outbuildings, and residences
PURPOSE	Control mite infestations that may cause a biting nuisance.
RESPONSIBLE PARTY	<ul style="list-style-type: none"> • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control infestations • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications • <u>Installation Preventive Medicine Technicians</u>: <ul style="list-style-type: none"> ○ Conduct surveys when pests pose a health threat ○ Provide pest management recommendations.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Personnel complaints: <ul style="list-style-type: none"> ○ Most often mite infestations are recognized when personnel complain of bites associated with specific work spaces or areas of a building; the mite may or may not be observed. ○ Have the personnel who are being bitten keep transparent tape nearby. When they feel like they are being bitten, tap the area of the biting with the sticky side of the tape. Personnel should take the tape to preventive medicine to have it identified. • Workspace investigations: <ul style="list-style-type: none"> ○ Have personnel being bitten identify the specific areas in which they are being bitten. ○ Ask if any bird or rodent problems have occurred in the building and, if it has, ask if control has been performed recently. ○ Look for evidence of rodent or bird infestation in false ceilings, under floor boards, in rafters, inside walls, and outside of the building. ○ Observe light colored surfaces for mites. ○ Identify other sources of nonliving material that may cause a biting sensation such as visible particles especially those coming from ventilation ducts. • Sticky traps: place sticky traps around the area of infestation. • Identification of the mite will indicate whether the source is from a bird or rodent. Precise identification may require an entomologist. Contact NECE or NAVFAC Applied Biology.

FREQUENCY	When notified of a potential problem.
ACTION THRESHOLD	Identification of mites collected from a person(s) or from a sticky trap.
NONCHEMICAL CONTROL	
RODENT AND BIRD MANAGEMENT	<ul style="list-style-type: none"> • Preventing birds and rodents from entering a building will prevent mite problems. • See commensal rodent and nuisance bird pest management fact sheet for more information.
NEST REMOVAL	<ul style="list-style-type: none"> • Nests are the usual source of most mites. • Apply a pesticide to the nest to kill any mites (see below). • Remove nesting material and place in a double plastic bag. Clean area around nest with soap and water.
MITE REMOVAL	<ul style="list-style-type: none"> • Use soap and water to wipe up mites observed on surfaces. • Use a wet/dry vacuum filled with water to vacuum area where mites are found.
CHEMICAL CONTROL	
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • <u>Aerosols</u>: Apply to cracks and crevices and other areas where mites are seen. • <u>Dusts</u>: Use in enclosed spaces where mites have been found.
CONSIDERATIONS	
SENSITIVE AREAS	Childcare facilities
PROHIBITED PRACTICES	Do not do preventive baseboard spraying in the absence of a pest.



Adult Mosquito Control

TARGET PEST	
TARGET PEST(S)	Flying adult pest mosquito species.
TARGET SITES(S)	Industrial and residential areas
PURPOSE	Control adult mosquitoes that are a nuisance or may transmit disease.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Housing Residents:</u> <ul style="list-style-type: none"> ○ Use personal protective measures to prevent mosquito bites. ○ Ensure maintenance of window and door screens. ○ If screens are not available, keep doors and windows closed when mosquitoes are present. • <u>Installation Preventive Medicine Technicians:</u> <ul style="list-style-type: none"> ○ Conduct adult mosquito trapping to identify problem areas and mosquito species. ○ Map locations of trapping sites. ○ Conduct disease risk assessments including pathogen testing if available. ○ Provide information to housing residents on how to prevent mosquito biting. • <u>Mosquito Control Provider:</u> <ul style="list-style-type: none"> ○ Conduct surveys to verify presence of adult mosquitoes at site to be treated. Treat only when and where adult mosquitoes are present. ○ Use pesticides in accordance with the label. • <u>Pest Management Performance Assessment Representative:</u> <ul style="list-style-type: none"> ○ Ensure contractor pest management service provider performs work in accordance with contract specifications. ○ Conduct pre- and post-treatment surveys to monitor efficacy of control measures • <u>Natural Resources Manager:</u> Review and approve mosquito control operations conducted adjacent to sensitive areas to ensure minimal impact on the environment. • <u>Housing Director:</u> <ul style="list-style-type: none"> ○ Ensure that residents keep premises clear of clutter that can hold water and become breeding sites. ○ Ensure distribution of mosquito prevention and control information to residents. • <u>Integrated Pest Management Coordinator:</u> <ul style="list-style-type: none"> ○ Coordinate with PMTs, control provider, PMPAR, and natural resource manager to identify mosquito-breeding sites that can be permanently

	<p>eliminated by nonchemical methods.</p> <ul style="list-style-type: none"> o Maintain mosquito control operation records. 				
SURVEILLANCE					
METHODS	<ul style="list-style-type: none"> • Conduct surveys using visual assessments (i.e., landing counts) and/or traps at sites where personnel complain about mosquito bites to verify presence of mosquitoes. • Record sites of verified complaints on a map. Use GPS receiver if available. • Use traps weekly at same locations to reveal seasonal trends in mosquito abundance. Surveys can be used in subsequent years to plan mosquito control program. • Trap mosquitoes for virus testing. • PMTs will continue to conduct adult mosquito surveys. 				
FREQUENCY	<ul style="list-style-type: none"> • Ongoing surveys by residents. • Survey prior to application of adulticide. For visual surveys, post-treatment surveys may be conducted immediately after the treatment. For traps, survey within 24 hours after application. 				
ACTION THRESHOLD	<ul style="list-style-type: none"> • Light traps: 25 biting females or 1 vector species in an un-baited light trap • Landing counts: 15 per hour or 4 per 15 minutes • Disease emergencies declared: light traps: 1 female of a species which has been identified as carrying disease within 5 miles of base caught in a trap 				
	NOTE: Action thresholds can be changed on advice of a BUMED entomologist				
	<table border="0" style="width: 100%;"> <tr> <td style="text-align: center;"><u>Vector species of concern</u></td> <td style="text-align: center;"><u>Primary diseases of concern</u></td> </tr> <tr> <td style="text-align: center;"><i>Aedes aegypti</i>, <i>Ae. albopictus</i></td> <td style="text-align: center;">Dengue, Chikungunya, Zika</td> </tr> </table>	<u>Vector species of concern</u>	<u>Primary diseases of concern</u>	<i>Aedes aegypti</i> , <i>Ae. albopictus</i>	Dengue, Chikungunya, Zika
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<i>Culex pipiens</i> complex	EEE, St. Louis encephalitis, WNV				
<i>Culex nigripalpus</i>	EEE, St. Louis encephalitis, WNV				
NON-CHEMICAL CONTROL					
PERSONAL PROTECTION	<ul style="list-style-type: none"> • Encourage use of repellents when outdoors in mosquito-infested areas. Products with the active ingredient diethyl toluamide (DEET) are most effective. • Avoid outdoor activities at dusk and during the evening hours to lessen chances of being bitten. • Wear long-sleeved shirts and pants when outdoors in mosquito infested areas. 				
EXCLUSION/PEST PROOFING	<ul style="list-style-type: none"> • Window and door screens • Remove tall weeds and overgrowth to remove possible resting areas for mosquitoes. 				
TRAPS	Propane-powered trapping devices that use heat and a chemical attractant have been shown to be effective for small to moderate area control of certain species of mosquitoes.				
CHEMICAL CONTROL					
COMMON ACTIVE INGREDIENTS	Organophosphates, such as malathion and naled; pyrethrum and pyrethroids				

METHOD OF DISPERSAL	<ul style="list-style-type: none"> • <u>Organophosphates (i.e., malathion, naled)</u>: Apply with ULV or fog-generating equipment. Some chemicals may be corrosive. Resistance to these chemicals is widespread. • <u>Pyrethrum and Pyrethroids</u>: Apply with ULV equipment. Safer for humans and mammals. May be toxic to non-target insects and fish.
SENSITIVE AREAS	All ULV-applied pesticides may affect aquatic organisms especially fish. Care should be taken to ensure proper insecticide droplet size, timing of application, environmental conditions, and calibration of equipment.

COMMENTS:

Emergency control operations as the result of a disease outbreak may require large area application of an adulticide. Aerial spraying using an appropriately labeled pesticide and application equipment may be used. However, all aerial spraying operations must be reviewed and approved by a pest management consultant from NAVFAC Applied Biology. Aerial spray operations must also be reviewed and approved by the installation's operations officer.

See AFPMB Technical Guide 13 for more information on ULV application of pesticides.

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Larval Mosquitoes



TARGET PEST	
TARGET PEST(S)	Mosquito larvae
TARGET SITES(S)	Catch basins, culverts, ponds, planters, gutters, drainage ditches, and freshwater marshes
PURPOSE	Control larval mosquitoes that are a nuisance or that may transmit diseases.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Housing Residents:</u> <ul style="list-style-type: none"> ○ Eliminate backyard mosquito breeding sites. ○ Keep gutters and backyard ponds clean. • <u>Preventive Medicine Technicians:</u> <ul style="list-style-type: none"> ○ Survey and identify larval breeding sites ○ Map locations of breeding sites ○ Conduct disease risk assessments ○ Provide information to housing residents and installation personnel on how to prevent mosquito breeding and biting. • <u>Mosquito Control Provider:</u> <ul style="list-style-type: none"> ○ Conduct surveys to verify presence of larvae at site to be treated ○ Use integrated pest management methods to control mosquito larvae ○ Use pesticides in accordance with the label. • <u>Pest Management Performance Assessment Representative:</u> <ul style="list-style-type: none"> ○ Ensure contractor pest management service provider performs work in accordance with contract specifications ○ Conduct pre- and post-treatment surveys to monitor efficacy of control measures. • <u>Natural Resources Manager:</u> Review and approve mosquito control operations conducted adjacent to sensitive areas to ensure minimal impact on the environment. • <u>Housing Director:</u> <ul style="list-style-type: none"> ○ Ensure residents keep premises clear of clutter that can hold water and become breeding sites ○ Ensure distribution of mosquito prevention and control information to residents.

	<ul style="list-style-type: none"> • <u>Integrated Pest Management Coordinator:</u> <ul style="list-style-type: none"> ○ Coordinate with preventive medicine technicians, mosquito control provider, performance assessment representative, and natural resources manager to identify mosquito-breeding sites that can be permanently eliminated by nonchemical methods ○ Maintain mosquito control operation records.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Maps should be used to identify non-residential water-holding sites. Conduct ground truthing to verify presence of sites. • Record all water-holding sites on a map or on a GPS receiver regardless of whether larvae are found or not. • Survey water-holding sites for larvae. Use a dipper to take water samples. Dip as follows: <ul style="list-style-type: none"> ○ 1 dip/10 ft in linear sources ○ 1 dip/100 ft² in wide sources ○ 2 dips/source when small source (i.e., catch basin) <p>For the first two sources, dip until larvae are found, then record number of dips after that; do not count negative dips prior to this.</p> <ul style="list-style-type: none"> • Record quantity as number of larvae/dip. Record negative sources. • Mark locations for treatment or treat immediately. • All positive larval sites will be identified on the map as larval sampling stations. These stations will be used in the ongoing surveillance program to detect the presence of mosquitoes after a high tide and when the action threshold for that site is exceeded, then control will be initiated. • PMTs will continue to look for and identify additional non-residential water-holding and breeding sites.
FREQUENCY	<ul style="list-style-type: none"> • Ongoing surveys by residents. • Weekly survey of permanent or semi-permanent sites. • Survey prior to application of larvicide and within 24 hours after application. (Method cannot be used after application of methoprene.)
ACTION THRESHOLD	One or more larvae per dip
NONCHEMICAL CONTROL	
MOSQUITO FISH	<ul style="list-style-type: none"> • <i>Gambusia affinis</i>, or mosquito fish, feed on mosquito larvae and other small aquatic animals and can eliminate and prevent mosquito breeding. • Mosquito fish can be placed into large ornamental ponds. • Mosquito fish are often introduced into a water source after treatment with a larvicide.
VEGETATION REMOVAL	Aquatic vegetation encourages mosquito breeding by slowing down water movement in ditches and streams and by providing larvae with protection from predators. Emergent and floating vegetation can be removed mechanically.
DRAINAGE	<ul style="list-style-type: none"> • Ponds may be drained to eliminate breeding sites. • Containers such as pet food dishes, garbage cans, garden pots, and wheel barrels should be emptied of water and prevented from collecting water.
PROPER IRRIGATION	Lawn and landscape should be irrigated properly to prevent over watering and run-off that can collect and produce mosquitoes.
CHEMICAL CONTROL	

COMMON ACTIVE INGREDIENTS	<i>Bacillus thuringiensis israelensis</i> (Bti), <i>Bacillus sphaericus</i> , methoprene, temephos, insect growth regulations (e.g., s-hydroprone, s-kinoprene), mineral oils, monomolecular films
METHODS OF DISPERSAL	<ul style="list-style-type: none"> • Bti: Apply by hand (granules), hand-compressed or hydraulic sprayer (liquid), as briquettes, or by manual or powered granule spreader. Liquid cost-effective when applied to open water; granules effective when water is covered by heavy vegetation. • Methoprene: Apply by hand or manual or powered granule spreader (granules and pellets), as briquettes, or by hand-compressed or hydraulic sprayer (liquid). Methoprene slow-release briquettes can be applied as a pre-flood application to dry water-holding areas that have been surveyed and are known to produce mosquitoes. Risk assessments for methoprene's effects on non-target aquatic invertebrates mixed and may require trials in test plots before using in environmentally sensitive areas. • Surface Films: Apply by hand compressed sprayer. • Herbicides: Herbicides labeled for aquatic sites may be used to remove vegetation where removal by mechanical means is not feasible or practical.
SITE PREPARATION	Survey treatment site prior to application of Bti and methoprene to ensure that majority of mosquitoes are in larval stage. Both are not effective on pupae.
CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Some catch basins and culverts drain into environmentally-sensitive habitats and pesticide use may have adverse effects. • Some permanent and semi-permanent water sources may be habitats for birds, fish, and other animals. Alterations, such as vegetation removal or drainage, introduction of fish, or herbicide application may have significant impact on these habitats. • Some drainage channels drain into environmentally-sensitive habitats and pesticide use may have adverse effects.

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Spiders

TARGET PEST	
TARGET PEST(S)	Various spiders. Medically important spiders such as the black widow (<i>Latrodectus hesperus</i>), the brown widow (<i>Latrodectus geometricus</i>), the desert recluse (<i>Loxocceles deserta</i>), the brown recluse (<i>Loxocceles reclusa</i>), and the hobo spider (<i>Tegenaria agrestis</i>).
TARGET SITES(S)	Housing and child development centers where young children may be at risk for spider envenomation, especially under playground equipment. Other areas where spiders are unwanted.
PURPOSE	<ul style="list-style-type: none"> • Control spiders that may cause envenomation or painful, serious bites. • Reduce discomfort or fear associated with the presence of spiders. • Webs are a nuisance.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>All Personnel</u>: Ensure proper of all living and working spaces as spiders harbor in areas that are rarely disturbed. • <u>Installation Preventive Medicine Technicians</u>: Conduct sanitation inspections. Investigate reported spider bites. Provide control recommendations. • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control infestations. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual inspections: look for spiders and webbing in areas where people may be at risk for spider bites. • Personnel complaints: including information on when pests were observed, where, and how many. • Conduct pre- and post-treatment surveys to determine whether control operation was effective
FREQUENCY	<ul style="list-style-type: none"> • Daily observation by building occupants • Monthly inspections outdoors around buildings by PMSP to identify spiders.
ACTION THRESHOLD	Visual sighting of one medically-important spiders indoors/room.
NONCHEMICAL CONTROL	
VIGILANCE TO PREVENT BITES	Be cautious when entering areas that are infrequently visited and disturbed such as storage sheds, wood piles, attics, utility sheds, etc.

SANITATION	<ul style="list-style-type: none"> • Routinely clean out storage areas. • Vacuum carpets and furniture routinely. • Remove webbing from ceilings.
MECHANICAL REMOVAL	<ul style="list-style-type: none"> • Smash the spider. • Place a jar over the spider and slip a piece of paper under the opening. Relocate the spider outdoors. • Vacuum spiders and webs while cleaning. Use a wet/dry vacuum filled with water or carefully empty bag when done.
PEST PROOFING	<ul style="list-style-type: none"> • Avoid attracting flying insects to buildings with exterior lighting. Reducing flying insects near buildings will deny spiders of their food. Save energy and turn off lights, or use motion detectors or colored lamps that do not attract insects readily. • Seal cracks in the foundation and other parts of the structure and gaps around windows and doors.
EDUCATION	<ul style="list-style-type: none"> • Emphasize the importance of sanitation in preventing spiders. • Education and awareness to reduce the fear of spiders and to highlight the benefits of spiders
CURRENT NONCHEMICAL CONTROL PRACTICES	<ul style="list-style-type: none"> • Sanitation: in indoor storage areas, place boxes off the floor and away from walls to reduce harborages. Seal boxes with tape. • Vigilance
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Pyrethroids, silica gel, and other insecticides
METHOD OF DISPERSAL	<p>Pesticides are a last resort for recurring problems, since non-chemical control methods, particularly mechanical, are very effective.</p> <ul style="list-style-type: none"> • <u>Residual application</u>: Pesticide applications should be done only as a last resort for recurring spider problems. • <u>Liquid Aerosol</u>: Most indoor-use insecticides do not leave a residual and require direct application to the spider. • <u>Dust</u>: Sorptive dusts, such as silica gel, that are formulated with pyrethrin can provide residual control. <p>Preventive baseboard spraying in the absence of a pest is prohibited.</p>
SENSITIVE AREAS	<ul style="list-style-type: none"> • Outdoors where children or pets may be exposed to pesticides. • Ensure that insecticides do not enter drains, streams, lakes and other surface water.
CONSIDERATIONS	
PROHIBITED PRACTICES	<ul style="list-style-type: none"> • Do not use ultrasonic pest repelling devices. • Do not use aerosols, dusts, and other insecticide formulations that can become airborne in occupied spaces.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Applicators must use personal protective equipment as required by the product label. Insecticide liquid and dusts shall not be applied to occupied spaces. • Minimal. Avoid contamination of water with pesticides.

COMMENTS:

The greatest problem posed by spiders is arachnophobia, the fear of spiders. Most spiders are harmless and are very beneficial in controlling insects around buildings. Education of the public is an important part of control.

Brown recluses—Many of the purported bites attributed to brown recluses are probably other arthropod bites, skin infections, or allergic reactions misdiagnosed as brown recluse bites. For general information on brown recluse identification, go to <https://spiders.ucr.edu/recluseid.html>.

Brown widow—venom is more potent than black widow venom. However, they do not inject as much venom as a black widow, are very timid, and do not defend their web so their bites are rare.

ADDITIONAL INFORMATION:

Eliminating spiders around homes and buildings, <http://www2.ca.uky.edu/entomology/entfacts/ef623.asp>

Common spiders in and around homes,
<http://labs.russell.wisc.edu/insectid/files/2014/03/ControllingSpidersinandAroundHomes.pdf>

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Stinging Insects

TARGET PEST	
TARGET PEST(S)	Bees, wasps, and yellow jackets
TARGET SITES(S)	Outdoors
PURPOSE	<ul style="list-style-type: none"> • Control stinging insects that can cause painful stings, massive envenomization, or serious allergic reactions. • Remove bee hives that can cause property damage and attract other unwanted pests.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Installation Preventive Medicine Technicians</u>: Evaluate medical threat of stinging insects if necessary • <u>Pest Management Service Provider</u>: Conduct inspections and integrated pest management to control infestations through killing or removal. Arrange for removal of beehives in buildings. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Facilities Maintenance Provider and Grounds Maintenance Provider</u>: Report any stinging insect nest sightings.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Observation of insect nesting or swarming. • Routinely examine buildings for openings where bees or other stinging insects appear to be entering and exiting. • Personnel complaints: including information on when pests were observed, where, and how many. • Identify whether bees are swarming or nesting. (see remarks below)
FREQUENCY	As observed by personnel.
ACTION THRESHOLD	<ul style="list-style-type: none"> • Nesting bees, wasps, or yellow jackets near populated areas require immediate response. • Swarming bees, especially near areas where few people are found, should be left alone. • Swarming bees in areas that cannot be avoided by people and appear to be a threat should be controlled. • Individual bees are foraging and are docile, but may be nesting nearby.
NONCHEMICAL CONTROL	

DISCOURAGE AND ELIMINATE NESTS	Nests should be removed by trained personnel
AVOIDANCE	Stay away from stinging insects if possible.
ELIMINATE FOOD SOURCES	<ul style="list-style-type: none"> • Keep pet foods indoors. • Cover trash cans.
ELIMINATE STANDING WATER	<ul style="list-style-type: none"> • Some stinging insects are attracted to water. • Repair leaking outdoor faucets and other mechanical water sources. • Eliminate standing water.
TRAPS	<ul style="list-style-type: none"> • Wasps and yellow jackets: <ul style="list-style-type: none"> ○ Trapping should start in the spring and be continued through the summer. Early elimination of queen will reduce the size of populations later in the year. ○ Lure traps—baited with a chemical attractant or with meat. ○ Water traps—Meat hung on a string hung 1-2 inches over a bucket of soapy water. Cover bucket with mesh to exclude other animals. • Bees: Swarming bees can be lured into a trap that mimics a nesting site.
MECHANICAL REMOVAL	Wet/dry vacuums may be used to remove bees, but should only be done by trained personnel.
PEST PROOFING	<ul style="list-style-type: none"> • Seal holes in exterior walls of buildings. Request support from facilities maintenance provider if necessary. • Remove debris that can serve as nesting areas. • Cover tree holes.
CHEMICAL CONTROL	
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • <u>Aerosol knockdown agents</u>: High pressure aerosols that can be applied from a long distance can be used. Application of these insecticides results in a rapid knockdown of the insects. • <u>Dusts</u>: Dusts can be applied to nesting areas. • <u>Baits</u>: Baits mixed with a toxicant can be used for wasps and yellow jackets
CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Personnel that may be harmed by bees or pesticide application. • Buildings that may be damaged by hives. • Ensure that insecticides do not enter drains, streams, lakes and other surface water.

NOTES REGARDING AFRICANIZED HONEY BEES (AHB):

Africanized Honey Bees (AHBs), or killer bees have colonized most of the southwestern United States. Most feral colonies of bees are considered to be AHB colonies.

AHB are often mistaken to be more venomous than their European counterparts that are raised for honey production and pollination. The venom that AHB produce is not more toxic. In fact, AHBs inject less venom than EHBs because they are smaller. AHB are more dangerous than EHB because they exhibit a more aggressive response to a disturbance of their nest or colony. An “attack” usually involves a large number of bees resulting in a large number of stings; often ranging into the hundreds. Injuries in these

types of attacks are the result of massive envenomation. Massive envenomation for small children, elderly and disabled persons and pets can be very serious and sometimes fatal.

Precautions that should be taken when dealing with any feral bee colony include:

1. Hiring a professional pest controller to kill or remove the bees.
2. Be aware of hives in the area. AHB are easily disturbed by loud noises or vibrations caused by lawn mowers and other machinery.
3. Warn people not to disturb hives or swarming bees.
4. Do not leave pets tied up in areas where they may be attacked by bees.
5. If attacked by bees, run and/or cover yourself up with a coat or heavy blanket or seek shelter in a building or a car immediately. Do not stop to swat at the bees or jump into water.
6. Call 911 or other emergency phone number in the event of an aggressive bee attack on a human.

Refer to Technical Information Memorandum (TIM) 34 "Bee Resource Manual with Emphasis on the Africanized Honey Bee" or view TIM 34 on the Department of Defense Armed Forces Pest Management Board web site at <http://www.uscg.mil/mlclant/Kdiv/Envrn%20Hlth/IPM/AFPMB%20TIMs/tim-34.pdf>

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Ticks

TARGET PEST									
TARGET PESTS	Ticks								
TARGET SITES(S)	Outdoors, especially near or in wooded areas								
PURPOSE	Prevent the spread of tick-borne diseases.								
RESPONSIBLE PARTY	<ul style="list-style-type: none"> • <u>Pest Management Service Provider</u>: Pesticide applications. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Installation Preventive Medicine Technicians (PMT)</u>: <ul style="list-style-type: none"> ○ Conduct surveys when pests pose a health threat. ○ Identify any collected ticks ○ Contact point for disease emergencies ○ Respond to complaints of tick bites. • <u>Environmental Division</u>: Recommendations and approval for land modifications near improved areas to eliminate tick harborage • <u>Grounds Maintenance Provider</u>: Vegetation removal. 								
SURVEILLANCE									
METHODS	<ul style="list-style-type: none"> • Cloth drag surveys (conducted by PMTs) • CO₂ ground traps (conducted by PMTs) • Customer complaints 								
FREQUENCY	When notified of a potential problem.								
ACTION THRESHOLD	<ul style="list-style-type: none"> • 5 or more adult vector species captured in a 5 minute drag near training or encampment areas • During disease emergencies declared, one or more adults or nymphs that have been identified as carrying the disease within 5 miles of base <p>NOTE: Action thresholds can be changed on advice of a BUMED entomologist</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;"><u>Vector species of concern</u></td> <td style="width: 50%;"><u>Primary diseases of concern</u></td> </tr> <tr> <td><i>Dermacentor variabilis</i></td> <td>Rocky mountain spotted fever (RMSF)</td> </tr> <tr> <td><i>Ixodes scapularis</i></td> <td>Lyme Disease</td> </tr> <tr> <td><i>Amblyomma americanum</i></td> <td>Ehrlichiosis</td> </tr> </table>	<u>Vector species of concern</u>	<u>Primary diseases of concern</u>	<i>Dermacentor variabilis</i>	Rocky mountain spotted fever (RMSF)	<i>Ixodes scapularis</i>	Lyme Disease	<i>Amblyomma americanum</i>	Ehrlichiosis
<u>Vector species of concern</u>	<u>Primary diseases of concern</u>								
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<i>Ixodes scapularis</i>	Lyme Disease								
<i>Amblyomma americanum</i>	Ehrlichiosis								

NONCHEMICAL CONTROL	
HABITAT MODIFICATION	Eliminate brush and high grass from improved and high traffic area
CHEMICAL CONTROL	
METHOD OF DISPERSAL	<u>Barrier spray</u> : Vegetation surrounding training areas and encampments may be sprayed with a pesticide that leaves a residual barrier to ticks. Dispersal is accomplished via a truck mounted power sprayer.

STRUCTURAL PESTS

Drywood Termites

Subterranean Termites

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Drywood Termites

TARGET PEST	
TARGET PEST(S)	Several species of termites in the family Kalotermitidae, particularly <i>Incisitermes minor</i> .
TARGET SITES(S)	Structures containing wood
PURPOSE	Control termites that reduce the aesthetics and integrity of real property
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>All Personnel</u>: Report termite damage and signs to the Pest Management Coordinator. • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control infestations. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications.
SURVEILLANCE	
METHODS	Visual inspections <ul style="list-style-type: none"> • Inspect wood in crawl spaces that is touching or near the soil surface. • Pay particular attention to wood that is damp. • Termite galleries will be filled with excrement and other debris. • Infested wood may be discolored (darkened) and can often be easily punctured by a knife or screwdriver. • The surface of a severely damaged piece of wood may appear blistered or peeled.
FREQUENCY	Annually
ACTION THRESHOLD	Presence of termites indicates a need for treatment.
NONCHEMICAL CONTROL	
SANITATION	Remove scrap and decaying wood from yards.
HEATING	<ul style="list-style-type: none"> • Items that may be damaged by high temperatures are removed from the building. • Building is then tented using nylon tarpaulins, and propane heater is used to pump hot air into and around the building, bringing the temperature of all parts of the structure to 120°F or 35 minutes.

	<ul style="list-style-type: none"> • Temperatures as high as 130°F for 50 minutes may be used.
FREEZING	<ul style="list-style-type: none"> • Liquid nitrogen is pumped into infested areas. • Termites are killed by the extreme cold.
MICROWAVES	<ul style="list-style-type: none"> • Microwave generators are placed against walls and structures to be treated. • The resulting heat kills termites.
ELECTRICITY	<ul style="list-style-type: none"> • Electro-gun is used to apply low-amperage, high voltage current to infested wood. • Termites are killed by the electrical shock.
EDUCATION	<ul style="list-style-type: none"> • Water-damaged wood is attractive to termites and residents and GMPs should be educated on avoiding landscape irrigations that cause water to contact wood. • Recognition of termite infestations • Flying termites near buildings do not necessarily indicate an infestation; they are attracted to light.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Sulfuryl fluoride (Vikane) fumigant, borates
METHOD OF DISPERSAL	Borate dust or liquid application for spot treatment or wood protection Chemical fumigation
RESTRICTIONS/ REGULATIONS/ PERMITS	Sulfuryl fluoride is a restricted-use pesticide.
CONSIDERATIONS	
SENSITIVE AREAS	Gases used for fumigation are potentially lethal to humans. A 24-hour guard should be posted outside to ensure that no people enter the building before it has been cleared for re-entry by the pest management service provider.
PROHIBITED PRACTICES	Do not use of ultrasonic pest repelling devices.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Whole structure fumigation is a dangerous operation. DOD-specific safety requirements are required including securing doors, warning signs on building and on tarp, a barrier with warning signs, and contractor personnel on-site during the duration of the fumigations. • Impact minimal. Sulfuryl fluoride dissipates into the air rapidly and does not leave a residual. Borates are low toxicity for non-target animals, but contamination of water should be avoided.

COMMENTS:

Navy policy is to spot-treat unless infestations are spread throughout the structure. Fumigation is expensive and not cost-effective to use on limited infestations. Though several treatment options exist for drywood termites (see **NONCHEMICAL CONTROL**), chemical fumigation is by far the most common and currently the most effective method of control. Nonchemical control methods may be indicated in certain situations, such as highly-localized infestations or infestations in very large buildings where the logistics and cost of fumigation are prohibitive. Some of these methods may cause structural damage. Any termite treatment should include a warranty that includes follow-up inspections.

Note that pre- or post-construction soil treatments are not effective in preventing drywood termite infestations. Inspections are critical to the success of drywood termite control to identify where infestations exist and the extent of the infestations. Post-treatment inspections are critical to ensuring effectiveness of the treatment. Consult with the NAVFAC pest management consultant about specific situations where nonchemical control methods may be indicated.



Fumiscopie for monitoring fumigant gas in structure.



Drywood termite damage.

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Subterranean Termites

TARGET PEST	
TARGET PEST(S)	Several species of termites in the family Rhinotermitidae, particularly the western subterranean termite, <i>Reticulitermes hesperus</i>
TARGET SITES(S)	Structures containing wood
PURPOSE	Control termites that reduce the aesthetics and integrity of real property.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>All Personnel</u>: Report termite damage and signs to the Pest Management Coordinator. • <u>Pest Management Service Provider (PMSP)</u>: Conduct integrated pest management to control infestations. • <u>Facilities Maintenance Provider (FMP)</u>: Provide facility repairs and modifications needed for termite exclusion. • <u>Pest Management Performance Assessment Representative (PMPAR)</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Inspect wood that is touching or near the soil surface. • Pay particular attention to wood that is damp • Look for shelter tubes in crawl spaces and in walls. • Termite galleries will be filled with excrement and other debris • Infested wood may be discolored (darkened) and can often be easily punctured by a knife or screwdriver. • The surface of a severely damaged piece of wood may appear blistered or peeled.
FREQUENCY	<ul style="list-style-type: none"> • Annually in most regions • Biannually in arid regions
ACTION THRESHOLD	Presence of termites indicates a need for treatment

NONCHEMICAL CONTROL	
BUILDING DESIGN AND MAINTENANCE	<ul style="list-style-type: none"> • Several design and construction techniques can help prevent subterranean termite infestations <ul style="list-style-type: none"> ○ Use wood species that are resistant to termite attack ○ Keep all wooden components at least 12-inches above the surface of the soil ○ Replace soil around the foundation of the building with sand (particle size ranging from 10 to 16 mesh) ○ Provide adequate ventilation in crawl spaces to keep wood dry. ○ Before pouring slab, install termite-resistant mesh and eliminate openings around plumbing and other utilities protruding from slab. • Reduce excess moisture in the building by correcting leaky plumbing and moisture associated with air conditioning condensate
PEST PROOFING	<ul style="list-style-type: none"> • Use screening over vents and other openings to discourage entry by winged reproductives. • Remove scrap wood from around structures.
SAND BARRIER	Replace soil around foundation and in crawl spaces with sand. Sand particles should be 10 to 16 mesh. Termites are unable to tunnel through sand.
EDUCATION	Difference between a winged ant and a termite swarmer.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Fipronil, sulfuramid., diflubenzuron, hydramethylnon, chlorantraniliprole, and others.
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • <u>Chemically Treated Lumber</u>: Lumber to be used near the soil surface is impregnated (pressure treated) with a variety of repellent/fungicidal/insecticidal chemicals prior to construction. Some of these products are also available to topical application to wood after construction. These products are not effective for controlling pre-existing termite infestations. • <u>Pre-Construction Soil Treatment</u>: The soil under and around the perimeter of a slab is treated with an insecticide prior to construction. The insecticide acts as a barrier, either by killing termites that contact the treated soil or repelling foraging termites. Only non-repellent termiticides should be used. • <u>Soil Insecticide Injection</u>: This is the most common method for controlling termites if a pre-construction chemical barrier fails or was never applied. Holes are drilled through the foundation of the building, and insecticides are injected into the soil. Insecticides will kill termites already infesting the building and prevent future infestations for several years. A licensed professional is recommended; applying pesticide to the wrong place can cause contamination in the plumbing or heating ducts. • <u>Baits</u>: Bait stations containing a slow acting insecticide are placed around the building. Termites feed on the bait, and then return to the colony where they share the bait with other members of the colony. Some baits are available to the general public whereas others are available only to licensed pest management personnel. Proper bait placement is critical to the success of the procedure, and is therefore best performed by pest management personnel with experience in termite baiting.

CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • If properly applied, insecticide pre-treatments and injections should pose little risk of unwanted insecticide exposure. • Bait stations should be placed to minimize the chances that children or facilities maintenance personnel will disturb them. • Ensure that insecticides do not enter drains, streams, lakes and other surface water.
PROHIBITED PRACTICES	Do not use ultrasonic pest repelling devices.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Applicators must use personal protective equipment as required by the product label. • Termiticides leave a long residual in soil. Care must be taken when applying to prevent contamination of non-target areas.

ADDITIONAL INFORMATION:**Formosan Subterranean Termites**

Formosan subterranean termites (FST) are a more destructive species of termite due to its colony size and foraging range. A single FST colony can contain several million termites compared to several hundred thousand for the native subterranean termite species. FST species share interconnected forage galleries in the soil and can forage up to 300 ft, posing a threat to nearby structures. Their distribution includes the southeastern United States and Hawaii.

Other differences between an FST colony and a native subterranean colony include:

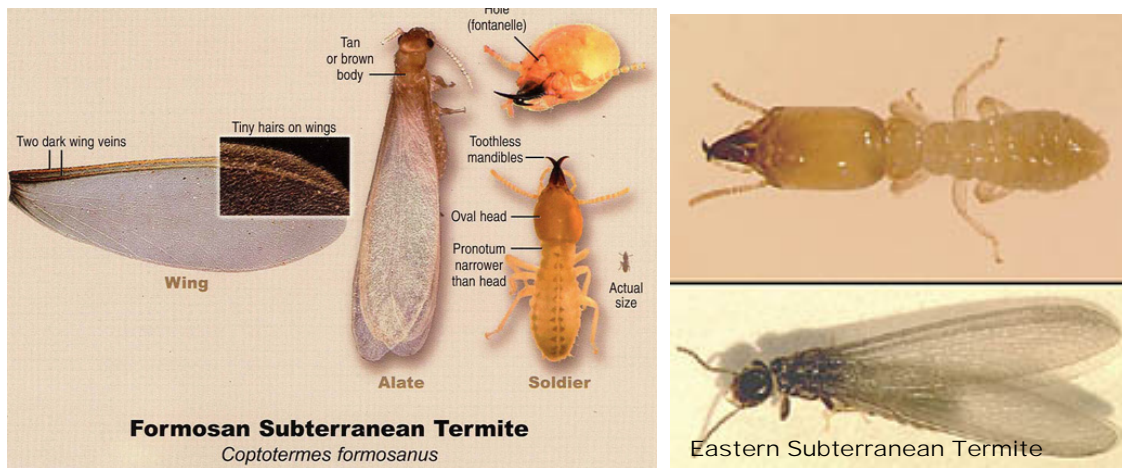
1. FST colonies contain more termite soldiers (have a hardened head capsule) in the colony (10–15% compared to 1–2%) and swarmers are larger
2. They form a material called “carton” in structure voids which allows them to obtain moisture without returning to ground (photo on right).
3. They can readily form aerial colonies by going the top of the structure to obtain moisture which makes controlling them difficult or impossible.



A more aggressive treatment program for FST colonies is required, using the same treatment options as above. Any cartons in voids should be located and removed.



Subterranean termite shelter tubes.



TURF AND ORNAMENTAL PESTS

Fire Ants

Ornamental Plant Pests

Snails and Slugs

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Fire Ants

TARGET PEST	
TARGET PEST(S)	Fire ants
TARGET SITE(S)	Outdoors and inside buildings
PURPOSE	Control fire ants that can cause painful stings or allergic reactions, be a nuisance, and short circuit electrical circuits.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Pest Management Service Provider</u>: Respond to trouble calls and conduct routine inspections during seasonal outbreaks. Thorough inspections will be made prior to any control operation. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Grounds Maintenance Provider</u>: Control aphids and similar insects on ornamental plants that attract and feed ants. • <u>Facilities Maintenance Provider</u>: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual inspections <ul style="list-style-type: none"> ○ Observation of foraging scout ants; ants aggressive when mound is disturbed ○ Aboveground mounds • Personnel complaints: including information on when, where, and how many pests were observed.
FREQUENCY	<ul style="list-style-type: none"> • As needed • Areas designated by customer complaints, or with a history of infestation.
ACTION THRESHOLD	Visual sighting of fire ants.
NONCHEMICAL CONTROL	
SANITATION	<ul style="list-style-type: none"> • Remove indoor plants which are attractive to ants and/or aphids • Trim trees and shrubs touching buildings
OUTSIDE BARRIER	<ul style="list-style-type: none"> • Keep a vegetation-free, clear area approx. 24" wide (often filled with gravel or coarse sand) around foundations to inhibit pest movement to structures and facilitate barrier treatments.
PEST PROOFING	<ul style="list-style-type: none"> • Reduce moisture • Replace outside hollow core doors with solid doors.

CONTROL OF PLANT INSECTS	<ul style="list-style-type: none"> • Ants live in cooperation with some plant-infesting insects such as aphids. These insects produce sugars that are food for the ants, while the ants provide protection for the plant-sucking insects. • Control aphids and other plant-sucking insects on plants
CHEMICAL CONTROL	
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • <u>Baits</u>: Improved areas should be treated with a granular bait annually in the late summer or early fall. Baits are slow-acting and require weeks to months to achieve 80 to 90% control. • <u>Drench, Dust, or Granular Insecticide</u>: Three to five days after initial broadcast application, specific nuisance mounds should be treated with a drench, dust, or granular application labeled for fire ant mounds. Nuisance mounds are those located in sensitive or high traffic areas.
CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Exposed food products, food containers, counter tops, any surface where food may be stored or prepared, or any food storage area. • Outdoors where children or pets may be exposed to pesticides.
PROHIBITED PRACTICES	<ul style="list-style-type: none"> • Do not apply liquid or dust formulations of insecticides in occupied spaces. • Do not do preventive baseboard spraying in the absence of a pest.
SAFETY PRECAUTIONS	<ul style="list-style-type: none"> • Treatment of child development centers and schools will be scheduled at night of the last day during the work week if practical. Pesticides will be allowed to dry and air out for at least 36 hours before children are allowed to enter treated spaces. • Additional re-entry interval time requirements specified by the product label must be strictly adhered to. • If a liquid, dust, or aerosol is used, treatments will be made after hours or at other times when the spaces are vacant.

COMMENTS:

Baits should not be applied if heavy rains are expected within 24 hours. Baits work best when they are fresh and are applied when ants are foraging, usually in the late afternoon and evening.

NOTES REGARDING FIRE ANTS:

The red imported fire ant (RIFA) is a very destructive pest that is well established along the southern tier of the United States. These ants are reddish brown and 1/8" to 1/4" long. RIFA nests are generally constructed in open, sunny areas such as lawns and around yard plants and trees. These ants can invade utility vaults and structures. The sting from the RIFA is very painful and, in certain cases, may require medical attention. Never use gasoline to burn out any ant nest. Gasoline is a soil and groundwater contaminant, and is very hazardous. For more information on red imported fire ants, contact your pest control service provider or go to <http://fireant.tamu.edu/>.



Ornamental Plant Pests

TARGET PEST	
TARGET PEST(S)	Insects and mites attacking ornamental plants
TARGET SITES(S)	All interior and exterior areas with ornamental plants
PURPOSE	<ul style="list-style-type: none"> • Prevent damage to real property (valuable ornamental plants) • Prevent unsightly honeydew and mold accumulation on vehicles and structures
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>All Personnel</u>: properly care for houseplants in working areas • <u>Pest Management Service Provider</u>: conduct integrated pest management to control infestations. • <u>Pest Management Performance Assessment Representative</u>: ensure contractor pest management service provider performs work in accordance with contract specifications • <u>Grounds Maintenance Provider</u>: maintain the health of ornamental plants • <u>Landscape Designer</u>: ensure use of plants well adapted for the given areas in landscaping; ensure placement of plants in areas where their health can be maintained • <u>Integrated Pest Management Consultant</u>: identify unknown pests and recommend control measures.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual sighting of pests: <ul style="list-style-type: none"> ○ <u>Caterpillars</u>: immature forms of moths and butterflies. These insects chew on leaves and are often found on the undersides of leaves. ○ <u>Aphids</u>: small (usually about 1/16-inch or smaller) globular, pear-shaped insects. Color is usually green, but may be pink, yellow, blue-green, or black. Almost always with two dorsal tubular structures on the posterior end of the body (cornicles). Wingless and winged forms may be present. Typically found on the undersides of leaves, but may also be present on stems. ○ <u>Scales</u>: flattened sessile insects that suck plant juices from leaves or, more often, stems. Usually appear as oval, waxy shells; no legs or body divisions are visible. Size and color vary depending on age and species. ○ <u>Mealybugs</u>: oval insects that superficially resemble small sowbugs. Exude loose cottony wax that may obscure the body of the insect. May be found on almost any part of the host plant, including the roots. ○ <u>Whiteflies</u>: adults usually appear as minute white flies that hold their wings roof-like over their bodies at rest (though these insects are not true flies). Dark spots or patterns are visible on the wings of some species.

	<p>Adults typically rest on the undersides of leaves, but fly readily if disturbed. Immature whiteflies are sessile, flattened, oval insects that are almost always found on the undersides of leaves. They suck plant juices and can severely reduce plant vigor.</p> <ul style="list-style-type: none"> ○ Mites: minute, globular arachnids very diverse in habit and form. Some are pests of plants. Adult mites will have eight legs, distinguishing them from insects which have six legs. Spider mites are the most common mite pests of ornamentals. Immature spider mites are usually yellowish or straw-colored and the adults are yellowish or green. In severe infestations, a fine web, similar to spider web will coat the plant's foliage. Bright red, fast moving, velvety mites are often present on plant foliage. These mites are predaceous and, therefore, considered beneficial. ○ Nematodes: microscopic, eel-like roundworms. Many species are root-feeding. They are difficult to control and can be easily spread from garden to garden on tools, in soil, or on boots. ○ Other pests: other insects, including cicadas, psyllids, leaf-feeding beetles, and gall-forming insects may be pests of ornamentals. Contact a pest management consultant if unsure of the identity of a pest. ● Signs of pest infestation: <ul style="list-style-type: none"> ○ Leaves: chewed, spotted, curled, or otherwise disfigured leaves can indicate an insect or mite infestation. Plant pathogens, nutrient imbalances, and uptake of toxic substances can cause similar disfigurements of leaves. Consult with the pest management consultant when in doubt of the origin of plant damage. ○ Branches: girdled twigs are an indication of infestation by certain types of beetles. ○ Trunks: holes in the trunk or globules of plant resin can indicate infestation by certain types of boring beetles. ○ Ants: ants scurrying about the foliage of a plant may be a sign of infestation by certain plant feeding insects, especially scales, aphids, and mealybugs. These insects exude sugary waste products that ants feed upon. In return, the ants protect the plant feeding insects from predators and parasites.
FREQUENCY	Ornamental plants should be inspected weekly for pests or signs of pests.
ACTION THRESHOLD	Variable, depending on pest. A low-level of infestation is to be expected on outdoor plants. Natural controls (predators, parasites, and plant defenses) typically prevent these low-level infestations from significantly harming the plant. Infestations that significantly reduce plant health or seriously affect plant aesthetics are candidates for chemical control. Unnecessary or excessive pesticide application can compromise natural control by killing beneficial organisms and may lead to pesticide resistance.
NONCHEMICAL CONTROL	
BIOLOGICAL CONTROL	<ul style="list-style-type: none"> ● Bti: Several formulations of the bacterial agent, <i>Bacillus thuringiensis israelensis</i> are available for use against certain pests, particularly caterpillars. ● Fungi: some fungal pathogens of insects have been isolated and formulated for use against insect pests. ● Natural control: Many pests of ornamentals are maintained at low, undamaging levels by the actions of natural enemies. Applying chemical pesticides only when necessary can help conserve these natural enemies. In some cases, universities and government agencies may be actively importing, rearing, and releasing natural enemies for control of particular pests.

SANITATION	<ul style="list-style-type: none"> • Removing, burning, or chipping dead wood and other plant debris can reduce certain pest populations, particularly beetles. • Keep gardening tools clean so as not to carry pests from one plant to the next. • Only buy plants from reputable sources. Ensure that plants don't harbor ants, nematodes, invasive weeds, or other problems.
MECHANICAL REMOVAL	<ul style="list-style-type: none"> • <u>Minor infestations</u>: simply picking pests off of plants can sometimes control small infestations. This technique is typically not practical for large infestations or infestations on outdoor landscaping. • <u>Severe infestations</u>: in some cases, a plant may be so severely infested that there is little chance of control, or the cost of control is not justified by the value of the plant. These plants should be removed, and their tissues destroyed (chipping or burning) so that they do not serve as a source of pests for other plants.
IMPROVE AND MAINTAIN PLANT HEALTH	<ul style="list-style-type: none"> • The best defense against pest infestations is maintenance of healthy, vigorous plants. Healthy plants will be able to tolerate low levels of infestation and prevent pest outbreaks. • Ensure proper watering, fertilizing, and pruning schedules. Do not over water or over fertilize. • Place plants in areas where they receive the appropriate quality and quantity of light.
USE OF NATIVE VEGETATION LANDSCAPING	<ul style="list-style-type: none"> • Native plants are usually less susceptible to pests because they are well adapted to survival in the area. Consider using native vegetation rather than exotic vegetation in landscape design. • Grow a diversity of plants. Plant a variety of sequentially flowering species to provide natural enemies with nectar, pollen, and shelter throughout the growing season.
EDUCATION	Education on natural enemies
CURRENT NONCHEMICAL CONTROL PRACTICES	Maintain health of ornamental plants through proper watering and pruning.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	<ul style="list-style-type: none"> • A number of soap and oil insecticides are available. Many of these are "25(b)" or EPA minimum-risk pesticides and are exempt from registration due to the low toxicity of the active and inactive ingredients in the product. For a list of these active ingredients, go to http://www.epa.gov/oppbppd1/biopesticides/regtools/25b_list.htm.
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • <u>Contact pesticides</u>: may be sprayed directly onto infested plants. The pesticide must directly contact the pest for control. The applicator should concentrate on the undersides of leaves for most types of pests. Insecticidal soaps are a particular class of contact pesticide with very low toxicity to nontarget organisms. These can be particularly effective against some scale, mealybug, and mite infestations. • <u>Systemic pesticides</u>: these chemicals are absorbed by the plant and ingested by the pest when it feeds on the plant. Some systemics are applied to the foliage; others are applied to the soil and absorbed by the plant's roots.
SENSITIVE AREAS	<ul style="list-style-type: none"> • Use nonchemical controls whenever possible around playgrounds and childcare centers. • Avoid exposing natural areas containing endangered or threatened species. • Ensure insecticides do not enter drains, streams, lakes and other surface water.

RESTRICTIONS/ REGULATIONS/ PERMITS	None.
CONSIDERATIONS	
PROHIBITED PRACTICES	Do not use ultrasonic pest-repelling devices.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Applicators must use personal protective equipment as required by the product label. • Take precautions to prevent pesticide exposure to personnel when spraying near buildings or other populated areas. • Avoid contaminating water. Do not apply before rain or irrigation to prevent runoff.



Snails and Slugs

TARGET PEST	
TARGET PEST(S)	Snails and slugs, particularly the brown garden snail (<i>Helix aspersa</i>) and the gray garden slug (<i>Peroceras reticulatum</i>), the banded slug (<i>Limax poirieri</i>), and the greenhouse slug (<i>Milax gagates</i>)
TARGET SITES(S)	Landscaped areas around buildings
PURPOSE	<ul style="list-style-type: none"> • Prevent damage to real property (landscaping plants) • Reduce the presence of unsightly snails and slugs on and around buildings
RESPONSIBILITY	<ul style="list-style-type: none"> • Pest Management Service Provider: conduct integrated pest management to control infestations. • <u>Pest Management Performance Assessment Representative (PMPAR)</u>: ensure contractor pest management service provider performs work in accordance with contract specifications. • Landscape Maintenance Provider: maintain the health of ornamental plants.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual sighting of pests: <ul style="list-style-type: none"> ○ <u>Snails</u>: conspicuous, shelled slow moving animals found in moist habitats. Most active at night and on cloudy or foggy days. During hot dry periods, dormant snails may be seen attached to walls, fences, or tree trunks. ○ <u>Slugs</u>: similar to snails, but without shell • Signs of pest infestation: <ul style="list-style-type: none"> ○ <u>Trails</u>: snails and slugs leave silvery mucus trails wherever they crawl. Trails may be present on the ground, on the foliage of plants, or on buildings. ○ <u>Plant damage</u>: chew irregular holes with smooth edges in leaves of succulent and herbaceous plants. Prefer plants that are close to the ground, but will climb to feed on fruits and leaves of fruit trees.
FREQUENCY	Survey during normal landscape maintenance
ACTION THRESHOLD	Populations densities sufficient to cause a nuisance or significant damage to plants warrants control
NONCHEMICAL CONTROL	
BIOLOGICAL CONTROL	<ul style="list-style-type: none"> • <u>Decollate snail</u>: a predaceous snail that feeds on young plant feeding snails and slugs. These snails pose a risk to endangered native snail populations, so their release is restricted to particular counties. They are not commercially available.

DRIP IRRIGATION	<ul style="list-style-type: none"> Replacing sprinklers with drip irrigation will reduce unnecessary moisture and therefore reduce the habitat for snails and slugs to hide
HABITAT REMOVAL	Remove debris, such as boards, flat stones, dead vegetation, and low hanging limbs that provide moist cover for snails and slugs during dry periods.
MECHANICAL REMOVAL	<ul style="list-style-type: none"> <u>Picking</u>: snails and slugs can be picked out of landscaped areas, placed in plastic bags, and disposed of in refuse containers. This method is not likely to be practical in large landscaped areas <u>Trapping</u>: a board with two rails on opposite edges will serve as an attractive site for snails and slugs to hide during dry periods. The board can be periodically lifted and the snails and slugs removed.
PEST PROOFING	<u>Barriers</u> : consist of copper foil or screens. Copper foil can be wrapped around the bases of potted plants. Copper screen can be used to create barriers around gardens and landscaped areas.
IMPROVE PLANT VIGOR	Healthy plants will be less likely to succumb to damage by pests.
CHEMICAL CONTROL	
METHOD OF DISPERSAL	<p><u>Baits</u>: products containing metaldehyde or iron phosphate are effective for slug and snail control. Apply baits in the evening. Baits applied during hot dry conditions are less likely to be effective because snails and slugs will be inactive and therefore less likely to come in contact with the bait.</p> <p>Note: Do not use salt to kill snails and slugs. This will damage the soil and render it unusable for landscaping or gardening.</p>
CONSIDERATIONS	
SENSITIVE AREAS	Products containing metaldehyde can be hazardous to children or pets. Emphasize nonchemical control and iron phosphate baits in areas frequented by children or pets.
PROHIBITED PRACTICES	Do not use ultrasonic pest repelling devices.

VERTEBRATE PESTS

Bats

Nuisance Birds

Feral Cats

Raccoons

Rodents

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Bats

TARGET PEST	
TARGET PEST(S)	Bats
TARGET SITES(S)	Buildings where bats may roost
PURPOSE	<ul style="list-style-type: none"> • Prevent damage to real property and unsanitary conditions resulting from the buildup of bat guano (feces) • Prevent fear • Reduce the risk of disease transmission from infected bats • May be a source of bat bugs, which are in the same genus as bed bugs
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Installation Preventive Medicine Technicians</u>: Conduct surveys if bats pose a health hazard and provide pest management recommendations. • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control bats in structures when necessary. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Natural Resources</u>: Implement a bat management plan developed by the contracted biological consultant and conduct bat removal from workspaces. • <u>Facilities Maintenance Provider</u>: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested. • <u>All Personnel</u>: Report bat problems, especially when they pose a health hazard.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual inspections <ul style="list-style-type: none"> ○ Observation of bats roosting or entering a building. ○ Observation of signs of bat roosting such as guano • Personnel complaints: including information on when, where, and how many pests were observed.
FREQUENCY	Daily observation by all personnel and pest management service providers.
ACTION THRESHOLD	<ul style="list-style-type: none"> • When bats pose a health hazard, become a nuisance, or deface property. • Bats in human living quarters or food preparation areas should always be removed.
NONCHEMICAL CONTROL	
EXCLUSION	Seal openings to attics and other areas where bats may enter and roost

BAT REMOVAL	<ul style="list-style-type: none"> • One-way valves: Devices that allow bats to leave a building, but not return, can be installed on buildings already infested. Leave such devices in place for 7 to 10 days before permanently sealing the opening. • Do not install devices on roosts where mothers are nursing immature bats.
MECHANICAL REMOVAL	<p>Bats that accidentally enter a room can be captured and released outside. To reduce stress on the animal, use the following procedure:</p> <ol style="list-style-type: none"> 1. Close doors to confine the bat to a single room. 2. Allow the bat to become exhausted and land. Do not attempt to catch a bat in flight. 3. Once the bat has landed (usually on curtains or a piece of furniture), allow it to rest for 20 to 30 minutes. 4. Place a bowl, can, or other suitable container over the bat. 5. Trap the bat in the container by sliding a piece of cardboard or other rigid material between the bat and the surface on which it is resting. Wear thick leather gloves for this procedure, and avoid touching the bat. 6. Release the bat outside. The bat may not fly immediately, so release it in an area where it can remain undisturbed for several hours. If the bat is still present the next day, report it to a preventive medicine technician or pest control service provider.
PROVIDE ALTERNATIVE ROOSTS	Bat houses can provide an alternative to buildings as roosting sites. Houses must be correctly built and placed for acceptance by bats.
EDUCATION	Public education on both the benefits and the risks associated with bats.
CONSIDERATIONS	
PROHIBITED PRACTICES	Do not use ultrasonic pest repelling devices.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Use care when handling bats and wear proper PPE when necessary. • Contact the natural resources manager for restrictions and guidance on bat management.

CHEMICAL CONTROL:

There are no chemical pesticides registered for use against bats. Deliberately poisoning bats or other wildlife is a violation of federal law.

COMMENTS:

Bats are generally considered beneficial organisms that reduce insect populations. Control is only necessary if the bats are causing a nuisance or public health concern.

ADDITIONAL INFORMATION:

How to build and place bat houses and bat eviction devices can be found at <http://www.batcon.org/>.



Nuisance Birds

TARGET PEST AND SURVEY	
TARGET PEST(S)	Nuisance birds (including pigeons, English sparrows, starlings, seagulls, etc.)
TARGET SITES(S)	<ul style="list-style-type: none"> • Office buildings, warehouses, aircraft hangars, and parking lots • Light posts and signs • Ledges, window ledges, and rooftops
PURPOSE	Manage birds that cause safety hazards (Bird/Wildlife Aircraft Strike Hazard), deface buildings, vehicles, and equipment, and provide a potential source of disease, mites, and bed bugs. Bird droppings which accumulate over several years may harbor spores of fungus that cause histoplasmosis, ornithosis, and cryptococcosis.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Installation Preventive Medicine Technicians</u>: Conduct surveys if birds pose a health hazard and provide pest management recommendations. • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control birds. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Facilities Maintenance Provider</u>: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested. • <u>BASH Manager</u>: Manage birds in and around airfields and aircraft facilities to prevent bird aircraft strike hazards (BASH). • <u>Natural Resource Manager</u>: Coordinate management of birds and other wildlife with USDA Wildlife Services and be the POC for depredation permits. • <u>All Personnel</u>: <ul style="list-style-type: none"> ○ Report bird problems especially when they pose a health hazard. ○ Do not feed pest birds (except for residential bird feeders) ○ Keep lids closed on dumpsters and other receptacles
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual inspections <ul style="list-style-type: none"> ○ Observation of birds roosting or nesting or entering into a building ○ Observation of signs of bird roosting and nesting such as feces ○ Observation of bird mites in buildings infested with birds. • Personnel complaints: including information on when, where, and how many pests were observed.
FREQUENCY	Daily observation by all personnel and pest management service providers.

ACTION THRESHOLD	When birds pose a health hazard, become a nuisance, or deface property.
NONCHEMICAL CONTROL	
REMOVAL OF FOOD SOURCES	<ul style="list-style-type: none"> • Cover trashcans and dumpsters which attract birds such as gulls • Avoid feeding birds especially pigeons • Sanitation
EXCLUDE ENTRY INTO BUILDINGS	<ul style="list-style-type: none"> • Close windows and doors to buildings • Place netting over windows and doors that must remain open • Place wood, metal, glass, masonry, rust-proofed wire mesh (1/4" thick), or plastic/nylon screen/netting or other barriers over openings or areas of buildings that might be used for nesting
ELIMINATE ROOSTING	<ul style="list-style-type: none"> • Design structures that prevent bird roosting. For example, place a board over ledges at a 45° angle. Make sure the ends are closed to prevent entry. • Remove structures that allow roosting. • Attach anti-roosting devices such as Nixalite bird strips • Apply a chemical repellent such as Hot Foot. • Thinning or pruning trees to remove protective cover can discourage roosting.
SHOOTING	<ul style="list-style-type: none"> • If allowed, a low-caliber rifle can be used indoors to eliminate birds. • Outdoors, shotgun blasts can also scare birds. • This method should only be used by personnel trained in the use of firearms. There are tight restrictions on bringing firearms onto an installation.
HABITAT MODIFICATION	<p>Modify habitats to make them less attractive to birds (especially around airfields)</p> <ul style="list-style-type: none"> • Keep grass low • Fill in areas that hold water
TRAPPING	<ul style="list-style-type: none"> • Pigeon traps have proven to be effective in some situations. • "Australian crow traps" collect a wide variety of birds, but may require a permit to use. • Pigeons should not be relocated as they will likely return to their roosting and feeding areas. They may need to be euthanized.
NEST REMOVAL	<ul style="list-style-type: none"> • Remove bird nests. Nuisance bird nests can be removed with eggs or chicks. Other bird nests cannot be removed unless abandoned or empty. • Cliff swallows: remove mud nests while they are still under construction and do not contain eggs or hatchlings. Once the nest has been established, it is illegal to destroy the nest until it is abandoned.
SCARE DEVICES	<ul style="list-style-type: none"> • Acoustical devices, such as propane-fired cannons, are known as bird bangers. The cannons that work most effectively are those that randomly fire at different times and are multidirectional. It is the unpredictable nature of the noise that frightens the birds • Visual repellent devices such as scare-eye balloons, bird effigies, laser lights, and streamers and flashtape. • Timing is important. It is easier to scare birds if the site has been occupied for a short period of time rather than used for many nights. Scare tactics require at least three to five evenings to be effective. • Raptor Models—strategic placement of owl decoys or raptor silhouettes may be used to discourage roosting. Models must be relocated frequently and have only a short-term effectiveness. <p>Both visual and auditory frightening devices are only effective for short periods of time.</p>

EDUCATION	Understanding of how baits and repellents work Importance of not feeding birds and keeping trash receptacles closed.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	<ul style="list-style-type: none"> • 4-aminopyridine, polybutene, methyl anthranilate
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • Bait: One type of chemically-treated bait causes birds that ingest the toxicant to emit distress and alarm cries and visual displays that frighten the rest of the flock causing them to leave the site. (e.g., Avitrol) • Chemical repellent: Chemical repellents are non-toxic to the birds and are available for direct application to turf and other surfaces where birds feed or roost. (e.g., 4 The Birds, Hot foot, Tanglefoot, Roost No More, Bird-Proof). Another application method available is a ULV formulation that is allowed to drift directly onto the birds (e.g., Fog Force).
RESTRICTIONS/REGULATIONS/PERMITS	<ul style="list-style-type: none"> • Nuisance birds are not protected under the Migratory Bird Treaty Act, but control of the birds may require a depredation permit. • The NRM should always be consulted when managing non-nuisance birds.
CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Areas where endangered or threatened species occur. • The use of toxicant bait can elicit a negative public response. Public education, timing, and placement of the bait are important in preventing negative publicity.
PROHIBITED PRACTICES	Do not use ultrasonic pest repelling devices.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Firearms safety if shooting • Noise hazards with auditory scare devices. • Fall hazard when working on roofs or ledges • Adverse impact on non-target bird especially when using chemicals.

COMMENTS:

All birds except rock doves (pigeons), English sparrows, and starlings are protected under the Migratory Bird Treaty Act (MBTA) and require a depredation permit to control. This also includes nests occupied by birds protected by the MBTA. Contact the installation environmental division regarding a permit before beginning new bird control operations.

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Feral Cats

TARGET PEST	
TARGET PEST(S)	Feral Cats
TARGET SITES(S)	Buildings where cats frequent
PURPOSE	Control feral cats that may contribute to flea infestations, increase the risk of rabies and other diseases, and prey on local wildlife.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Army Veterinary Detachment</u>: Conduct surveys if cats pose a health hazard and trap cats when necessary. • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control cats near buildings when necessary. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Facilities Maintenance Provider</u>: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual inspections • Customer complaints
FREQUENCY	Daily observation by all personnel.
ACTION THRESHOLD	<ul style="list-style-type: none"> • Any wild/feral animals capable of transmitting rabies and acting sick or aggressive, or damaging property shall be managed. • Any animal (capable of carrying rabies) that has bitten or scratched someone shall be managed and analyzed for rabies.
NONCHEMICAL CONTROL	
LIVE TRAPS	Cats that require extensive care will be taken to the local humane society or Society for the Prevention of Cruelty to Animals (SPCA), cats that are rejected by the SPCA will be euthanized.
SANITATION	<ul style="list-style-type: none"> • Remove food source • Cover trash cans/dumpsters
EDUCATION	Keep personnel from feeding the feral cat population.
HABITAT MANAGEMENT	Remove available harborage sites

COMMENTS:

Toxic baits shall not be used for feral cat management.

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Raccoons

TARGET PEST	
TARGET PEST(S)	Raccoons.
TARGET SITES(S)	Areas near buildings or populated areas where raccoons become a pest.
PURPOSE	Control raccoons due to danger when they are cornered and become aggressive, pathogens they carry such as rabies and raccoon roundworm which can be fatal to humans, and severe damage they cause to buildings and other structures.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Installation Preventive Medicine Technicians</u>: Conduct surveys where raccoons pose an adverse health or safety risk, such as inside buildings • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control raccoons. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor PMSP performs work in accordance with contract specifications. • <u>Facilities Maintenance Provider</u>: Perform facilities repairs and improvements that exclude raccoons from buildings. • <u>Base Operation Support</u>: Ensure that dumpsters and trashcans are emptied on schedule and that they are securely covered to prevent raccoon entry. • <u>All Installation Personnel</u>: Practice good sanitation and do not feed wild animals to prevent attracting raccoons from becoming a pest.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual sighting of raccoons or signs of raccoons. • Raccoons are nocturnal, so visual surveys are usually conducted at night. • Verify personnel reports of raccoon activity.
FREQUENCY	As needed.
ACTION THRESHOLD	Any verified sighting of a raccoon where it enters a building or poses a safety or health hazard.
NONCHEMICAL CONTROL	
EXCLUSION	Use lids/covers that can be secured on dumpsters and trashcans.
SHOOTING	<ul style="list-style-type: none"> • Shooting with a .22 caliber rifle may be used to control small populations in areas where: <ul style="list-style-type: none"> ○ shooting is legal ○ shooting can be safely conducted • Qualified marksmen should do shooting. • Not generally practical for large populations

TRAPPING	<ul style="list-style-type: none"> • Live cage-type traps should be used • Use cat food containing fish or canned tuna for bait. To avoid catching cats use marshmallows, grapes, prunes, peanut butter, or sweet rolls. • Ensure that the raccoon cannot reach through the back or side of the trap to steal the bait. • Secure trap to the ground to prevent the raccoon from tipping it over.
FOOD REMOVAL	<ul style="list-style-type: none"> • Deny access to trash and other sources of food. • Prevent personnel from feeding raccoons.
CHEMICAL CONTROL	
Chemicals are not available for the control of raccoons.	
CONSIDERATIONS	
PROHIBITED PRACTICES	<ul style="list-style-type: none"> • Use of ultrasonic pest repelling devices is prohibited. • Relocation of trapped animals greater than one mile from point of capture is prohibited by State law.

ADDITIONAL INFORMATION:

Raccoon biology and management

<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74116.html>

Information on raccoon roundworm infection

<http://www.cdc.gov/parasites/baylisascaris/index.html>



Rodents

TARGET PEST	
TARGET PEST(S)	<ul style="list-style-type: none"> • Commensal: Norway rats, roof rats, house mice • Peridomestic: Field mice (e.g., deer mice) • Landscape: gophers, ground squirrels
TARGET SITES(S)	Buildings, utility vaults, other structures, and landscaped areas
PURPOSE	Control rodents that may cause food contamination, disease transmission, property damage or be a nuisance.
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Building Occupants</u>: Ensure sanitation and other measures to prevent introduction and propagation of pests. • <u>Installation Preventive Medicine Technicians</u>: <ul style="list-style-type: none"> ○ Conduct surveys where rodents pose an adverse health or safety risk ○ Provide informal quality assurance for pest control ○ Provide pest management and disease prevention recommendations. • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control infestations. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Facilities Maintenance Provider</u>: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested. • <u>Grounds Maintenance Provider</u>: Perform removal of potential food sources (e.g., fruit on trees) and creation of barriers (e.g., vegetation removal) around buildings that promote rodent invasion. • <u>Natural Resource Manager</u>: Provide guidance when rodent control operations may impact endangered or threatened species or species of concern.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual inspections: observations of rodents or signs of rodents, such as nests, rub marks, gnawing, earth mounds, holes, etc. • Use of tracking powder • Personnel complaints: including information on when pests were observed, where, and how many. • Conduct pre- and post-treatment surveys to determine whether control operation was effective • Use of ultraviolet inspection lights (rodent urine and hair will fluoresce under UV light)
FREQUENCY	Daily observation by building occupants. Routine facilities inspections by cognizant PMT or pest control service provider.

ACTION THRESHOLD	Sighting of any rodent or sign of rodent in or immediately surrounding the building.
NONCHEMICAL CONTROL	
SANITATION	Remove or prevent access to all potential food and harborage sources inside and outside of buildings.
ELIMINATE STANDING WATER	Fix leaking plumbing around buildings
PEST PROOFING	<ul style="list-style-type: none"> • Trim ornamental plants and trees to prevent harborage. • Seal holes in exterior walls that may serve as entryways. • Trim tree limbs so that they are at least 6 feet from the building. • Trim vegetation around buildings. • Clean up debris from inside and around buildings. • Request support from facilities maintenance and/or grounds maintenance provider if necessary.
HABITAT DESTRUCTION	<ul style="list-style-type: none"> • For field mice: vegetation removal and disking of soil in a barrier 50 ft around buildings will prevent rodent invasion. This is usually done after area-wide rodenticide application. • Use of native landscaping will tend to reduce peridomestic and landscape rodent infestations. Avoid heavy ground covers that provide harborage and cover for rodents to move into buildings from unimproved grounds.
TRAPPING	Glue boards, snap traps, or other mechanical trapping devices. (see health precautions below)
EDUCATION	<ul style="list-style-type: none"> • Awareness of the importance of sanitation on preventing rodents. • Understanding and preventing diseases associated with rodents.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	<ul style="list-style-type: none"> • Second generation anti-coagulants: brodifacoum, bromadiolone, difenacoum, difethialone • First generation anti-coagulants: diphacinone, chlorophacinone, warfarin • Others: zinc phosphide, cholecalciferol, bromethalin • Fumigant: aluminum phosphide
METHOD OF DISPOSAL	<ul style="list-style-type: none"> • <u>Anticoagulant bait</u>: Multi or single dose blocks or pellets; toxicant effect is delayed. • <u>Single dose acute toxicant bait</u>: Acute toxicant effect; often broadcast outdoors on ground. • <u>Liquid bait</u>: Used in areas where water sources are scarce. <ul style="list-style-type: none"> ○ When used in occupied spaces or outdoors where there is a risk of exposure to humans and nontarget animals, the bait should be contained in a tamper-proof bait station. ○ Baits can be applied directly into burrows. • <u>Fumigation</u>: Used for control of rodents in burrows. Consult a NAVFAC pest management consultant if necessary.
RESTRICTIONS/ REGULATIONS/ PERMITS	All rodenticide baits are required to be applied in tamper-proof bait stations.

CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Areas where humans and nontarget animals may come into contact with the rodenticide, particularly childcare centers. • Areas where endangered or threatened rodent species occur and may consume bait. • Areas where rodents may be primary food source for an endangered or threatened animal. • Habitat destruction to reduce food sources or harborage may also be destructive to critical habitats of endangered or threatened species. • The pest management coordinator shall consult the environmental compliance office before any pest management operations are conducted outdoors on unimproved grounds or wildlands.
PROHIBITED ITEMS	<ul style="list-style-type: none"> • Do not use ultrasonic pest repelling devices. • Myth: Allowing cats to live around buildings controls rodent population. Reality: Cats are inefficient at rodent control especially when they are already being fed. In many situations, cats pose greater hazards than rodents.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Active ingredients in rodenticides are highly toxic to humans and precautions must be taken to prevent human exposure. • Applicators must wear proper protective equipment as required by the product label. • Rodenticides can adversely impact non-target animals through direct poisoning or secondary poisoning. • Traps, such as stick traps, may catch non-target animals such as reptiles and birds. These should only be used indoors.

COMMENTS:

1. Precautions on indoor rodent control:

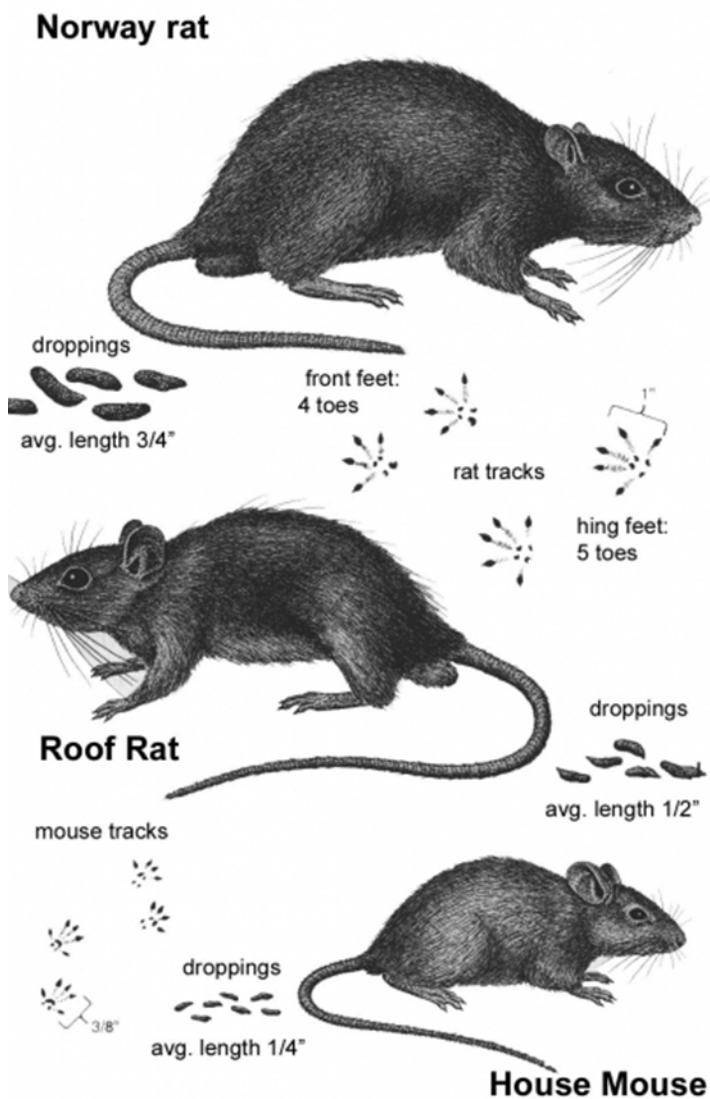
- a) Most rodents are infested with ectoparasites (fleas, mites, lice) that may also infest or transmit disease to humans. Ectoparasite control should be conducted prior to eliminating (trapping or rodenticides) rodents.
- b) Rat control indoors using rodenticides should be avoided. The most commonly used rodenticide baits have a delayed toxic effect that do not kill the rodent until hours (or days for multidose) after they have consumed the bait. Rodents may die in walls and other voids where the carcass is difficult to retrieve leading to odor problems due to the decaying carcass.

2. Disease Prevention:

Rodents can harbor a number of human disease agents; among them are hantavirus and plague. Precautions must be taken when working in rodent infested areas. Rodent feces and dried urine may contain hantavirus that is transmitted when these waste materials are inhaled. Precautions should also be taken when handling dead rodents in traps and when found after rodenticide use. The following precautions should be taken:

- a) Avoid disturbing feces and other rodent waste when entering enclosed spaces. Use a fitted respirator with high efficiency particulate air (HEPA) filter if necessary.
- b) Soak rodent waste and dead rodents with a household disinfectant or bleach solution before removing.

- c) Wear gloves when cleaning or picking up rodent carcasses. Put material in a double plastic bag and dispose of in regular trash.



VEGETATION MANAGEMENT

Invasive Weeds in Natural Areas

Terrestrial Weeds

Weeds in Right of Ways

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Invasive Weeds in Natural Areas

TARGET PEST	
TARGET PEST(S)	Non-native plants that are widespread and adversely affect the habitats they invade economically, environmentally, or ecologically.
TARGET SITES(S)	Natural areas, ranges, riparian areas, training areas, and encroachment buffers threatened by invasive weeds
PURPOSE	Control invasive weeds in natural areas since it is required by law and for the following reasons: <ul style="list-style-type: none"> • Impacts access to and use of training areas and ranges • Interferes with mission operations • Degrades natural habitats; impacts endangered and threatened species habitats • Preserve natural heritage • Reduce health and safety risks; may increase wildfire hazard • Reduce training costs
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control weeds. • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor invasive weed management provider performs work in accordance with contract specifications. The PAR may be the natural resources manager. • <u>Grounds Maintenance Provider</u>: Remove weeds during regular landscape maintenance to prevent establishment; maintain the health of desirable plants. • <u>Natural Resources Manager</u>: Oversee weed program coordinating detection and control. • <u>Invasive Weed Management Provider</u>: Manage weeds as required by the installation • <u>Integrated Pest Management Coordinator</u>: Ensure environmental compliance of the program.
SURVEILLANCE	
METHODS	Visual inspection and mapping
FREQUENCY	Yearly inspection, especially in the spring and summer when plants are easy to identify by their blooms.
ACTION THRESHOLD	Areas of installations where ordinance or other flammable/explosive materials are stored have zero tolerance for weeds due to fire hazard. Consequently, visual sighting of any weed warrants control.

<p>STRATEGY</p>	<p>Develop a plan. Determine what resources need protection against invasive species and which plants pose an actual threat. For planning and measuring success, use a map to determine problem areas. Place highest priority on the most destructive weeds. Use the state's Noxious Weed List to help prioritize. The plan should include solid knowledge on the target plant, such as growing habit, how often it sets seed, months of seed production, etc. and a solid knowledge of the native species whose populations need to be maintained.</p> <p>Strategy options are generally to eradicate or to control and maintain invasive species at an acceptably low threshold. One strategy is to map the infestation then break the map into sections depending on the density of the invasive weed. Some areas will be dense and completely over run, while other patches are relatively free of it. Removal efforts should begin in outlier areas that are only lightly infested. Efforts should move gradually from the easiest areas to the more densely infested areas. The densest patches should be eliminated last. Refer to the Bradley Method referenced below. At each step of the way, the areas targeted for clean-up must be of a size and quality that goals are achievable within one growing season. Because of the bank of seeds stored in the soil, weeds will re-sprout for years after the plants have been removed. In the case of some weeds, the seeds can survive for decades. It is important to return and maintain cleared areas until the seed bank has been exhausted. Maps and records can assist in targeting which areas to concentrate on. After weeds have been removed it is important to recover the area in native plants to crowd out and help stop the reinvasion of invasive species.</p>
<p>REPORTING</p>	<ul style="list-style-type: none"> • Report all pest management operations to the IPMC. • Report invasive weed control operations to the natural resources personnel in cases where weeds are being removed to protect or restore natural habitats. • Reporting of herbicide use and application monitoring to the local water regulatory agency is required when the operation is covered under a NPDES Aquatic Pesticide Permit.
<p>ACTION THRESHOLDS</p>	<ul style="list-style-type: none"> • Priority of control of weeds is based upon the Federal and State Noxious Weeds list and the impact on the mission. • Areas of installations where ordinance, or other flammable/explosive materials, is stored have zero tolerance for weeds due to the fire hazard. Consequently, visual sighting of any weed warrants control.

PREVENTION	<p>Preventing just one new invasive weed is of greater conservation benefit in the long run and is far less costly than controlling a widespread rampant pest.</p> <p>Block the transport of seeds from invasive plants onto relatively clean sites or sites that are actively being cleaned. Common means of importing seeds are:</p> <ul style="list-style-type: none"> • Tire tread from bicycles and vehicles • Vehicle undercarriages • Boot treads • Dung from horses or other ruminants • Top soil; seeds are often brought in with imported soils • Seed mixes; invasive species are often included in planting mixes • Potted plants; seeds are sometimes transported in the potting soil • Hay and other animal feed <p>Check plants that are intentionally brought in to ensure none of them are invasive. Keep vehicles, tire treads, and boots clean of dirt and seeds before entering a sensitive area. If horses or other plant-eating animals are brought on the property, make sure they are moving from an infested area to an un-infested area. Import only soils from areas that do not have invasive weed problems.</p>
GENERAL CONTROL	<ul style="list-style-type: none"> • Minimize soil disturbances. Soil disturbances include creating patches of bare soil or mixing and loosening soil. Many invasive plants rapidly move into disturbed areas; particularly in those areas that haven't experienced much disturbance. Choose control techniques that make the minimum amount of disturbance possible. • Anticipate unavoidable disturbances and minimize them. For example, removing a large area of plants can result in erosion issues. Landscape fabrics or mulch can reduce erosion. Some activities may disturb wildlife. Also, do not mow grasslands or remove trees during bird nesting season in sensitive habitats.
NONCHEMICAL CONTROL	
TOOLS	<p>Hand pulling invasive weeds can be a daunting task. However, steady and persistent hand weeding over time can lead to dramatic success. There is a large variety of hand tools designed specifically for weed removal. Many of these tools can be found in online stores or ordered through the mail.</p>
PULLING	<p>Tools are available that help pull weeds. When pulling plants, bring as much of the root as possible out of the ground since many plants can re-sprout from even a small amount of root.</p>
DIGGING	<p>Digging can be used along with pulling to lift the entire plant from the soil.</p>
CUTTING	<p>Cutting works well with woody plants that do not re-sprout. Especially if those plants are cut as close to the ground as possible. If the plant is likely to re-sprout, chemical herbicides can be painted on top of the cut stump. For invasive trees the herbicide needs to come in contact with the cambial ring between the wood and bark of the trunk. The cambial tissues will transport the herbicide to the roots.</p>

FLAMING	Flaming does not involve incinerating the plant, rather to heat it just long enough to produce visible wilting. Heat causes cell walls to burst, which interrupts the flow of water and nutrients. Flaming is most effective when plants are in very early stages of growth. Older plants with significant stored reserves will require repeat applications and/or concentrating enough heat on the root crown to produce mortality. Flaming is generally used as a way of coping with the huge flush of seedlings which is often triggered by the removal of parent plants. This technique is most effective and best done when the ground and vegetation are too wet to carry fire. Avoid conditions that may lead to injury or wildfire.
SOLARIZATION	Weeds and insect pests can be killed by covering the ground with layers of clear plastic allowing the sun to create enough heat to destroy all living things.
LARGE MACHINES	Large machines can remove weeds as well. Machines can clear large areas of weeds, but also tend to cause soil disturbances which encourage the invasion of weeds and sometimes pathogens.
PRESCRIBED FIRE	Prescribed fire can be effective in removing fire-sensitive invasive species from communities that evolved with fire. Blowtorches and flamethrowers can also be used to burn individual plants or small areas.
COMPETITION AND RESTORATION	Use native plants to outcompete invasive weeds. To do so, natives must be planted and cared for until they are well established. When choosing seed mixes choose seeds that are from adjacent sites and well adapted to the climate. Choosing plants from far away sources is a common cause of failure. Be careful of seed mixes that include other invasive plants.
GRAZING	Grazing animals can selectively control or suppress weeds. Cattle, sheep, goats, geese, and chickens have been used to graze undesirable species. Grazing must be continued until the weed's seed bank is exhausted. It is important never to move the animals from an infested to an un-infested site since seeds can be spread in the animals' droppings.
BIOLOGICAL CONTROL	Beneficial organisms can reduce a few certain plants. For example, two species of leaf beetle have been very effective in wiping out populations of purple loosestrife. To be effective, the insect or pathogen must be host-specific and not pose a threat to other plants.
PLANT DISPOSAL	<ul style="list-style-type: none"> • Avoid leaving plant remains onsite. Many plants can re-root themselves if left in piles and grow anew. • If the invasive plants have seed heads, remove them from the site in sealed bags to ensure that the seeds aren't spread to new areas on the way out.
CLEANING OF VEHICLES AND EQUIPMENT	<ul style="list-style-type: none"> • In order to prevent the introduction and spread of invasive weeds, all vehicles and equipment used on a base (especially those used for weed control) must be cleaned of dirt, mud, and visible plant material prior to being brought on base (if coming from off-base) or prior to coming on site (if coming from another location on base). • Vehicles and equipment must also be cleaned after construction, prior to being used elsewhere on base. • When moving vehicles/equipment from site to site when doing weed control, they should also be inspected and cleaned in order to prevent further spread. • Equipment may include things like weed whackers, shoes, shovels, etc. • Before leaving a site, workers should brush off shoes in order to prevent tracking seeds on the way to other sites.

CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Glyphosate, triclopyr, 2, 4D, imazapyr, and others
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • <u>Selective Broadcast Herbicides</u>. These herbicides usually selectively kill one class of plants and are safe on other classes of plants. The herbicide is applied evenly over a large area of land usually through a boom sprayer. Boom sprayers can be mounted on a tractor, ATV, truck, airplane, or helicopter. Relatively small areas can be treated with a backpack sprayer or hand-compressed sprayer. • <u>Non-selective Spot Treatment Herbicides</u>. This method directly targets individual plants. Non-selective herbicides are used and are applied directly to the target and are less likely to affect nontarget plants. Care must be taken to reduce drift that could harm non-target plants. Direct application is sometimes used in conjunction with nonchemical treatments especially when removing invasive trees and shrubs which require root kill to prevent re-sprouting. • <u>Foliar Spray</u> • <u>Cut Stump Treatment</u> <p>Note: Correct timing of the herbicide application is often essential for effective weed control. Timing will depend on the species of weed, the mode of action, and persistence of the herbicide; nonchemical practices in use; soil conditions; and climate.</p>
RESTRICTIONS/REGULATIONS/PERMITS	<ul style="list-style-type: none"> • When applying herbicide to riparian areas or other sites near water, use only formulations labeled for aquatic sites. • Herbicide applications to, over, or near waters of the United States may require coverage under a NPDES Aquatic Pesticide Permit.
CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Areas frequented by children—use mechanical controls instead of chemical controls whenever possible around playgrounds and childcare centers. • Sensitive habitats—Use non-chemical methods in natural areas containing endangered or threatened plant or animal species or use herbicides with care. • Use drift-reduction methods to prevent damage to non-target plants and organisms and sensitive sites. • Prevent pesticide drift into sensitive areas.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Applicators must use personal protective equipment as required by the product label. • Since this operation is conducted in natural areas, care must be taken to prevent adverse impacts to the environment through control measures, vehicles, and workers.
SPECIAL APPLICATOR QUALIFICATIONS	<ul style="list-style-type: none"> • Contractors and personnel conducting invasive weed control must be knowledgeable about identifying and controlling the target plants. They must also be knowledgeable about preventing the spread of invasive plants. • They should also be able to produce maps (preferably using GPS and GIS) and write detailed reports. • All personnel applying herbicides must be licensed/certified pesticide applicators.

ADDITIONAL INFORMATION:

Management of invasive species

<http://www.cal-ipc.org/ip/management/ipcw/mois.php>

The Bradley Method for Control of Invasive Plants

http://courses.washington.edu/ehuf462/462_mats/bradley_method.pdf

Federal and State Noxious Weed Lists

<http://plants.usda.gov/java/noxiousDriver>

Database of herbicide labels

<http://www.greenbook.net/>

Center for Invasive Plant Management

<http://www.weedcenter.org/>

DOD Strategic Management of Invasive Species in the Southwestern United States

<http://www.weedcenter.org/dodworkshop/2009/index.html>



Terrestrial Weeds

TARGET PEST	
TARGET PEST(S)	Grass-like, broadleaf, and woody weeds growing on land
TARGET SITES(S)	<ul style="list-style-type: none"> • Landscaped areas • Natural areas threatened by invasive weeds
PURPOSE	<ul style="list-style-type: none"> • Reduce fire hazards • Remove vegetation coverage for rodents and other pests • Control the spread of invasive species
RESPONSIBILITY	<ul style="list-style-type: none"> • <u>Pest Management Service Provider (PMSP)</u>: Conduct integrated pest management to control weeds. • <u>Pest Management Performance Assessment Representative (PMPAR)</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Grounds Maintenance Provider (GMP)</u>: Remove weeds during regular landscape maintenance to prevent establishment; maintain the health of desirable plants.
SURVEILLANCE	
METHODS	Visual sighting
FREQUENCY	<ul style="list-style-type: none"> • Daily inspection of areas with extreme fire hazard • Weekly inspection of landscaped areas. Can be done in conjunction with regular landscape maintenance. • Yearly inspection of natural habitats targeted for ongoing weed-abatement programs
ACTION THRESHOLD	Areas of installations where ordinance or other flammable/explosive materials are stored have zero tolerance for weeds due to fire hazard. Consequently, visual sighting of any weed warrants control.

NONCHEMICAL CONTROL	
MECHANICAL REMOVAL	<ul style="list-style-type: none"> • <u>Pulling or hoeing</u>: pulling can be done either by hand or with tools such as the weed wench which works well on large plants. Try to pull up as much root as possible as roots can sprout new shoots. Digging or hoeing is sometimes used in conjunction with pulling to remove the entire root. Follow up work will be necessary until desired plants become well established. • <u>Mulching</u>: mulch shades the soil surface and kills sprouting weeds. Mulching also keeps lawn mowers away from ornamentals. • <u>Mowing</u>: Mow unwanted plants before they have a chance to set seeds. • <u>Chaining</u>: chains are dragged across the top of target weeds, destroying the canopy and reducing weed density. • <u>Root plowing</u>: horizontal blades beneath the surface of the ground sever the root system of target weeds
STEAM	Steam applied to foliage will often kill plants. This technique is unlikely to be cost effective for most weed-control situations
IMPROVE PLANT VIGOR	<ul style="list-style-type: none"> • Landscaping plants that are healthy will be better able to compete with weeds, thereby slowing the rate of weed invasion. • Maintain proper watering, fertilizing, and pruning schedules for desirable landscaping plants. This is particularly important for managing crabgrass in turf.
MULCH	<ul style="list-style-type: none"> • Organic mulches include wood chips, sawdust, yard waste, and bark chips. Course textured mulches should be applied up to 4 inches deep. Fine textured mulches should be applied to a depth of about 2 inches. • Inorganic mulches include sand, gravel, and pebbles. Use a porous landscape fabric underneath to prevent mulch from sinking into soil. • Synthetic mulches include geotextiles and landscape fabric. Synthetic mulches can be used in conjunction with organic and inorganic mulches.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Glyphosate, 2,4-D, diuron, dicamba, sethoxydim, bromacil, diquat, surflan, and others
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • <u>Pre-emergent</u>: herbicide is applied to the soil before the weed emerges, preventing the weed from developing. The chemical should be applied to the soil just before seed germination. Selective pre-emergents must be used so that desirable landscape plants are not harmed. • <u>Foliar-sprayed Post-emergent</u>: herbicide is sprayed directly onto the foliage of the weed. Post-emergents should be applied after the weed emerges, but before seed set. Foliar application is most effective when weeds are young. • <u>Soil-applied Post-emergent</u>: herbicide is applied to the soil around the weed. The herbicide is absorbed by the plant through its root system. • <u>Stump Treatment</u>: herbicide is applied to stumps immediately following cutting. For trees, the herbicide needs to cover the cambium which is located between the bark and wood. The herbicide prevents the tree or weed from growing stump-sprouts in the next growing season. • <u>Weed and Feed Products</u>: Some fertilizers are formulated with herbicides to prevent the growth of weeds. <p>Note: Correct timing of the herbicide application is often essential for effective weed control. Timing will depend on the species of weed, the mode of action and persistence of the herbicide, nonchemical practices in use, soil conditions, and climate.</p>

CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Use mechanical controls instead of chemical controls whenever possible around playgrounds and childcare centers. • Avoid exposing natural areas containing endangered or threatened plant or animal species. • Prevent pesticide drift into sensitive areas and onto desirable landscape plants.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Applicators use personal protective equipment required by the product label. • Prevent drift of herbicides to non-target areas and prevent contact with desirable plants. Avoid contaminating water.

ADDITIONAL INFORMATION:

Non-chemical methods are preferred.

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Weeds in Right-of-Ways

TARGET PEST	
TARGET PESTS	Grasses and broadleaf and woody weeds
TARGET SITES(S)	Fence lines, road shoulders, parking lots, around fuel storage tanks, and sidewalks.
PURPOSE	<ul style="list-style-type: none"> • Decrease fire hazard • Prevent damage to paved surfaces • Decrease rodent and other pest infestations in dense weeds • Decrease the risk for vehicle and animal collisions due to weeds along roadways hiding wildlife • Increase sight lines along security fences • Improve aesthetics.
RESPONSIBLE PARTY	<ul style="list-style-type: none"> • <u>Pest Management Service Provider</u>: Conduct integrated pest management to control weeds • <u>Pest Management Performance Assessment Representative</u>: Ensure contractor pest management service provider performs work in accordance with contract specifications. • <u>Grounds Maintenance Provider</u>: Mowing to reduce height of weeds. May be the PMSP.
SURVEILLANCE	
METHODS	<ul style="list-style-type: none"> • Visual observation and identification during routine inspections. Annual surveys of roadways and fence lines.
FREQUENCY	<ul style="list-style-type: none"> • Daily inspection of area with extreme fire hazard. • Weekly inspection of landscaped areas. Can be done in conjunction with regular landscape maintenance.
ACTION THRESHOLD	<ul style="list-style-type: none"> • Areas of installations where ordnance or other flammable/explosive materials are stored have zero tolerance for weeds due to fire hazard. Consequently, visual sighting of any weed warrants control.

NONCHEMICAL CONTROL	
MECHANICAL REMOVAL	<ul style="list-style-type: none"> • <u>Pulling or hoeing</u>: pulling can be done either by hand or with tools such as the weed wench which works well on large plants. Try to pull up as much root as possible as roots can sprout new shoots. Digging or hoeing is sometimes used in conjunction with pulling to remove the entire root. Follow up work will be necessary until desired plants become well established. • <u>Mowing</u>: Mow unwanted plants before they have a chance to set seeds. • <u>Chaining</u>: Chains are dragged across the top of target weeds, destroying the canopy and reducing weed density. • <u>Root plowing</u>: Horizontal blades beneath the surface of the ground sever the root system of target weeds.
STEAM	Steam applied to foliage will often kill plants. This technique is unlikely to be cost effective for most weed-control situations
PLANT COMPETITION	Plant areas with desirable, low-height plants to outcompete weeds such as invasive grasses.
WEED CONTROL MAT	Comes in roll form and is composed of synthetic polyester fibers spun tightly together to prevent weed growth by blocking sunlight, yet still allowing water percolation for drainage, http://www.dot.ca.gov/hq/LandArch/roadside/detail-fwc.htm
MULCH	<ul style="list-style-type: none"> • Organic mulches include wood chips, sawdust, yard waste, and bark chips. Course textured mulches should be applied up to 4 inches deep. Fine textured mulches should be applied to a depth of about 2 inches. • Inorganic mulches include sand, gravel, and pebbles. Use a porous landscape fabric underneath to prevent mulch from sinking into soil. • Synthetic mulches include geotextiles and landscape fabric. Can be used in conjunction with organic and inorganic mulches.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Imazapyr, dichlobenil, bromacil, diuron, pendimethalin, prometon, tebuthiuron, hexazinone, dicamba, 2,4-D, diflufenzopyr, glyphosate, triclopyr, metsulfuron methyl, paraquat, sulfometuron, and others.
METHOD OF DISPERSAL	<ul style="list-style-type: none"> • <u>Pre-emergent</u>: Herbicide is applied to the soil before the weed emerges, preventing the weed from developing. The chemical should be applied to the soil just before seed germination. Selective pre-emergents must be used so that desirable landscape plants are not harmed. • <u>Foliar-sprayed post-emergent</u>: Herbicide is sprayed directly onto the foliage of the weed. Post-emergents should be applied after the weed emerges, but before seed set. Foliar application is most effective when weeds are young. Use spot treatment of weeds on paved areas. • <u>Soil-applied post-emergent</u>: Herbicide is applied to the soil around the weed. The herbicide is absorbed by the plant through its root system. <p>Applications can be made to soil or paved surfaces. Herbicide treatments can also be made to graded surfaces prior to pouring asphalt or concrete during road or walkway construction.</p> <p>Note: Correct timing of the herbicide application is often essential for effective weed control. Timing will depend on the species of weed, the mode of action and persistence of the herbicide, non-chemical practices in use, soil conditions, and climate.</p>

CONSIDERATIONS	
SENSITIVE AREAS	<ul style="list-style-type: none"> • Use mechanical controls instead of chemical controls whenever possible around playgrounds and childcare centers. • Avoid exposing natural areas containing endangered or threatened plant or animal species. • Prevent herbicide drift onto desirable landscape plants.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	<ul style="list-style-type: none"> • Applicators use personal protective equipment required by product label. • Prevent drift of herbicides to non-target area and prevent contact with desirable plants. Avoid contaminating water.

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APPENDIX A

Points of Contact

- A.1 INSTALLATION PEST MANAGEMENT POINTS OF CONTACT**
- A.2 NAVAL FACILITIES ENGINEERING COMMAND, ATLANTIC APPLIED BIOLOGY SECTION POINTS OF CONTACT**
- A.3 NAVY ENTOMOLOGY CENTER OF EXCELLENCE POINTS OF CONTACT**
- A.4 NAVY ENVIRONMENTAL PREVENTIVE MEDICINE UNIT TWO POINTS OF CONTACT**

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A.1 INSTALLATION PEST MANAGEMENT POINTS OF CONTACT

This list provides the contact information for pesticide compliance and pest management. This page should be kept up to date to ensure the appropriate personnel may be contacted as necessary.

Name	Title	Phone Number (Area Code 757)	E-mail
Markham, Jack	IPMC	341-0490	jack.markham@navy.mil
Porter, Andrew	Deputy Public Works Officer	433-3321	andrew.porter@navy.mil
Sawyer, Jacqueline	PAR	433-2425	jacqueline.sawyer@navy.mil
Chamberlain, Terry	Environmental Director	433-3437	terry.n.chamberlain@navy.mil
Wright, Michael	Installation Natural Resources Manager	433-3461	michael.f.wright@navy.mil
Robbins, Heather	Regional Cultural Resources Manager	341-0374	heather.l.robbs@navy.mil
Waters, Donald	PREVMED Department Head	953-3808	donald.w.waters2.civ@mail.mil
Widish, Paul	Assistant Air Operations Officer	433-2823 Cell: 450-1202	paul.widish@navy.mil
Piland, Roger	Pest Control Supervisor	341-0475*	roger.piland@navy.mil
Norman, John	Pest Control Program Manager	445-2919 (ext 3039)	john.e.norman@navy.mil
Schiller, Michael	Golf Course Maintenance Supervisor	433-2291 Cell: 690-3639	mschiller@mwrma.com
Carey, Robert	Golf Course Applicator		rcarey@mwrma.com
Hoffenberger, Joe	MWR Stables		
Gorst, Bruce	Unaccompanied Personnel Housing		bruce.gorst@navy.mil
Nichols, Harry	Commissary Store Director		harry.nichols@deca.mil
Hunter, Gregory	NEX Manager		
McGrogan, Lawrence	Game Warden	433-2151	lawrence.mcgrogan@navy.mil

*If an established Working Capital Fund JON is in place, call (757) 444-7528 to place a request for pest control (in-house) service.

A.2 NAVAL FACILITIES ENGINEERING COMMAND, ATLANTIC APPLIED BIOLOGY SECTION POINTS OF CONTACT

NAVFAC Atlantic Applied Biology Section			
Code EV51	6506 Hampton Blvd	Norfolk, VA 23508-1278	
COMMERCIAL		DSN	
Commercial: (757) 322-XXXX		DSN: 262-XXXX	
NAME	TITLE	EXT	EMAIL
Sabra Scheffel	Applied Biology Dept Head	4320	sabra.scheffel@navy.mil
Chris Hohnholt	Pest Management Consultant	4735	chris.hohnholt@navy.mil
Steven Holmes	Pest Management Consultant	8295	steven.p.holmes@navy.mil
Chris Martin	Pest Management Consultant	4611	chris.d.martin@navy.mil
Steve Robertson	Pest Management Consultant	4796	steve.b.robertson1@navy.mil
Kirk Williams	Pest Management Consultant	4254	kirk.williams@navy.mil

A.3 NAVY ENTOMOLOGY CENTER OF EXCELLENCE POINTS OF CONTACT

Navy Entomology Center of Excellence (NECE)		
Naval Air Station	P.O. Box 43 Bldg 937	Jacksonville, FL 32212-0043
COMMERCIAL		DSN
(904) 542-2424		942-2424

A.4 NAVY ENVIRONMENTAL PREVENTIVE MEDICINE UNIT TWO POINTS OF CONTACT

Navy Environmental Preventive Medicine Unit TWO (NEPMU-2)		
NEPMU-2	128 West D Street, Bldg U238	Norfolk, VA 23511-3394
COMMERCIAL	DSN	FAX
757-953-6600	377-6600	151-953-7212
E-MAIL		WEBSITE
nepmu2@med.navy.mil		http://www.med.navy.mil/sites/nepmu2/Pages/default.aspx

APPENDIX B

Maps

Maps are included on the CD of supporting documents provided with this plan.

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APPENDIX C

Program Review

- C.1 PEST MANAGEMENT PROGRAM SELF-ASSESSMENT CHECKLIST**
- C.2 INTEGRATED PEST MANAGEMENT PLAN ANNUAL UPDATE FORM**

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C.1 PEST MANAGEMENT PROGRAM SELF-ASSESSMENT CHECKLIST

Installation Name: _____ Date: _____

Name of Person Completing Checklist: _____

Review Item	Reference	Verification and Documentation	Y	N	N/A
Pest Management Coordinator					
Is IPMC designated and appointed by CO/CG by letter?	6250.4C : Encl. (1), Para.4.h.(6) 5090.1 : 24-5.3	Copy of appointment letter.			
Is IPMC properly qualified and trained? If an IPMC selects or applies pesticides, he or she must be certified as a DOD pesticide applicator.	6250.4C : Encl. (1), Para.6.	Copy of course completion certificate or DOD pesticide applicator certificate.			
Does the IPMC oversee the installation pest management program and pest management plan and remain aware of and familiar with all pest management operations on the installation?	4150.07 : E2.11	Operations documented in the installation integrated pest management plan; IPMC has copies of pesticide approvals and pest management reports; IPMC is actively involved in pest management decision making.			
Pest Management Plan					
Does installation have a current comprehensive IPMP? IPMPs remain current for 5 years.	4150.07 : E4.2. 6250.4C : Encl. (1), Para.9.a. 5090.1 : 24-3.9. 5090.2A: 14203	Copy of IPMP.			
If installation does not have an IPMP, has command planned and budgeted for development and maintenance of an IPMP?	4150.07 : E4.2.1.1.	Environmental division should have IPMP listed as a deficiency and submit an EPR.			
Is IPMP signed by CO/CG?	6250.4C : Encl. (1), Para.9.a.	IPMP signature page.			
Is IPMP reviewed and signed by IPMC, medical department, and BUMED and NAVFAC pest management consultants?	4150.07 : E4.2.1.7 6250.4C : Encl. (1), Para.6.a.	IPMP signature page.			
Is IPMP updated annually by qualified personnel (trained or certified IPMC or PMPAR) and current (contains current POCs, contracts, applicator licenses, list of approved pesticides, etc.)?	4150.07 : E4.2.1.2.	View applicator licenses, dates of pesticide approvals, and other items that indicate the information is not outdated.			
IPMP includes the following sections: <ul style="list-style-type: none"> List of program objectives Description of all pest management requirements and programs and staffing requirements (including in-house, contract, agricultural outlease, golf course, NAFI, GOCO, experimental, and natural resources) Description of IPM procedures for all pest and disease vectors Identification of program resources (facilities, equipment, etc.) to support program List of pesticides approved by NAVFAC pest management 	4150.07 : E4.2.	IPMP contains information and sections as outlined in 4150.07 , Encl.4.			

consultant <ul style="list-style-type: none"> • Procedures for managing spills • Identification of planned measures to comply with DOD MOA and with state pesticide regulatory office regarding use or application of pesticides • Description of contracted pest management operations • Description of operations with special environmental considerations • Identification of animal control efforts • Identification of potential vector-borne diseases and collaboration with local health agencies • Applicable laws and regulations • Agricultural outlease operations 					
Section of IPMP pertinent to pest management in habitat(s) of endangered/threatened species is reviewed and comment provided by U.S. Fish and Wildlife Service.	4150.07 : E4.8.1.	Correspondence from USF&WS that they have reviewed the IPMP is on file.			
All stakeholders (including IPMC, PMPARs, environmental division, medical department, pest control shops, NAFIs, agricultural outlease program manager, and golf course superintendent) have copy of or ready access to current IPMP.	BMP	IPMP readily available to stakeholders as hard or electronic copy.			
Program Maintenance					
Have BUMED and/or NAVFAC conducted program reviews in order for the installation to maintain program and IPMP?	6250.4C : Encl. (1), Para.10.a. 5090.1 : 24-3.10. 5090.2A: 14204,1.c.	Program reviews on file.			
Have deficiencies and recommendations from past reviews been resolved or addressed in order to maintain and improve program?	6250.4C : Encl. (1), Para.10.a. 5090.1 : 24-4.4 5090.2A: 14204,1.c.	Documentation of corrections on file and/or corrections made were noted in follow-up inspection or review.			
Do DOD pest management personnel remain current in IPM technologies?	BMP	Personnel attend training workshops, are provided in-service training and/or have access to pest control trade journals.			
Training and Certification					
Do all installation pest management personnel who apply or supervise the application of pesticides have current DOD certification or EPA-approved certification or license?	4150.07 : E4.4.2. 5090.1 : 24-3.19.	Copies of all licenses and certificates on file, preferably in IPMP, and applicators have cards while applying.			
If DOD applicator certification expired, has applicator received a six-month extension from a NAVFAC pest management consultant?	4150.07 : E4.4.2.1.	Correspondence from NAVFAC approving extension.			
If DOD applicators are not certified (i.e., apprentices), are they under the direct supervision of a certified applicator while performing pesticide applications?	4150.07 : E4.4.2.	Observe operations to ensure proper supervision, if necessary.			

Was evidence of contractor pesticide applicator licensing or certification provided to contracting officer prior to award?	4150.07 : E4.4.2.2 6250.4C : Encl. (1), Para. 15.b.	Copies of all licenses and certificates on file, preferably in IPMP, and applicators have cards while applying.			
Are PMPARs trained in performance assessment evaluation and pest management technology?	6250.4C : Encl. (1), Para. 15.c.	Copies of training course certificates on file, preferably in IPMP.			
Do pest management personnel seek and attend continuing education courses?	BMP	Copies of course completion certificates on file.			
Staffing					
Is staffing sufficient to effectively control pests and manage program?	BMP	Interview applicators, supervisors, and managers.			
If personnel indicate that staffing is insufficient, then what indicators or data are being collected to show that staffing levels are insufficient?	BMP	View indicators or data.			
Pesticide Procurement					
Does installation use only pesticides approved by NAVFAC pest management consultant?	4150.07 : E4.2.2.1. 5090.1 : 24-3.16. 5090.2A: 14206.1.b.	IPMC maintains approved pesticide list. Inspect pesticides in pest control storage and on vehicles to ensure they are listed on the current pesticide approval list.			
Pest Management Records and Reporting					
Are records kept for all pest management operations conducted on the installation, including those by NAFIs and for agricultural operations and environmental protection?	7 U.S.C. § 136i-1(a)(1) 6250.4C : Encl. (1), Para. 23. 5090.1 : 24-3.16. 5090.2A: 14210 4150.07 : E4.11.1				
Are records retained indefinitely?	6250.4C : Encl. (1), Para.23.a. 5090.1 : 24-3.4.				
Do personnel and regulatory agencies have ready access to records? (e.g., able to access records by location, pesticide, applicator, etc.)	7 U.S.C. § 136i-1(b)				
Is the installation using the NAVFAC Online Pesticide Reporting System?	BMP				
Are reports of pest management operations being sent to NAVFAC?	6250.4C : Encl. (1), Para. 23.b.				
Contracting					
Do properly trained PMPARs inspect the performance of contractors?	4150.07 : E4.6.4.(1)	Training certificates and contract monitoring documents are on file.			
Are all pest management contracts on the installation monitored by PMPARs?	4150.07 : E4.6.2.	Check also MCCS, MCX, NEX, and MWR contracted services.			
Do PMPARs measure efficacy and ensure safety and environmental compliance of contract pest control?	6250.4C : Encl. (1), Para.15.c.	Interview PMPARs to identify method and frequency of inspections. List methods of measurement.			
Are pest management contracts sent to NAVFAC for review?	5090.1 : 24-3.16	Correspondence with NAVFAC.			
Are all contract pesticide applicators currently licensed in the state in which they operate?	4150.07 : E4.4.2.2. 4150.07 : E4.6.1.	Copies of current certificates or licenses are on file, preferably in IPMP.			
Is the pest control contractor currently registered with the Structural Pest	4150.07 : E4.6.1.	Copy of current registration certificate on file, preferably in IPMP.			

Control Board or the equivalent state pest control business registration agency?					
Pest Control Shop					
Does pesticide storage area pose a hazard to personnel in adjacent areas or buildings?	4150.07 : E4.5.1. 1028/8A: Para.2.4	Inspect building to see that exhaust vapors will not move into adjacent occupied areas.			
Does storage area have sufficient security to prevent unauthorized entry?	4150.07 : E4.5.1. 1028/8A: Para.2.8	Conduct inspection to ensure doors can be locked, equipment storage areas can be secured, and that applicators lock doors when leaving premises.			
Does building have clean area for office?	4150.07 : E4.5.1. 1028/8A: Para.3.1.3.1				
Are separate laundry facilities (designated only for cleaning of clothing potentially contaminated with pesticide) available for work clothing?	BMP				
Are shower facilities available for employees?	BMP				
Is separate space or cabinets provided for storage of PPE?	4150.07 : E4.5.1. 1028/8A: Para.3.1.3.1.3				
Are pesticides stored off the floor and with sufficient access so that all labels are visible?	4150.07 : E4.5.1. 1028/8A: Para.3.1.4.1.2				
In areas where pesticide concentrates are stored or mixed, are floor drains sealed or not present and is containment provided (bermed or sloped floors)?	4150.07 : E4.5.11028/8A: Para.3.1.4.1.2 5090.1 : Para.24-3.11				
Are all surfaces on which pesticides are stored and mixed and on which pesticide application equipment is serviced made of non-absorbent materials?	4150.07 : E4.5.1. 1028/8A: Para.3.1.4.1.2				
Are pesticides stored in a dry room or building with a temperature between 50 °F and 100 °F?	4150.07 : E4.5.1. 1028/8A: Para.3.1.4.1.2				
Are fire extinguishers provided and easily accessible to occupants?	4150.07 : E4.5.1. 1028/8A: Para.3.1.4.1.2	Inspect inspection record and see that fire extinguishers are fully charged.			
For large pesticide containers with spigots, is a drip pan containing absorbent material placed below spigot?	4150.07 : E4.5.1. 1028/8A: Para.3.1.4.1.2				
Are backflow prevention devices installed on faucets used to fill pesticide tanks?	4150.07 : E4.5.1. 1028/8A: Para.3.5.2.10				
Are emergency decontamination facilities (i.e., eye wash, deluge shower) provided onsite and readily accessible?	4150.07 : E4.5.1. 1028/8A: Para.3.5.2.12	Check to see that it is functional and that inspection records are up-to-date. Ensure that, in an emergency, personnel can easily access and operate the devices.			
Are ventilation fans available in storage and mixing areas and do they function and provide adequate ventilation (six changes of air per hour)?	4150.07 : E4.5.1. 1028/8A: Para.3.5.4.2 5090.1 : 24-3.11.	Operate fans. Check IH survey ventilation results (Copy may be available in shop or contact installation IH).			
Are identification signs clearly visible on building and fences to advise	4150.07 : E4.5.1. 1028/8A: Para.3.8				

personnel of the contents and warn of their hazardous nature?					
Are only pesticides listed on approved pesticide list stored?	4150.07 : E4.5.1. 5090.1 : 24-3.16. 5090.2A: 14206.1.b.	Compare approved pesticides list with items stored on shelves.			
Do all pesticide containers have EPA-approved labels attached?	5090.1 : 24-3.5.				
Are spill kits provided and readily accessible?	6250.4C : Encl. (1), Para. 13.d. 5090.1 : 24-3.12(b)	Inspect to ensure contents are suitable for pesticide spills.			
Are MSDSs and labels for each pesticide stored and used maintained and readily accessible in the pest control shop?	5090.1 : 24-3.5	Review MSDS/label book and compare with pesticides stored in shop and on vehicles.			
Pest control equipment					
Is equipment properly maintained and clean (no evidence of leakage and spillage)?	BMP				
Are different sprayers used for herbicides and insecticides?	BMP	Sprayers are properly marked.			
Is equipment routinely calibrated to ensure proper delivery of pesticide?	BMP	Calibrations, if needed, are recorded in a logbook or other recordkeeping system.			
Is application equipment stored in a secure area?	4150.07 : E4.5.1. 1028/8A: Para. 3.4.6.				
Pest Control Vehicles (DOD and Contract)					
Are pesticides stored in a lockable compartment on the vehicle?	BMP				
Does applicator ensure that pesticides are not stored in passenger compartment of vehicle?	BMP				
Is the vehicle clean and maintained (no evidence of leakage and spillage)?	BMP				
Does the vehicle have a properly stocked spill kit?	6250.4C : Encl. (1), Para. 13.d.				
Is the vehicle properly identified to warn of pesticides on vehicle?	BMP				
Are all containers on vehicle, including service containers, properly labeled?	5090.1 : 24-3.5.				
Is PPE properly stored on vehicle?	BMP				
Are SDSs (formally MSDSs) for pesticides carried on vehicle?	BMP				
Are appropriate wash racks provided for cleaning vehicles (i.e., does not drain into stormwater system)?	BMP				
Integrated Pest Management					

Is integrated pest management practiced in order to minimize pesticide use when non-chemical alternatives are available and cost effective?	7 U.S.C. § 136r-1 6250.4C : Encl. (1), Para. 3.c. (5) 5090.1 : 24-3.8 5090.2A: 14202/14301.8. 4150.07 : E4.2.	Pest management service providers have survey devices (i.e., sticky traps) and less toxic and sustainable pesticides (i.e., baits) in their inventory. Records include surveys and the application of less toxic pesticides and use of non-chemical methods.			
Does the installation pest management plan emphasize and describe the use of IPM to provide sustainable pest management?	7 U.S.C. § 136r-1 6250.4C : Encl. (1), Para. 3.c.(5). 4150.07 : 4.2 5090.2A: 14202	Review IPMP sections that list pest control methods. Review installation instructions, orders, or policies, especially for housing, that encourage IPM practices.			
Does the installation use practices that demonstrate IPM?	7 U.S.C. § 136r-1 6250.4C : Encl. (1), Para. 3.c. (5) 4150.07 : 4.4 5090.2A: 14202	Identify and list practices.			
Does the installation promote IPM?	7 U.S.C. § 136r-1 6250.4C : Encl. (1), Para. 3.c. (5) 4150.07 : 4.1 5090.2A: 14202	Identify and list promotion practices.			
Pesticide Application					
Are pesticides applied in accordance with the label directions?	7 U.S.C. § 136(j) 4150.07 : E4.5.3.	Interview applicators. Observe application if possible. Wear appropriate PPE.			
Are special precautions taken for operations at child development centers, housing, medical treatment facilities, and food preparation areas?	4150.07 : E4.8.1, E4.8.2, and E.4.8.3.	Interview applicators and review records to see if steps are taken to minimize pesticide use or use less toxic pesticides in these areas.			
Are liquid and dust formulations of pesticides applied only when unprotected personnel are not occupying the work space to be treated?	5090.1 : 24-3.2.	Interview applicators. Observe application if possible. Wear appropriate PPE.			
Are preventive pesticide treatments prohibited unless approved by a pest management consultant?	4150.07 : 4.10.3.	Interview applicators regarding practices. Review pest management records to see if there is any indication of routine pesticide applications.			
Are all applicators familiar with the installation's spill response procedures?	6250.4C : Encl. (1), Para. 13.d.	Get copy of installation instruction on spill response procedures. Interview applicators.			
Are all feasible efforts and management controls used to avoid production of hazardous wastes and to ensure use of pesticides before shelf-life expiration?	6250.4C : Encl. (1), Para. 13.f.	Ask applicators how they clean equipment and dispose of rinsate. Interview shop supervisor to determine container disposal methods.			
Is the installation aware of and do they enforce pesticide "stop sale, use, or removal" orders issued by the EPA?	FIFRA	Check EPA Web site regarding the provisions of pesticide orders. Check records to see if pesticides that have a "stop sale, use, or removal" order are being used contrary to the provisions of the order.			
Aerial Pesticide Applications					
If conducted or proposed, has a plan for the aerial application of pesticides been reviewed and approved by a BUMED (medically-important pests) or	6250.4C : Encl. (1), Para. 13.e.	Ask for and review signed validation statement.			

NAVFAC (economic pests) aerial spray-certified pest management consultant?					
Safety					
Are applicators provided with the appropriate PPE?	5090.1 : 24-3.7.	Ask applicators to show you PPE in shop and on vehicles.			
Do applicators maintain and wear appropriate PPE when applying pesticides?	6250.4C : Encl. (1), Para. 12.b.	Ask applicators to show you PPE in shop and on vehicles. Observe application, if possible.			
Do all applicators receive training on use of PPE? Are applicators physically qualified to wear respirators?	4150.07 : 5.4.17.	Review training record or rosters. Ask to see respirator fit test cards.			
NAFI Operations (NEX/MCX/MCCS/MWR)					
Are all NAFI pest management operations described in the IPMP? This includes operations conducted at: <ul style="list-style-type: none"> • NEX/MCX retail stores • NEX/MCX and MWR/MCCS food service facilities • MWR/MCCS athletic fields and golf courses 	4150.07 : 4.2.	Review IPMP.			
Are pesticides used by NAFI pest control providers included on the installation approved pesticide list?	4150.07 : E4.2.2.1. 5090.2A: 14206.1.b.	Pesticides used by NAFIs are included on pesticide approval list.			
Are pesticide use records maintained at each facility?	7 U.S.C. § 136i-1(a)(1) 6250.4C : Encl. (1), Para. 23.a. 5090.2A: 14210	NAFI maintains records.			
Are all pest management operations reported to the installation IPMC so that it can be reported to NAVFAC?	6250.4C : Encl. (1), Para. 23.b.	Records and reports contain operations conducted by NAFIs			
If NAFIs purchase pest control services with the DON purchase card, are the services in compliance with DOD and DON pest management requirements?	4200.1: Para.7.				
Pesticide Retail Sales in the Navy Exchange, Commissary, and Veterinary Clinics					
Are only pesticides that are <u>not</u> Category I pesticides labeled "Danger, Poison" displayed for retail sale?	6250.4C : Encl. (1), Para. 13.c.	Inspect pesticide display.			
Are pesticides properly displayed to prevent contamination of food, equipment, utensils, linens, and single-service and single-use articles? (i.e., separated by partition or located in an area not above items)	FOOD: 7-301.11	Inspect pesticide display.			
Are spill containment items available?	6250.4C : Encl. (1), Para. 13.d.	Inspect spill containment kits.			
Are employees familiar with spill procedures?	6250.4C : Encl. (1), Para. 13.d.	Ask employees to describe procedures.			
Is the retail store aware of and do they enforce pesticide "stop sale, use, or removal" orders issued by the EPA?	FIFRA	Check EPA Web site regarding the provisions of pesticide orders. Check retail shelves to see if pesticides that have a "stop sale, use, or removal" order are being displayed for sale contrary to the provisions of the order.			

Environmental Programs					
Does the installation have a program to comply with the Federal Noxious Weed Act that is also being implemented on state or private lands in the vicinity of the installation?	5090.2A: 14208.14.	Review any plans (INRMP) or contracts for noxious weed control. Identify and list specific control/prevention measures.			
If the installation has an active airfield, does the IPMP reference the BASH plan?		Review any plans, directives, or contracts for BASH. Identify and list specific control/prevention measures.			
Does the IPMP reference the INRMP? Are appropriate portions of the IPMP implemented in accordance with the INRMP?	5090.1 : 24-3.9. 4150.07 : 5.4.20.12	Review IPMP.			
Are pesticides used in invasive weed control, BASH, depredation and other environmental programs included in the installation approved pesticide list?	5090.1 : 24-3.16. 5090.2A: 14206.1.b.	Review records or plans.			
Are pesticides used in these operations recorded and reported to the IPMC so that they can be reported to NAVFAC?	7 U.S.C. § 136i-1(a)(1) 6250.4C : Encl. (1), Para. 23.b. 5090.2A: 14210	Review records. Check to see that IPMC has records.			
Have pest management operations that may have an impact on natural resources been coordinated with and reviewed by the natural resources program manager?	6250.4C : Encl. (1), Paragraphs 20, 21, and 22. 5090.2A: 14301.18.h.	Review IPMP for environmental impacts of pest management operations and for environmental manager signature. Interview natural resources manager to ensure if he/she is aware of pest management impacts on natural resources.			
If feral cats and dogs are present or potentially present, does the installation have a program to capture and remove them from the installation?	6401.1A: Para.4-2c(4) CNO policy letter 5090 N456M/1U595820 of 10 Jan 2002	Visual observations. Review installation policies or directives. Identify and review procedures.			
Are installation pest management and environmental personnel and the installation commander aware of the CNO policy on feral animals?	CNO policy letter 5090 N456M/1U595820 of 10 Jan 2002	Does the installation have an instruction, order, or policy to prevent feral animals?			
Is the CNO feral animal policy communicated to installation personnel and enforced?	CNO policy letter 5090 N456M/1U595820 of 10 Jan 2002	Identify practices that support the presence of feral animals.			
Agricultural Outlease Program					
Does the IPMP describe the agricultural outlease pest management program?	4150.07 : E4.2.	Review IPMP.			
Are agricultural pesticides included on the installation list of approved pesticides?	4150.7 : E4.6.a.(2) 5090.1 , 24-3.16 5090.2A: 14206.1.b.	Review records or plans.			
Are the pest management operations reported to the installation IPMC reported to the NAVFAC PPMC?	7 U.S.C. § 136i-1(a)(1) 6250.4C : Encl. (1), Para. 23.b. 5090.1 , 17-4.2 5090.2A: 14210	Review records. Ensure IPMC has records.			
Is on-base agricultural pesticide storage in compliance with local and State regulations?	4150.07 : 4.3	Obtain State regulations and inspect pesticide storage or review agricultural commissioner inspection records.			
If lessee(s) use aerial pesticide application, has the aerial spray	6250.4C : Encl. (1), Para. 13.e.	Review aerial spray validation letter.			

project been reviewed and approved by NAVFAC?					
Pest Management Operations					
What are the installation's top five pests and what are their impacts on the installation?	BMP	Interview pest management service providers and complete pest management project sheets for each pest.			
What survey methods are used to detect, assess, and prescribe treatment for the top five pests?	BMP	Interview pest management service providers and complete pest management project sheets for each pest.			
What non-chemical control methods are used to prevent and control the top five pests?	BMP	Interview pest management service providers and complete pest management project sheets for each pest.			
<p>Key to references:</p> <ul style="list-style-type: none"> • 7 U.S.C. § 136 FIFRA • 4150.07: DODI 4150.07, DOD Pest Management Program • 1028/8A: MIL-HDBK-1028/8A, Military Handbook, Design of Pest Management Facilities • 6401.1A: SECNAVINST 6401.1A, Veterinary Health Services • 6250.4C: OPNAVINST 6250.4C, Navy Pest Management Programs • 5090.1: OPNAV M-5090.1, Environmental Readiness Program Manual • 5090.2A: MCO 5090.2A, Environmental Compliance and Protection Manual • 4200.1: EBUSOPSOFFINST 4200.1 (DON EBusiness Operations Office Instruction), Department of the Navy Policies and Procedures for the Operation of the Government Commercial Purchase Card Program • FOOD: U.S. Food Code 2013 					

C.2 INTEGRATED PEST MANAGEMENT PLAN ANNUAL UPDATE FORM

Navy/Marine Corps Integrated Pest Management Plan Annual Update

Fiscal Year Submission Date

1. **Installation:** Please provide the following information about your installation.

Installation Name	State/Country	County(ies), if applicable	Year current IPMP was written

2. **Contact Information:** The following data provides information on installation resources and responsibilities in support of the pest management program. If not applicable, leave blank.

	Name	E-mail	Phone	Organization
Installation Pest Management Coordinator				
Lead Pest Controller				
Primary Pest Management PAR				
Primary Grounds Maintenance PAR				
Lead MWR Golf Course Applicator				
Medical Dept. Representative				
Natural Resource Manager				
Cultural Resource				

Manager				
Public Works Officer				
Installation Environmental Program Manager				

3. **Certification and Training:** List all personnel who have DOD certification or training numbers at your installation. This may include Public Works, MWR and/or Natural Resources personnel. Be sure to include all contractor personnel who apply pesticides (e.g., insecticides, herbicides, etc.) as a part of pest control or grounds maintenance contracts, including those contractor operations performed via credit card or small purchase contracts.

DOD or State Certification	Type of Work*	Organization or Contractor Name	Applicator Name	Applicator Certification/ License Number	License Class/Type (i.e., Commercial, Noncommercial, Government, Registered Technician)	Certification Category Number(s) or Letter(s)**	Exp Date MM/DD/YY
DoD							
DoD							
DoD							
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DoD							
DoD							
DoD							
DoD							
DoD							
DoD							
DoD							
DoD							
DoD							

*Specify the type of work (e.g., grounds maintenance, pest control, QAE/PAR, IPMC, Natural Resources, etc.)

**Provide a list of all categories of certification

4. **Plan Maintenance:** Please list any minor program changes (e.g., personnel changes, certifications, other programming changes or challenges, etc.) relative to the IPMP for the upcoming fiscal year. Major program changes require re-submittal of the entire updated plan for approval.

5. **Assistance:** Please indicate if you require on-site assistance from a NAVFAC Applied Biologist (Professional Pest Management Consultant) for your pest management program. Briefly describe the reason for such a visit. If you are planning aerial spray or other large scale pest management operations (such as large-scale weed control) please indicate the nature of the project below.

FOR OFFICIAL USE ONLY

IPMP Approved by NAVFAC Professional Pest Management Consultant

Date of Approval: (FY approval)

APPENDIX D

Pesticide Authorized Use List

D.1 PESTICIDE AUTHORIZED USE LIST

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D.1 PESTICIDE AUTHORIZED USE LIST

The following pesticides are authorized for use at NASO, NALFF, and NASO DNA as of March 2016.

The most current list of approved pesticides for each installation can be found on the NAVFAC Online Pesticide Reporting System at <https://noprs.pestlogics.com/>.

Pesticide Type	Formulation	Pesticide Name	Active Ingredient	EPA Number
Avicide	Bait - Solid	Avitrol Whole Corn	4 - Aminopyridine	11649-7
Fungicide	Solution	3336 F	Thiophanate-Methyl	1001-69
Fungicide	Solution	4 Flowable Mancozeb	Mancozeb	707-156-10404
Fungicide	Emulsifiable Concentrate	Banner Maxx	Propiconazole	100-641
Fungicide	Solution	Banol	Propamocarb Hydrochloride	45639-88
Fungicide	Solution	Chipco 26019	Iprodione	359-723
Fungicide	Solution	Chipco 26GT / Chipco 26019 Flo	Iprodione	432-888
Fungicide	Granules/Pellets	Chipco Aliette Brand WDG Fungicide	Aluminum Tris	264-515
Fungicide	Granules/Pellets	Chipco Signature	Aluminum Tris	432-890
Fungicide	Wettable Powder	Cleary 3336 WP	Thiophanate-Methyl	1001-63
Fungicide	Granules/Pellets	Curalan EG	Vinclozolin	7969-85-51036
Fungicide	Dust/Granule	Daconil Ultrex	Chlorothalonil	50534-202
Fungicide	Liquid	Daconil Weather Stik	Chlorothalonil	50534-209-100
Fungicide	Solution	Eagle 20EW	Myclobutanil	62719-463
Fungicide	Wettable Powder	Fore 80 WP	Mancozeb	62719-388
Fungicide	Suspension Concentrate	Headline AMP	Pyraclostrobin / Metconazole	7969-291
Fungicide	Dispersible Granules	Heritage	Azoxystrobin	100-1093
Fungicide	Suspension Concentrate	Insignia SC	Pyraclostrobin	7969-290
Fungicide	Wettable Powder	Koban 30 Turf Fungicide	Etridiazole	58185-5
Fungicide	Dust/Granule	Lesco Touche' EG Fungicide	Vinclozolin	7969-85-10404
Fungicide	Solution	Mefenoxam 2 AG	Mefenoxam	66222-216
Fungicide	Dispersible Granules	Pentathlon DF	Mancozeb	67690-39
Fungicide	Dispersible Granules	Phoenix Wingman DFX	Mancozeb	70506-269
Fungicide	Wettable Powder	Prostar 70WP	Flutolanil	432-1223
Fungicide	Emulsifiable Concentrate	Raven	Iprodione	70506-260
Fungicide	Solution	Rubigan A.S.	Fenarimol	1471-155
Fungicide	Liquid	Subdue Maxx	Metalaxyl-M	100-796
Fungicide	Dispersible Granules	T-Bird	Thiophanata-Methyl	70506-250
Fungicide	Granules/Pellets	T-Bird 85 WDG	Thiophanate-Methyl	81943-3
Fungicide	Concentrate	Tebuconazole 3.6 Select	Tebuconazole	89442-1
Fungicide	Emulsifiable Concentrate	Vireo 2E	Metalaxyl	70506-275
Herbicide	Emulsifiable Concentrate	Acclaim Extra	Fenoxoprop-Ethyl	432-950
Herbicide	Solution	Accord Concentrate / Rodeo	Glyphosate	62719-324
Herbicide	Dust/Granule	Anderson Dimension Herbicide	Dithiopyr	9198-121
Herbicide	Granules/Pellets	Anderson's Goosegrass/Crabgrass Control	Bensulide / Oxadiazon	9198-176

Herbicide	Solution	Aqua Neat	Glyphosate	228-365
Herbicide	Solution	Aquamaster / Roundup Custom	Glyphosate	524-343
Herbicide	Emulsifiable Concentrate	Arrow 2EC Herbicide	Clethodim	66222-60
Herbicide	Solution	Atrazine 4L	Atrazine	19713-11
Herbicide	Emulsifiable Concentrate	Barrage HF	2,4-D	5905-529
Herbicide	Granules/Pellets	Barricade 65WG Herbicide	Prodiamine	100-834
Herbicide	Solution	Clearcast	Imazimox	241-437-67690
Herbicide	Liquid	Credit 41 Extra	Glyphosate	71368-20
Herbicide	Wettable Powder	Dimension Ultra 40WP	Dithiopyr	62719-445
Herbicide	Dry Flowable	Drive 75 Df	Quinclorac	7969-130
Herbicide	Solution	Finale	Glufosinate	45639-187
Herbicide	Solution	Garlon 3A / Element 3A	Triclopyr	62719-37
Herbicide	Solution	Gly Star Plus	Glyphosate	42750-61
Herbicide	Solution	Glyphosate 4	Glyphosate	73220-6-74477
Herbicide	Solution	Glyphosate 4 Plus	Glyphosate	81927-9
Herbicide	Wettable Powder	Hyvar X	Bromacil	352-287
Herbicide	Emulsifiable Concentrate	Illoxan 3ec Herbicide	Diclofop - Methyl	432-1231
Herbicide	Solution	Lesco Msma 6.6	Msma	42519-1-10404
Herbicide	Solution	Lesco Three-Way	2,4-D / MCPP / Dicamba	10404-43
Herbicide	Emulsifiable Concentrate	Milestone VM	Aminopyralid	62719-537
Herbicide	Solution	Milestone VM Plus / Capstone	Aminopyralid / Triclopyr	62719-572
Herbicide	Dust/Granule	Monument 75WG	Trifloxysulfuron-Sodium	100-1134
Herbicide	Solution	MSMA 6 Plus	MSMA	19713-42
Herbicide	Emulsifiable Concentrate	MSMA 6.6	MSMA	50534-16-10404
Herbicide	Solution	Pasture Pro	2,4-D	2217-703
Herbicide	Granules/Pellets	Pendulum 2G	Pendimethalin	241-375
Herbicide	Emulsifiable Concentrate	Pendulum 3.3 EC Herbicide	Pendimethalin	241-341
Herbicide	Emulsifiable Concentrate	Plateau	Imazapic	241-365
Herbicide	Solution	Princep 4L	Simazine	100-526
Herbicide	Granules/Pellets	Prodiamine 65 WDG	Prodiamine	66222-89
Herbicide	Emulsifiable Concentrate	Prograss Emulsifiable Concentrate	Ethofumesate	45639-68
Herbicide	Emulsifiable Concentrate	Prosecutor	Glyphosate	228-366-10404
Herbicide	Emulsifiable Concentrate	Prosecutor Pro	Glyphosate	524-536-10404
Herbicide	Liquid	Q 4 Plus	Quinclorac / Sulfentrazone / 2,4-D / Dicamba	2217-930
Herbicide	Emulsifiable Concentrate	Ranger Pro	Glyphosate	524-517
Herbicide	Solution	Razor Pro	Glyphosate	228-366
Herbicide	Suspension Concentrate	Revolver	Foramsulfuron	432-1266
Herbicide	Solution	Reward	Diquat Dibromide	100-1091
Herbicide	Emulsifiable Concentrate	Roundup	Glyphosate	524-308
Herbicide	Solution	Roundup Custom	Glyphosate	542-343
Herbicide	Liquid	Roundup Powermax	Glyphosate	524-549
Herbicide	Emulsifiable Concentrate	Roundup Pro	Glyphosate	524-475

Herbicide	Dry Flowable	Sencor DF 75% Dry Flowable Herbicide	Metribuzin	3125-325
Herbicide	Solution	SFM 75	Sulfometuron Methyl	81927-26
Herbicide	Emulsifiable Concentrate	Simazine 4L	Simazine	9779-296
Herbicide	Granules/Pellets	Snapshot 2.5 TG	Trifluralin / Isoxaben	62719-175
Herbicide	Solution	Trimec Plus	2,4-D / Monosodium Methanearsonate / Mcpp / Dicamba	2217-709
Herbicide	Liquid	Vessel	2,4-D / Mecoprop-P / Dicamba	2217-656-72112
Herbicide	Solution	Weedar 64	2,4-D	71368-1
Herbicide	Solution	Weedestroy	2,4-D	228-145
Insect Growth Regulator	Solution	Gentrol EC IGR	Hydroprene	2724-351
Insect Growth Regulator	Solution	Gentrol Point Source	Hydroprene	2724-469
Insecticide	Aerosol	565 Plus Xlo	Piperonyl Butoxide / N-Octyl Bicycloheptene Dicarboximide / Pyrethrins	499-290
Insecticide	Gel	Advion Cockroach Gel Bait	Indoxacarb	100-1484
Insecticide	Bait - Solid	Avert Prescription Treatment	Abamectin / Related Compounds	499-294
Insecticide	Concentrate	Bifenthrin Golf & Nursery 7.9F	Bifenthrin	66222-192
Insecticide	Solution	BP-100	Pyrethrins / Piperonyl Butoxide / N-Octyl Bicycloheptene Dicarboximide	499-452
Insecticide	Suspension Concentrate	Carbaryl 4L	Carbaryl	19713-49
Insecticide	Concentrate	Cyzmic	Lambda-Cyhalothrin	53883-261
Insecticide	Dust	Delta Dust	Deltamethrin	432-772
Insecticide	Emulsifiable Concentrate	Demand CS	Lambda-Cyhalothrin	10182-361
Insecticide	Solution	Demand CS	Lambda-Cyhalothrin	100-1066
Insecticide	Emulsifiable Concentrate	Demon Max	Cypermethrin	100-1218
Insecticide	Dust/Granule	Drione	Pyrethrin / Pyrethrins	6754-22-5802
Insecticide	Dust	Drione Insecticide	Silica Gel / Piperonyl Butoxide / Pyrethrins	4816-353
Insecticide	Aerosol	Eco PCO Jet	Hexa-Hydroxyl / 2-Phenethyl Propionate	67425-5
Insecticide	Dust/Granule	Ecoexempt G	Clove Oil / Thyme Oil	25 (B) Exempt
Insecticide	Emulsifiable Concentrate	EcoExempt IC2	Peppermint Oil / Rosemary Oil	25 (B) Exempt
Insecticide	Aerosol	Ecopco AC Contact Insecticide	Eugenol/2-Phenethyl Propionate / 2-Phenethyl Propionate	67425-4
Insecticide	Aerosol	Ecopco Acu	Phenethyl Proplonate	67425-14
Insecticide	Aerosol	Ecopco Ar-X	2-Phenethyl Propionate / Pyrethrins	67425-15
Insecticide	Concentrate	Firebird Pro	Bifenthrin	70506-256
Insecticide	Gel	Maxforce Ant Killer Gel	Fipronil	432-1264
Insecticide	Granules/Pellets	Maxforce Complete Granular Bait	Hydramethylnon	432-1255

Insecticide	Gel	Maxforce EC Bait Gel	Fipronil	64248-21
Insecticide	Bait Stations	Maxforce FC Ant Bait Stations	Fipronil	432-1256
Insecticide	Gel	Maxforce FC Roach Bait Gel	Fipronil	432-1259
Insecticide	Bait Stations	Maxforce FC Roach Killer Bait Stations	Fipronil	432-1257
Insecticide	Granules/Pellets	Maxforce Granular Insect Bait	Hydramethylnon	64248-6
Insecticide	Gel	Maxforce Roach Killer Bait Gel	Hydramethylnon	64248-5
Insecticide	Gel	Maxforce Roach Killer Bait Gel (Reservoir)	Hydramethylnon	432-1254
Insecticide	Bait Stations	Maxforce Roach Killer Small Bait Station	Hydramethylnon	432-1251
Insecticide	Solution	Mustang Max	Zeta-Cypermethrin	279-3249
Insecticide	Granules/Pellets	Niban-FG	Orthoboric Acid	64405-2
Insecticide	Suspension Concentrate	Onslaught	(S)-Cyano (3-Phenoxyphenyl) Methyl-(S)-4-Chloro-Alpha-(1-Methylethyl) Benzenacetate	1021-1815
Insecticide	Aerosol	Permethrin	Permethrin	50404-5
Insecticide	Solution	Phantom	Chlorfenapyr	241-392
Insecticide	Solution	Premise 2	Imidacloprid	3125-454
Insecticide	Soluble Powder	Premise 75	Imidacloprid	3125-455
Insecticide	Solution	Premise Pre Construction Insecticide	Imidacloprid	432-1331
Insecticide	Solution	Premise Pro	Imidacloprid	432-1449
Insecticide	Aerosol	Pt Microcare	Pyrethrins / Piperonyl Butoxide / N-Octyl Bicycloheptene Dicarboximide	499-381
Insecticide	Briquets	Summit B.T.I. Briquets	Bacillus Thuringiensis	6218-47
Insecticide	Suspension Concentrate	Suspend SC	Deltamethrin	432-763
Insecticide	Suspension Concentrate	Suspend SC	Deltamethrin	432-763-62719
Insecticide	Emulsifiable Concentrate	Talstarone / Talstar P	Bifenthrin	279-3206
Insecticide	Emulsifiable Concentrate	Tempo SC Ultra	Cyfluthrin	3125-498
Insecticide	Solution	Termidor SC	Fipronil	432-901
Insecticide	Aerosol	ULD BP-100	Pyrethrins / Piperonyl Butoxide / N-Octyl Bicycloheptene Dicarboximide	11540-9
Insecticide	Aerosol	Wasp-Freeze	D-Trans Allethrin / Phenothrin	499-362
Insecticide	Bait - Solid	Whitmire Pt 370 Ascend Fire Ant Stopper Bait	Abamectin	499-370
Plant Growth Regulator	Emulsifiable Concentrate	Goldwing	Trinexapac-Ethyl	70506-259
Plant Growth Regulator	Emulsifiable Concentrate	Primo Maxx	Trinexapac-Ethyl	100-937
Rodenticide	Bait - Solid	Contrac All Weather Blox	Bromadiolone	12455-79
Rodenticide	Bait - Solid	Eatons Bait Blocks	Diphacinone	56-42
Rodenticide	Granules/Pellets	Final Rodenticide RTU Place Pac	Brodifacoum	12455-91

APPENDIX E

Certifications

- E.1 TABLE OF CURRENT CONTRACTORS**
- E.2 TABLE OF APPLICATOR AND IPMC/PAR CERTIFICATIONS**
- E.3 IPMC APPOINTMENT LETTER**

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E.1 CURRENT CONTRACTORS

Contractor	Type of Work	Business License Number	Categories
ABC Pest Management	Pest control	5025	7A,7B
R-Con Construction	Grounds maintenance	10256	3A,3B,6
Didlake Inc.	Grounds maintenance	3289	3A,3B,6
Invasive Plant Control	Invasive species	5810	2,3A,3B,5A,6
Carolina Silvics	Invasive species	5304	2,3A,3B,5A
Dodson	Pest control		
Hometown Pest Control	Pest control	10060	7A,7B
Orkin	Pest control	4787	7A,7B
Chesapeake Lawnsapes	Grounds maintenance	5219	6

E.2 PESTICIDE APPLICATOR AND IPMC/PAR CERTIFICATIONS

DOD or State	Organization or Contractor Name	Name	Applicator Cert Number	Cert Category Number*	Expiration Date
DOD	PREVMED	HM3 David Mayes	M-266-15	8	3/26/18
VA	ABC	Ferguson, Dennis	120674 (C)	7A,7B	6/30/17
VA	R-Con	Ramos, Ronald	119467 (C)	3A,3B,6	6/30/17
VA	Carolina Silvics	Merritt, Joshua	139883 (C)	2,5A	6/30/18
VA	Carolina Silvics	Willis, Thomas	135965 (C)	5A	6/30/17
VA	Invasive	Whiting, Aaron	137405 (C)	3A,3B,5A	6/30/18
VA	Orkin	Gallo, James	74127 (T)	n/a	6/30/17
DOD	NAVFAC	Piland, Roger	NJ-013-04-0813	3,5,6,7,8	3/31/19
DOD	NAVFAC	Bass, Roger	NJ-003-04-0813	3,5,6,7,8	3/31/19
DOD	NAVFAC	Norman, Patrick	NJ-017-09-0312	3,5,6,7,8	3/31/18
DOD	NAVFAC	Clarke, Zachary	NJ-008-12	3,5,6,7,8	3/31/18
DOD	NAVFAC	Cowan, William	NJ-020-87-0214	2,3,5,6,7,8	2/28/17
DOD	NAVFAC	Crisp, Steve	NJ-088-79-0310	2,3,5,6,7,8	3/31/19
DOD	NAVFAC	McSwain, Shane	NJ-10-15	2,3,5,6,7,8	2/28/18
DOD	NAVFAC	Mondrzejewski, Michael	NJ-11-15	2,3,5,6,7,8	2/28/18
DOD	NAVFAC	Brown, David	NJ-003-16	2,3,5,6,7,8	3/31/19
DOD	NAVFAC	Council, Julius	NJ-005-16	2,3,5,6,7,8	3/31/19

APPENDIX F

Laws

- F.1 FEDERAL LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT**
- F.2 DEPARTMENT OF DEFENSE LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT**
- F.3 DEPARTMENT OF THE NAVY LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT**
- F.4 STATE LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT**
- F.5 INSTALLATION LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT**

Add to appendix F: lists of state regulations, other DOD and federal regulations

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F.1 FEDERAL LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

FEDERAL		
Title/Reference	Date	Relevant Requirements / Guidance
Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C 136 et seq.) http://www.law.cornell.edu/uscode/text/7/chapter-6/subchapter-II (codified at 40 CFR Parts 152-180 http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr152_main_02.tpl)	1947, and amendments	Requires pesticide and applicator registration with the U.S. EPA, properly labeled containers, pesticide application records, adequate worker safety, and the proper disposal of unused products. Pesticides are also classified under this act as general use or restricted use.
Integrated Pest Management for Federal Agencies (7 USC § 136R-1) http://www.law.cornell.edu/uscode/text/7/136r-1		Requires Federal agencies to use IPM techniques in carrying out pest management activities and promote IPM.
National Environmental Policy Act (NEPA) (42 USC 4321-4347) http://www.nepa.noaa.gov/statute.html	1969	Requires a detailed environmental impact statement for any major federal action that can significantly affect the environment. This may include pest management operations that involve large areas of land, application of chemicals to waterways and aerial application of pesticides.
Executive Order 12856, Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements http://www.archives.gov/federal-register/executive-orders/pdf/12856.pdf	3 Aug 1993	The head of each Federal agency is responsible for ensuring that all necessary actions are taken for the prevention of pollution with respect to that agency's activities and facilities, and for ensuring that agency's compliance with pollution prevention and emergency planning and community right-to-know provisions.
Executive Order 13148, Greening the Government Through Leadership in Environmental Management http://www.epa.gov/epp/pubs/eo13148.pdf	21 April 2000	Requires that the head of each Federal agency ensures that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision making and long-term planning processes, across all agency missions, activities, and functions. Each agency shall strive to reduce or eliminate harm to human health and the environment from releases of pollutants, such as pesticides, to the environment.

Federal Noxious Weed Act (7 USC 2801) incorporated into the Plant Protection Act <i>http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/sec2814.pdf</i>	FNWA 1974 PPA 2000	Requires federal agencies to develop and implement noxious weed management programs on federal land.
Resource Conservation and Recovery Act (RCRA) <i>http://www4.law.cornell.edu/uscode/42/6901.html</i> (42 USC 6901 et seq.) (40 CFR § 260-265)	1976, amended in 1986	Requires proper disposal of waste pesticides and pesticide containers.
Non-indigenous Aquatic Nuisance Prevention and Control Act (16 USC 4700 et seq.) <i>http://www.anstaskforce.gov/Documents/nanpca90.pdf</i>	1990	Espouses taking preventive management measures nationwide to prevent and control unintentionally introduced non-indigenous aquatic species and prevent further distribution of these species.
Food Quality Protection Act (FPQA), Section 303 <i>http://www.fda.gov/RegulatoryInformation/Legislation/FederalFoodDrugandCosmeticActFDCA/SignificantAmendments/totheFDCA/ucm148008.htm</i>	1996, amendment to FIFRA and FDCA	Mandates that federal agencies use IPM techniques in pest management activities and promote IPM through procurement and regulatory policies. Primarily established safety standards for pesticides applied to foods.
Executive Order 13112, Invasive Species <i>http://www.invasivespeciesinfo.gov/laws/execorder.shtml</i>	3 Feb 1999	Institutes measures to prevent the introduction of invasive species, provide for their control using environmentally sound techniques, and minimize the economic, ecological, and human health impacts caused by invasive species.
Clean Air Act (CAA) (42 USC 7401 et seq.) <i>http://www.epa.gov/air/caa/</i>	1955, amended in 1970, 1977, and 1990	Mandates the prevention and control of air pollution from toxic emissions including pesticides.
Animal Damage Control Act (7 USC 426-426c) <i>http://www.animallaw.info/statutes/stusfd7usc426.htm</i>	1931, amended in 1987 and 1991	Gives the Secretary of Agriculture broad authority to investigate and control certain predatory or wild animals and nuisance mammal and bird species.
Migratory Bird Treaty Act <i>http://www.fws.gov/alaska/ambcc/ambcc/treaty_act.htm</i>	1918, with numerous amendments	Requires permits to take migratory birds.
OSHA Hazard Communication Standard (29 CFR 1910) <i>http://www.osha.gov/dsg/hazcom/standards.html</i>	1970	Stipulates the requirements for applicable and adequate training of all employees regarding hazardous substances (including pesticides) and providing access to SDSs for all chemicals.

<p>Endangered Species Act (16 USC 1531-1544), (50 CFR Part 402) http://www.fws.gov/laws/lawsdigest/ESACT.html Federal list of endangered/ threatened plants and wildlife is at 50 CFR §§ 17.11 & 17.12 http://www.fws.gov/angered/</p>	<p>1973, amended in 1978</p>	<p>Dictates that all federal agencies must protect listed plants and animals and their habitats from harm. Indicates that pesticide formulations and application methods be reviewed by the U.S. Fish and Wildlife Service to determine whether there could be adverse effects.</p>
<p>Endangered Species Protection Bulletins http://www.epa.gov/espp/bulletins.htm</p>		<p>Bulletins set forth geographically-specific <i>pesticide use limitations</i> for the protection of endangered or threatened species and their designated critical habitat.</p>
<p>Sikes Act Improvement Act (SAIA) (16 USC 670) http://www.fws.gov/habitatconservation/sikes_act.html</p>	<p>31 Dec 2003</p>	<p>Authorizes the Secretary of Defense to develop cooperative plans for conservation and rehabilitation programs on military reservations and modify or improve habitat for endangered species and migratory birds. This includes authorizing the elimination of noxious weeds in efforts to rehabilitate native species.</p>
<p>Toxic Substances Control Act (TSCA) (15 USC 2601 et seq.) http://www.epa.gov/oecaagct/lsc.html</p>	<p>1976</p>	<p>Requires that new chemicals, including pesticides, be registered and that testing for human health and environmental hazards be performed.</p>
<p>Clean Water Act (Amended the Federal Water Pollution Control Act of 1972) (33 USC 1251-1387) http://www.law.cornell.edu/uscode/text/33/chapter-26</p>	<p>1977, reauthorized in 1987</p>	<p>Calls for the restoration and maintenance of the chemical, physical, and biological integrity of our nation's waters, including sensitive environments like wetlands. This Act prohibits non-storm water discharges from entering surface waters.</p>
<p>National Pollution Discharge Elimination System (NPDES)— EPA General Permit https://www.epa.gov/npdes Covers the following states: MA, ID, NH, NM, DC, and federal facilities in WA, CO, DE, and VT.</p>	<p>31 Oct 2016 to 31 Oct 2021</p>	<p>Operators that apply pesticides that result in discharges from the following use patterns may have to submit a notice of intent (NOI) and create a Pesticide Management Discharge Plan (PMDP) if they meet certain criteria: (1) mosquito and other flying insect pest control; (2) weed and algae control; (3) animal pest control; and (4) forest canopy pest control</p>

United States Public Health Service (USPHS)/Food and Drug Administration (FDA) Food Code <i>http://www.fda.gov/food/guidanceregulation/retailfoodprotection/foodcode/default.htm</i>	2001	Provides regulations on pest control methods, application of pesticides, removal of dead animal pests from food retail sales establishment, and display of pesticides for retail sale. It also provides food inspection guidelines and inspection forms. This is the primary guideline used by Defense Commissary Agency (DeCA) food inspectors for ensuring food safety in the Commissary.
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F.2 DEPARTMENT OF DEFENSE LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

DEPARTMENT OF DEFENSE		
Title/Reference	Date	Relevant Requirements/Guidance
DOD Instruction 4150.07 , DOD Pest Management Program <i>http://www.dtic.mil/whs/directives/corresponds/pdf/415007p.pdf</i>	29 May 2008	Sets policies, responsibilities, and procedures for implementing an environmentally sound IPM program to control pests and ensure installations develop, maintain, and review their pest management plans.
DOD 4150.07-M, Volume 1, DOD Pest Management Training: The DOD Plan for the Certification of Pesticide <i>http://www.dtic.mil/whs/directives/corresponds/pdf/415007m_vol1.pdf</i>	23 May 2013	Outlines the DOD procedures for pest management training and certification of pesticide applicators.
DoD Manual 4150.07, Volume 2, DoD Pest Management Training and Certification Program: The DoD Plan for Non-Federal Insecticide, Fungicide, and Rodenticide Act Pesticide Applicators <i>http://www.dtic.mil/whs/directives/corresponds/pdf/415007m_vol2.pdf</i>	23 May 2013	Assigns responsibilities and sets procedural requirements for non-FIFRA training and certification.
DOD 4150.07-M, Volume 3, DOD Pest Management Training and Certification Program: The DOD Plan for FIFRA Pesticide Applicators <i>http://www.dtic.mil/whs/directives/corresponds/pdf/415007m_vol3.pdf</i>	23 May 2013	Outlines the DOD procedures for pest management training of IPMCs and PARs.

DOD Directive 4715.1E, Environmental Security http://www.dtic.mil/whs/directives/corres/pdf/471501p.pdf	19 March 2005	Establishes the AFPMB which provides information, guidance, and publications related to pest and pesticide management. Also advocates implementing IPM into DOD acquisition, procurement, maintenance, and repair processes for systems, equipment, facilities, and land.
DOD /EPA MOU with Respect to IPM https://extranet.acq.osd.mil/eie/afpmb/cac/mous/MOU_DoD-Epa.pdf	March 1996	Adopts integrated pest management strategies to reduce the potential risks to human health and the environment associated with pesticides.
DOD D/USDA Master MOU https://extranet.acq.osd.mil/eie/afpmb/cac/mous/USDA_DoD_MOU_Decision_Memo.pdf	14 Mar 2003	Indicates that these agencies will work together and meet regularly to discuss such mutual interests as pest management, forestry, and wildlife activities.
DOD /USDA MOU—Animal Damage Assessment and Control https://extranet.acq.osd.mil/eie/afpmb/cac/mous/MOU_DoD_USDA_Aphis.pdf	15 May 1990	Establishes procedures for planning, scheduling and conducting animal damage control activities exclusive of routine vertebrate pest control operations.
Armed Forces Pest Management Board Technical Guides http://www.acq.osd.mil/eie/afpmb/techguides.html		DOD-specific guidance on various pest management and pesticide-related topics.

F.3 DEPARTMENT OF THE NAVY LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

DEPARTMENT OF THE NAVY		
Title/Reference	Date	Relevant Requirements/Guidance
OPNAVINST 6250.4C , Pest Management Programs	11 April 2012	The Navy policy that implements DOD's Pest Management Program. Provides policy specific to Navy operations. This includes record keeping, reporting, safety, management of contracted operations, pest management plans, and environmental protection. Provides responsibilities for preventive medicine.
OPNAVINST 5090.1D, Environmental Readiness Program	10 Jan 2014	Overarching document implementing OPNAV M-5090.1 .

OPNAV M-5090.1 , Environmental Readiness Program Manual (Chapter 24—Pesticide Compliance Ashore)	10 Jan 2014	Generally requires all pesticide applicators to be DOD- or state-certified. In addition, pest management records must be kept and a pest management plan developed, implemented, and maintained that stresses the importance of IPM.
OPNAVINST 5100.23G , Navy Occupational Safety and Health (NAVOSH) Program	11 July 2011	Requires that pest control operations be thoroughly evaluated to identify and quantify potential health hazards.
NAVMED P-5010, Manual of Naval Preventive Medicine Chapter 8—Navy Entomology and Pest Control Technology	9 Nov 2004	Guidelines and procedures on the prevention, surveillance, and control of medically important pests.
OPNAVINST 6210.2, Quarantine Regulations of the Navy	29 June 2006	Delineates the Navy and Marine Corps responsibility to prevent the introduction of medically and economically important pests into the United States.
NAVFAC P-73 Volume II, Real Estate Operations and Natural Resources Management Procedural Manual		Provides a comprehensive document which addresses all Chief of Naval Operations natural resources program requirements, guidelines, and standards.

F.4 STATE LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

COMMONWEALTH OF VIRGINIA		
Title/Reference	Date	Relevant Requirements/Guidance
Virginia Pesticide Control Act http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+TOC0302000039000000000000 Regulations Pursuant to the Virginia Pesticide Control Act <ul style="list-style-type: none"> • Public Participation Guidelines • Rules and Regulations for Enforcement of the Virginia Pesticide Law • Rules and Regulations Governing Pesticide Fees • Rules and Regulations Governing Licensing of Pesticide Businesses Regulations Governing Pesticide Applicator Certification		Regulates applicator certification, business licensing, product registration, and fees.

Virginia Pollutant Discharge Elimination System http://law.lis.virginia.gov/admincode/title9/agency25/chapter800		Installations are required to send notices of intent for operations such as mosquito control, aquatic weed and animal control, and forest pest control.
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F.5 INSTALLATION LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

<h2>NAS OCEANA</h2>		
Title/Reference	Date	Relevant Requirements/Guidance
Naval Air Station Oceana Bird/Wildlife Aircraft Strike Hazard (BASH) Program and Installation BASH Plan	4 Feb 2014	Establishes BASH program guidelines for the installation.

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APPENDIX G

Environmental

- G.1 SAMPLE PESTICIDE MANAGEMENT PROGRAM ENVIRONMENTAL IMPACT LOG**
- G.2 SAMPLE PESTICIDE DISCHARGE MANAGEMENT PLAN**

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G.1 SAMPLE PESTICIDE MANAGEMENT PROGRAM ENVIRONMENTAL IMPACT LOG

Practice	Practice Owner	Aspects	Impacts	Vulnerable Assets
Pesticide storage	Pest control shop supervisor	Potential spill	Degradation of water quality exposure to chemicals	Environmental resources Human health and safety
	Pest control shop supervisor	Fire	Risk of human injury due to fire and chemicals Degradation of air quality	Human health and safety Environmental resources
Pesticide transportation	Pesticide applicator / transporter	Potential spill due to container damage	Degradation of water and soil quality Property contamination	Real property Mission Human health and safety Public perception
	Vehicle owner	Air emissions from vehicle	Degradation of air quality	Environmental resources
	Pesticide mixer / applicator	Potential spill	Degradation of water and soil quality	Environmental resources
	Pesticide mixer / applicator	Hazardous waste generation Chemical mixing	Cost of disposal Exposure to toxic chemicals	Mission Human health and safety
Pesticide application	Pesticide applicator	Potential spill	Degradation of water and soil Exposure to toxic chemicals	Natural resources Human health and safety
	Pesticide applicator	Pesticide drift	Killing of non-target plants and animals	Natural resources
	Pesticide applicator	Stormwater discharge	Degradation of water	Natural resources
	Pesticide applicator	Air emissions from gas powered application equipment	Degradation of air quality	Environmental resources
	Pesticide applicator	Vehicle use for pesticide application	Damage to plants and animal habitats if off road	Natural resources
	Pesticide applicator	Hazardous waste generation	Cost of disposal Exposure to toxic chemicals	Mission Human health and safety
	Pesticide applicator	Chemical usage	Exposure to toxic chemicals	Human health and safety Environmental resources
	Pesticide applicator	Waste water generation	Degradation of water quality Cost of treatment/disposal	Mission
	Pest control shop supervisor	Solid hazardous waste generation	Cost of disposal	Mission
	Pest control shop supervisor	Waste water generation	Degradation of water quality Cost of treatment/disposal	Environmental resources Mission
Non-chemical control: mechanical weed removal	Grounds maintenance workers	Root damage to native plants	Destruction of natural resources	Natural resources
Non-chemical control: animal trapping	Pest control operator	Animal relocation	Potential destruction of natural resources	Natural resources
	Pest control operator	Trapped animal	Human or domestic animal injury caused by trapped animals	Human and domestic animal health and safety

G.2 SAMPLE PESTICIDE DISCHARGE MANAGEMENT PLAN

Pesticide Discharge Management Plan

Instructions

If you are required to submit an NOI (see table 1 below), you must prepare a PDMP for your pest management area within the deadlines described below (table 2). This plan must be kept up-to-date. The EPA's general permit can be accessed at: <https://www.epa.gov/npdes>.

Pesticide Use	Annual Threshold
Mosquitoes and Other Flying Insect Pests	6,400 Acres of treatment area
Aquatic Weed and Algae Control:	
-In Water	80 Acres of treatment area*
-At Water's Edge:	20 linear miles of treatment area at water's edge+
Aquatic Nuisance Animal Control:	
-In Water	80 Acres of treatment area*
-At Water's Edge	20 linear miles of treatment area at water's edge+
Forest Canopy Pest Control	6,400 Acres of treatment area
<p>*Calculations should include the area of the applications made to: (1) waters of the U.S. and (2) conveyances with a hydrologic surface connection to waters of the U.S. at the time of pesticide application. For calculating annual treatment area totals, count each pesticide application activity as a separate activity. For example, applying pesticides twice a year to a ten acre site should be counted as twenty acres of treatment area.</p> <p>+Calculations should include the linear extent of the applications made at water's edge adjacent to: (1) waters of the U.S. and (2) conveyances with hydrologic surface connection to waters of the U.S. at the time of pesticide application. For calculating annual treatment totals, count each pesticide application activity and each side of a linear water body as a separate activity or area. For example, treating both sides of a ten mile ditch is equal to twenty miles of water treatment area.</p>	

Table 1. Annual Treatment Area Thresholds

Category	PDMP Deadline
Operators are not required to submit an NOI.	Not applicable.
Operators who know or should have reasonably known, prior to commencement of discharge, that they will exceed an annual treatment area threshold for that year.	Prior to first pesticide application covered under the permit.
Operators who do not know or would reasonably not know until after commencement of discharge that they will exceed an annual treatment area threshold for that year.	Prior to exceeding an annual treatment area threshold.
Operators commencing discharge in response to a declared pest emergency situation that will cause the operator to exceed an annual treatment area threshold.	No later than 90 days after responding to the declared pest emergency situation

Table 2. Pesticide Discharge Management Plan deadlines

**Pesticide Discharge Management Plan
For
Pest Management Area:**

A. Pesticide Discharge Management Team

The following person will be responsible for managing pests in relation to the specified pest management area:

Name	Title	Department/Division	Phone	Email

The above person is responsible specifically for:

The following person will be responsible for developing and revising the PDMP:

Name	Title	Department/Division	Phone	Email

The above person is responsible specifically for:

The following person will be responsible for developing, revising, and implementing corrective actions and other effluent limitation requirements:

Name	Title	Department/Division	Phone	Email

The above person is responsible specifically for:

The following person(s) will be responsible for pesticide applications in the specified pest management area:

Name	Title	Department/Division	Phone	Email

The above person(s) is/are responsible specifically for:

The pesticide applications for the specified pest management area are performed by:

In-House Personnel	<input type="checkbox"/>	Contractor Personnel	<input type="checkbox"/>	In-House and Contractor Personnel	<input type="checkbox"/>
--------------------	--------------------------	----------------------	--------------------------	-----------------------------------	--------------------------

If contractor personnel perform the pesticide applications, attach a copy of the contract or other written agreement to this PDMP. Document attached? Yes No Not applicable

B. Pest Management Area Description

1. Pest Problem Description

Target Pest(s):

Source of Pest/Root Cause of Pest Problem:

Historical information regarding this pest problem in this area:

Source and location of historical data:

2. Action Threshold

Established Pest Action Threshold (reference IPMP and/or Contract, if applicable):

3. Map

Attach a map of the pest management area. Map attached. Yes No

4. Water Quality Standards

Established Water Quality Standards for waters of the U.S. located in this pest management area to which there may be a discharge (provide reference from State or other source):

C. Control Measure Description

Select control measures that you will implement to comply with effluent limitations. Further details will be provided in Section D.

Active Ingredient(s) to be applied to the pest management area (attach pesticide label):

Rate of application (provide rate):

Frequency of application (provide frequency):

Spill Prevention

Equipment Maintenance and Calibration

D. Schedules and Procedures

1. Control Measures Used to Comply with Effluent Limitations

For all of the following provide justification, procedures and schedules, as appropriate. Reference the IPMP, other installation Plans, SOPs, manufacturer's directions or any

other applicable documents. Procedures do not need to be re-written here if they are clearly delineated in another planning document and the document is referenced.

Rate of application:

Spill Prevention:

Pesticide Application Equipment Maintenance:

Pest Surveillance:

Assess Environmental Conditions Prior to Application (temperature, precipitation, wind speed):

2. Other Actions Necessary to Minimize Discharges

Spill Response Procedures

Provide information on and/or reference existing plans for the following:

Spill Response Procedures:

Spill-related Training/Certification:

Notification Procedures:

Adverse Incident Response Procedures

Provide information on and/or reference existing plans for the following:

Incident Response Procedures:

Notification Procedures:

Locations where Contact Information for Responders can be Found:

Pesticide Monitoring Schedules and Procedures

“Monitoring” includes checking that the amount of pesticide applied is correct, performing regular maintenance on equipment and spot checking for observable adverse incidents. Visual assessments of the application site must be performed during pesticide applications and during post-application surveillance.

Process for determining monitoring locations:

Schedule for monitoring:

Person(s) responsible for monitoring:

Procedures for documenting any observed impacts:

E. Documentation to Support Eligibility Considerations under Other Federal Laws

Have you included a copy of your NOI with this PDMP? Yes No

F. Signature

This PDMP must be signed by “either a principal executive officer or ranking elected official (i.e., a Chief Executive Officer of the Agency or a Senior Executive Officer having responsibility for the overall operations of a principal geographic unit of the agency).”

Signature: _____

Name:

Title:

APPENDIX H

Medical

H.1 EMERGENCY DISEASE VECTOR CONTROL PLAN FOR THE HAMPTON ROADS REGION

Enclosures to EDVCP are included on the CD of supporting documents provided with this plan.

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H.1 EMERGENCY DISEASE VECTOR CONTROL PLAN FOR THE HAMPTON ROADS REGION

EMERGENCY DISEASE VECTOR CONTROL PROGRAM
FOR THE HAMPTON ROADS REGION

PREPARED BY
NAVY ENVIRONMENTAL AND PREVENTIVE MEDICINE UNIT TWO
NORFOLK, VA

PREVIEWED BY
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Updated November 2013

Navy Environmental and Preventive Medicine Unit TWO
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This document is for official use only by Navy and Marine Corps military and DoD civilian pest management and preventive medicine personnel.

- Ref: (a) DODINST 4150.07
(b) OPNAVINST 6250.4 series
(c) BUMEDINST 6250.12 series

- Encl: (1) Emergency Vector Control Points of Contact
(2) Authorized User List for Vector Control
(3) DoD Standard Pesticide List
(4) DoD Pest Management Material List (Other Than Pesticides)
(5) Disease Vector Ecology Profile Eastern Virginia
(6) Mosquito-borne Arboviral Disease Risk / Response Matrix
(7) Suggested Disease Indicator or Case Responses for Mosquito-borne Encephalitis
(8) Suggested Disease Indicator or Case Responses for Flea-borne Typhus
(9) Suggested Disease Indicator or Case Responses for Rabies
(10) Suggested Vector Management Responses in the Event of a Disaster

1. Purpose. To develop a plan of action for the control of potential disease vectors to prevent arthropod-borne or zoonotic disease in the event of a natural or man-made disaster, disease outbreak or other emergency.

2. Scope. This plan covers Navy and Marine Corps installations in the Hampton Roads Region including Department of Navy installations in Eastern Virginia listed as follows:

- a. Naval Station Activity (NSA) Hampton Roads
 - (1) NSA Hampton Roads
 - (2) NSA Northwest Annex
- b. Naval Station Norfolk
 - (1) Naval Station Norfolk
 - (2) Camp Allen
- c. Norfolk Naval Shipyard
- d. Joint Expeditionary Base Little Creek-Fort Story
- e. Naval Weapons Station (NWS) Yorktown
 - (1) NWS Yorktown
 - (2) Cheatham Annex
- f. Naval Air Station (NAS) Oceana
 - (1) NAS Oceana
 - (2) Dam Neck Annex

g. Naval Medical Center Portsmouth-Craney Island

h. Surface Combat Systems Center (SCSC) Wallops Island

3. Responsibility. Per reference (a) through (c), the Preventive Medicine Department (PMD) aboard each respective base is responsible for developing an Emergency Disease Vector Control Plan (EDVCP) and implementing the plan upon the order of the base Commanding Officer. This plan will be coordinated with Navy Environmental and Preventive Medicine Unit TWO (NEPMU-2).

4. Background. Areas in Eastern Virginia provide suitable habitat for many of the vectors and zoonotic hosts of endemic and introduced diseases. However, based on historical disease occurrence data, the risk of these diseases is generally low in the Hampton Roads region. Manmade or natural changes in the environment can create habitats that are ideally suited for disease-carrying organisms. Irrigation of lawns and landscaping can create "micro-habitats" capable of sustaining vector populations. Increased vector populations may also be a consequence of ecological and local public works infrastructure changes due to natural or manmade disasters or emergencies. An increase in vector and host populations may increase the risk of disease transmission.

5. Emergency Vector Control Planning. In order to implement an EDVCP an emergency must be declared. For the purposes of this plan, an emergency occurs when the risk of human disease transmission increases rapidly, indicated by one or a combination of the following, and approval of the individual base Commanding Officer:

a. Outbreak of Human Disease.

(1) A single diagnosed human case of vector-borne or zoonotic disease may be sufficient to be designated as an outbreak due to the rare occurrence of these diseases in the Hampton Roads region. Upon diagnosis of a vector-borne or zoonotic disease, an investigation should determine where the individual was exposed. Patient travel history is the primary means for determining where the disease was acquired. If the disease appears to be locally acquired, then, depending on the disease, a vector risk investigation and assessment at the patient's residence, place of employment, or other frequented area should be conducted. On military installations and housing this should be done by the PMD. If off-base, then the assessment should be conducted by the local county or city Department of Health Services with cooperation of the PMD. An emergency situation may exist when it appears that the human case was exposed to vectors in or around a residence or facility located on the installation.

(2) Most Sailors assigned to stations in Southeast Virginia have residences that are off-base. These personnel and their families spend most, but not all, of their recreational time at their residence. Therefore, the greatest risk exists off-base. All municipalities in Southeast Virginia have vector-control agencies. These agencies conduct surveillance and control of vector-borne diseases to the entire municipality, which would include residents that happen to be in the Navy. Local health departments and vector control agencies do a good job of publicizing disease incidence or increases in disease risk. Advisories from these agencies should be heeded by personnel that live in those municipalities. Some Sailors do live in base housing, which may either be on a base or in a development that is managed by a civilian company for military residents. Communication between preventive

medicine departments on each base and vector control agencies where these bases are located is critical. Vector control activities on base should match those conducted off-base in that same municipality.

b. Infected Animal Hosts. Animal hosts infected with zoonotic diseases transmissible to humans are usually detected postmortem after the sudden death of a domestic, captive or wild animal. Other cases are found by lab diagnosis of a severely ill captive or domestic animal. An emergency situation may occur when investigations indicate that the host is in high density and close proximity to susceptible human hosts to increase the risk of transmission. A situation may also occur when the host is exposed to a large number of vectors that may increase the risk of biting for susceptible humans.

c. Vectors of Infectious Diseases. Infectious vectors are detected through the collection, identification and testing of potential arthropod vectors. The county/municipal vector control program collects, identifies, and, depending on the disease, tests arthropods for pathogens. An emergency is dependent on the vector and disease of concern. Ticks and mites generally do not pose a threat that would initiate an emergency response due to their limited distribution. Mosquitoes, on the other hand, would initiate an emergency response due to their mobility and wide distribution. An emergency may exist when infectious vectors are found in high densities and in close proximity to susceptible humans.

d. Increased Abundance of Flying Insects. A rapid increase in the number of flying insects after a natural or manmade disaster may pose an increased risk of disease transmission. Houseflies and other nuisance flies usually accompany a breakdown of sanitation infrastructure and services following a disaster. Enteric diseases can be transmitted and distributed through flies because of exposure to contaminated food and water from damage to the infrastructure and the accompanying lack of hygiene.

6. Disease Vector Ecology Profile, Eastern Virginia. Enclosure (5) is the Disease Vector Ecology Profile (DVEP) for Eastern Virginia. The document lists vector-borne and zoonotic diseases that have occurred or may occur in Virginia and surrounding states. It provides general information on epidemiology, ecology of the vectors and hosts, and surveillance and control methods. It also provides information and local public health resources to determine disease risk and appropriate preventive measures for the installation.

7. Potential Vectors and Diseases. Each local Department of Public Health conducts routine vector surveillance programs throughout the Hampton Roads Region. Their programs include vector surveillance and disease risk assessments for ticks (Lyme Disease), rodents (plague, hantavirus, and arenavirus), mosquitoes (encephalitis) and other vectors and diseases as required. Current disease risk assessments and surveillance information can be obtained from each local Department of Public Health.

a. Mosquitoes (West Nile Virus, St. Louis Encephalitis and Eastern Equine Encephalomyelitis).

(1) Arthropod-borne viral diseases can cause serious illness and death in humans. They can be vectored by *Culex pipiens quinquefasciatus* mosquitoes that can breed in natural and manmade water sources. Birds that carry the virus can live throughout the installation and the surrounding

community. The common raven, *Corvus corax*, and crow are common hosts of West Nile Virus (WNV). West Nile Virus causes an emerging illness that resulted in thousands of human and equine cases annually and many fatalities since its introduction to North America in 1999. In 2012, the US experienced a significant increase in WNV mosquito activity, including Virginia; however, the incidence of human cases did not have a correlating epidemic trend. Potential emergency response actions include increased surveillance for mosquitoes, area wide pesticide application for adult mosquitoes, implementing personal protective measures including distribution of repellents, and education of the public on mosquito bite avoidance.

(2) Saint Louis encephalitis virus (SLEV) and Eastern equine encephalitis virus (EEE) are transmitted to humans by the bite of an infected mosquito. While SLE remains more prevalent throughout the eastern and central states, Eastern equine encephalitis (EEE) is a rare illness in humans concentrating mostly in the Atlantic and Gulf of Mexico regions, and only a few cases are reported in the United States each year. Most persons infected have no apparent illness. Initial symptoms of those who become ill include fever, headache, nausea, vomiting, and tiredness. Severe neuroinvasive disease (often involving encephalitis, an inflammation of the brain) occurs more commonly in older adults. In rare cases, long-term disability or death can result. There is no specific treatment for SLEV or EEE infection; care is based on symptoms.

b. Mice / Hantavirus Cardiopulmonary Syndrome. Hantavirus Cardiopulmonary Syndrome is a serious respiratory disease that is fatal in about 40% of persons infected with the virus. White-footed mice, *Peromyscus leucopus*, which can be found in rural areas of the region and on the installation, carry the virus. The virus is transmitted through the inhalation of dried mouse feces, urine and other excreta. Deer mice can occur in very large numbers when an abundance of food and water are available and will readily enter buildings through small openings. Emergency response actions may include increased hantavirus host and human case surveillance, indoor and outdoor mouse control if population density is high, implementation of sanitation and exclusionary measures to prevent entry of mice into buildings, extensive cleanup of rodent droppings, and education of the public on personal protective measures and recognition of disease symptoms.

c. Ticks (Lyme, Rocky Mountain Spotted Fever, Ehrlichiosis, Southern Tick - Associated Rash Illness, and Tularemia). The frequency of training operations in wooded and open field areas has resulted in annual human cases of tick-borne illness. Pest management contractors are primarily responsible for surveillance and control activities, in conjunction with the PMD, to limit the potential for epidemics of the following:

(1) Lyme Disease. Transmitted to humans through the bite of infected nymphal or adult blacklegged ticks, *Ixodes scapularis* (formerly known as deer ticks). Lyme disease is diagnosed based on symptoms, physical findings (e.g., rash), and laboratory evidence of infection. The rash is the only physical manifestation that is distinctive enough to allow a definitive diagnosis without laboratory testing. The dramatic increase in the number of reported cases of Lyme disease since 2007 is likely due to both an actual increase in Lyme disease occurrence and increased case follow-up by local health departments, aided by voluntary reporting of Lyme-positive findings by laboratories.

(2) Rocky Mountain Spotted Fever. Transmitted to humans by the bite of an infected American dog tick, *Dermacentor variabilis*. Persons with Rocky Mountain spotted fever (RMSF) may have a sudden onset of fever, severe headache, muscle pain, nausea and vomiting. Three to five days after onset of illness, a rash may develop that starts on the hands and feet and spreads to the rest of the body. Prevention of RMSF can be achieved by minimizing tick bites through avoidance of likely tick habitats such as open fields with tall brush and weeds, old fields with early succession forest growth, or brushy vegetation along forest margins and trails.

(3) Ehrlichiosis. Transmitted to humans when bitten by the Lonestar Tick, *Amblyomma americanum*, found in the southeastern and south-central parts of the United States. This disease is a serious illness and can be fatal if it is not treated quickly. The initial symptoms begin to show around 1-2 weeks after being bitten. These symptoms are fever, headache, chills, malaise, muscle pain, nausea/vomiting/diarrhea, confusion, and conjunctival injection. The majority of cases are reported May-August. On average around 3 million cases are reported per year.

(4) Tularemia. Mode of transmission via an infected tick such as American dog tick, *Dermacentor variabilis*, lone star tick, *Amblyomma americanum*, or the blacklegged tick, *Ixodes scapularis*. Wild animals are the reservoir for *Francisella tularensis* and rabbits, hares, and rodents are especially susceptible to infection. Signs/symptoms vary and include depending on the mode of transmission, but usually include sudden onset of high fever, chills, fatigue, general body aches, headache and nausea. Pneumonia may complicate the disease and requires prompt identification and specific treatment to prevent development of serious, life-threatening illness. No cases of tularemia were reported in Virginia during 2011-2012. The last reported case occurred in 2010 in a male.

(5) Southern Tick - Associated Rash Illness, and Tularemia (STARI). A rash similar to the rash of Lyme disease has been described in humans following bites of the lone star tick, *Amblyomma americanum*. The rash may be accompanied by fatigue, fever, headache, muscle and joint pains.

d. Mammals (Rabies). Rabies is a fatal human viral disease that is carried by wild animals, particularly canines (dogs), felids (cats), raccoons and bats. It is spread through the saliva of the infected animal. The virus travels from the wound into the brain, where it causes swelling and inflammation. The inflammation often leads to the initial symptoms, rapid chemoprophylaxis is critical to patient survival post-bite by an infected vector. The PMD and Immunizations Clinic are equipped to facilitate chemoprophylaxis and disease reporting to both DoN and county/municipal public health departments in the event of infection. US Army Veterinarians Office will also be contacted for isolation, quarantine and/or destruction of suspected vectors.

e. Mites, Lice, and Fleas (Typhus). Typhus is a bacterial disease spread by mites, lice, and fleas. It is caused when a person is bit by an infected flea or tick. The symptoms are usually not fatal; they include abdominal pain, backache, diarrhea, vomiting, rashes, high fevers, hacking, headache, muscle pain, and chills. Epidemic typhus is caused when a person is bitten by a flea and scrub typhus is caused when a person is bit by a mite.

f. Filth Flies (Food-borne Gastrointestinal Diseases). Filth flies are ubiquitous after most natural disasters and are potential carriers of bacteria and other microorganisms that can contaminate food and cause gastrointestinal illness.

8. Potential Disasters / Emergencies.

a. Flooding. Hurricanes frequently have significant impact on coastal Virginia, with the sizeable Atlantic Ocean coast as well and the large network of inlets, bays, and other waterways surrounding the Chesapeake Bay. Flooding can occur due to heavy rains creating microhabitats which can foster arthropods capable of vectoring diseases. Mosquito breeding may begin several days to a week after floodwaters have receded.

b. Earthquake. Earthquakes are a relatively infrequent occurrence in the Virginia area. Water supplies and sewage systems may be damaged by an earthquake and may create breeding sources for mosquitoes and filth flies. Additionally, a breakdown in public works infrastructure may cause an accumulation of human waste that can attract feral animals (cats, opossums, etc.) and rodents.

c. Disease Outbreak. A disease outbreak will first be identified at a local medical treatment facility and be reported to the local public health agencies. A disease alert will be sent out to the community and appropriate control measures will be initiated.

9. Emergency Disease Vector Control Measures. When disease is present or imminent, immediate control and reduction of the pest populations that carry the disease are necessary. The following measures may be necessary depending on the disease of concern:

a. Adult mosquito and fly control involving area-wide spraying of an insecticide using a vehicle-mounted mist generator (fogger, ultra low volume).

b. Adult mosquito and fly control involving application of residual insecticides (i.e. emulsifiable concentrates and wettable powders) to resting sites.

c. Mosquito control in aquatic breeding sites using larvicides.

d. Rodent reduction using traps and/or rodenticides. Use personal respiratory protection for persons entering buildings that are infested with rodents and exclusion of rodents from buildings.

e. Killing of animals and removal of carcasses that may carry rabies.

f. Control of disease-carrying ectoparasites, such as fleas, especially before rodent control and removal.

10. DoD Approved Pesticides and Equipment. The Department of Defense - Armed Forces Pest Management Board (AFPMB) provides information on the pesticides that have been approved for DLA/DSCR stockage for control of diseases vectors and pests during operations worldwide. Enclosure (3) provides a detailed list of all currently approved pesticides available to DoD personnel. Enclosure (4) provides a detailed list of all currently approved equipment available to DoD personnel. Both are routinely updated by

the AFPMB and the most recent edition can be found at www.afpmb.org. For further information and questions on pesticides and pesticide usage within the DoD, refer to the DoD Pesticide Hotline. The DoD Pesticide Hotline is a service provided by the Entomological Sciences Program, US Army Public Health Command, Aberdeen Proving Ground (EA), MD 21010-5403 or at (410) 436-3613 Fax: (410) 436-2037 DSN: 584-3613. Common services available from the Hotline include:

- a. Pesticide Labels. Obtain copies of pesticide labels, assist in interpreting label information and provide the federal and state registration status of a particular product.
- b. Pesticide Regulation. Interpreting regulations pertaining to pest management, pesticide handling and usage.
- c. Pesticide Selection. Assist with selection of the most appropriate products for the specific pest situation.
- d. Integrated Pest Management (IPM). Provide general information on pest biology, (i.e. life cycle, habitat, host preference) to maximize control efforts and minimize reliance on pesticides
- e. Pesticide Application. Provide information on the equipment and personal protective measures required for specific applications.
- f. Environmental Concerns. Provide assistance in recognizing potential environmental issues and suggest alternative strategies and countermeasures.
- g. Safety Data Sheets (SDS). Obtain copies of pesticide SDSs and assist in understanding the properties of a particular product.
- h. Fact Sheets. Produce, provide and/or locate fact sheets and educational materials on pesticide active ingredients, pest biology, surveillance and control measures.
- i. Plant/Animal Identification Services. Coordinate identification services to ensure timely/accurate identification of a particular plant/animal specimen or image.
- j. DoD Expert Locator Assistance. Identify unique DoD resources best equipped to assist the customer's specific needs.

11. Resources.

a. Human Disease Surveillance. NEPMU-2 maintains in-house disease surveillance capabilities including epidemiologists, infectious disease specialists, entomologists and environmental health specialists. Routine laboratory diagnostics are available through the nearest medical center and advanced diagnostics are available through the local public health and veterinary laboratories. For more information on laboratory testing contact NEPMU-2.

b. Vector-borne and Zoonotic Disease Surveillance. The PMD is staffed with preventive medicine technicians (PMT) trained in vector and vector-borne disease surveillance. However, currently the resources to conduct extensive surveillance, such as vector trapping, are limited. The individual County Department of Public Health Vector Control Program conducts surveillance and

can provide surveillance data to the PMD. NEPMU-2 has extensive surveillance capabilities and can be requested to conduct vector-borne and zoonotic disease risk assessments.

c. Vector Control. The installation's pest control personnel/contractor is the primary vector control responder. The pest control personnel/contractor has the equipment, pesticides and personnel to conduct emergency vector control operations. PMD PMTs are certified in public health pest control and can provide additional support if necessary. Additional vector control support, including personnel, technical expertise, pest control equipment, and pesticides, is available from NEPMU-2 in response to health threats that affect the entire community.

12. Emergency Disease Vector Control Plan Actions.

a. Pre-Emergency Preparations.

(1) The PMD and/or contract pest control staff should be familiar with vector-borne and zoonotic disease risk in the local area and obtain the necessary training from NEPMU-2 or NAVFAC entomologists.

(2) The PMD shall establish liaison with the local public health agency regarding preventing, reporting, and controlling communicable diseases. This will include vector surveillance and disease occurrence information.

(3) The PMD shall maintain communications with emergency medicine, a laboratory, and other appropriate clinical and ancillary support staff to obtain human surveillance information.

(4) The pest control contractor (PCC) shall determine whether sufficient equipment and pesticide quantities are available for vector control operations or whether additional support will be needed. The pest control contractor shall procure any necessary equipment. To avoid purchasing and storing large quantities of contingency pesticides, the PCC should identify a source for the purchase of pesticides that can be delivered within 24 hours.

(5) All DoD pesticide applicators will maintain DoD pesticide applicator certification in Category 8, Public Health and contractor applicators will maintain state license/ certification in the appropriate categories.

(6) The PMD shall identify installation points of contact that will be needed to expedite disease prevention and control operations in the event of an emergency.

b. Emergency Response Procedures.

(1) After the occurrence of the disaster or emergency that threatens public health, the base Commanding Officer will task the PMD to initiate preventive measures in accordance with this plan to prevent human disease outbreaks.

(2) The PMD shall coordinate control efforts with other installation departments including the CO, security, public affairs, safety, and environmental.

(3) The PMD staff will provide disease specific information to clinical staff to enable identification of human disease cases. The staff may contact NEPMU-2 for support if necessary.

(4) If the disease involves domestic animals as well, then the PMD should consult NEPMU-2 and the U.S. Army Veterinary Services, Southwest.

(5) The PMD will inform NEPMU-2 when the EDVCP is activated.

(6) The PMD shall submit a Medical Event Report (MER) via the Navy Disease Reporting System Internet (NDRSI) version if a civilian or military member or dependent is diagnosed with a vector-borne disease. For NDRSI procedures go to <https://data.nmcphc.med.navy.mil/ndrsi/>. The PMD shall also submit a report to the local health department.

(7) The PMD will conduct surveillance and operations to prevent or control a disease outbreak in coordination with local public health officials. Suggested disease indicator or case responses for potential zoonotic or vector-borne diseases are included in enclosures (7 - 9). Responses for disasters are found in enclosure (10).

(8) The pest control contractor will conduct vector control operations as deemed necessary.

(9) The PMD will request support from NEPMU-2 if a contingency vector surveillance and control team is needed.

c. Post-Emergency Procedures. The PMD shall prepare an after action report to be sent to NEPMU-2 and Navy and Marine Corps Public Health Center (NMCPHC) containing the following information:

(1) Diagnosis and summary of human disease cases.

(2) Implicated vector and contributing environmental factors.

(3) Surveillance methods used and data identifying breeding sites and target locations for control operations.

(4) Preventive and control methods used, including effectiveness of those methods.

(5) Names and agencies of personnel involved.

(6) After Action and recommendations.

Glossary

Acaricide. An agent used to kill mites and ticks.

Applied Biology Program. A network of NAVFAC Pest Management Consultants (PMCs) in the Environmental Business Line that assist Navy and Marine Corps installations with FIFRA and Final Governing Standards-based compliance and provide Integrated Pest Management solutions that protect operations, war-fighters, quality of life, property, materiel and the environment from the adverse effects of living organisms.

Arachnid. An arthropod that has eight legs and two body segments in the adult stage.

Arthropod. Invertebrate animals (insects, arachnids and crustaceans) that have jointed appendages and a segmented body.

Avicide. An agent used to kill or repel birds.

Broad spectrum. A classification of pesticide that will kill a wide range of pests.

Broadcast application. The application of a pesticide to a wide area.

Crack and crevice treatment. Application of a pesticide to cracks and crevices where pests are known to live, feed, and/or breed.

DOD-certified pesticide applicator. Military or civilian personnel certified per the “DOD Plan for Certification of Pesticide Applicators” in the pest management categories that are appropriate for their type of work.

Drift. The movement of a pesticide through air, ground, or water out of the control target area.

Exclusion. A pest control method that prevents the entry of a pest into an area to be protected from the pest.

Functional area. Installation personnel, agencies, departments, contractors and facilities that use or store pesticides, conduct pest management operations, provide for safety or security of pest control operations, or have the responsibility of preventing pests.

Fungicide. An agent used to destroy or inhibit growth of fungi.

Herbicide. An agent used to destroy or inhibit plant growth.

Insecticide. An agent used to destroy insects.

Integrated pest management (IPM). A planned program incorporating education, continuous monitoring, record keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. IPM uses targeted, sustainable (effective, economical, environmentally sound) methods including habitat modification;

biological, genetic, cultural, mechanical, physical, and regulatory controls; and, when necessary, the judicious use of least-hazardous pesticides.

Integrated pest management coordinator. The individual officially designated by the installation commander to coordinate and oversee the installation pest management program and installation IPM plan. IPM coordinators must be certified as pesticide applicators if their job responsibilities require them to apply or supervise the use of pesticides.

Integrated Pest Management Plan. A detailed document for the design, implementation, and maintenance of all pest management and pesticide storage and use on an installation or group of installations.

Invasive species. A species of animal, plant or organism that is not native to a geographic area and can potentially cause harm to native organisms and their habitats.

Leach. The movement of a pesticide through soil.

Molluscicide. An agent used to kill snails.

Noxious or invasive weed. A weed that, if introduced, into a habitat can cause damage or injury to other organisms in that habitat. They may cause deprivation of water to other plants, physical injury to animals, or increased risk for wild fire.

Personal relief. Pest management control efforts made by DOD personnel or their family members at their own expense for control of pests consistent with DOD and Navy policy.

Pest. Any organism (except for microorganisms that cause human or animal diseases) that adversely affects operations, preparedness, the well-being of humans or animals, real property, materiel, equipment or vegetation, or is otherwise undesirable.

Pest management performance assessment representatives (PMPARs). Installation personnel trained in contract performance assessment and pest management, whose duties include surveillance of commercial pest management services to ensure that the performance complies with contract specifications and legal requirements. [Formerly known as Pest Control Quality Assurance Evaluators (PCQAE).]

Pest management. The prevention and control of disease vectors and pest that may adversely affect the DOD mission or military operations; the health and well-being of people; or structures, materiel, or property.

Pesticide. Any substance or mixture of substances registered by EPA under FIFRA, intended to destroy, repel, or mitigate pests. Includes, insecticides, rodenticides, herbicides, fungicides, plant regulators, defoliant, desiccants, disinfectants, antifouling paints and biocides (such as water treatment chemicals). NAVFAC PPMCs do not approve disinfectants or biocides.

Pesticide applicator. Any individual who applies pesticides.

Pesticide cancelation. An action by EPA that may limit the use of a pesticide. EPA often issues instructions with the pesticide cancelations providing information on the disposition of canceled pesticides.

Pesticide Facility. The building and areas designated for handling and storing pesticides.

Pre-treatment. A termiticide applied to the soil during the construction of a new building or addition.

Professional pest management consultant. Degreed technical specialists, such as NAVFAC civilian entomologists (Applied Biologist) and BUMED commissioned medical entomologists, who have command program oversight responsibilities and provides guidance and information on the management of pest management programs for commands and installations.

Registered pesticide. A pesticide registered by the EPA for sale and use within the United States.

Residual pesticide. The application of a pesticide that will remain effective on to the surface to which it is applied for a long period of time.

Rodenticide. An agent used to destroy rodents.

Safety Data Sheet. A document (OSHA form 174, or equivalent) that accompanies a pesticide product, providing the handler with chemical information on ingredients, handling instructions, potential hazards, and manufacturer address and emergency contact information.

Space spray. The application of a pesticide as a fine airborne mist to kill flying insects. This includes ultra-low volume application and fogging.

Stakeholder. A person, agency, organization, or department that has an interest in the installation's pest management program.

State-certified commercial pesticide applicators. Personnel certified in accordance with FIFRA by a State (in which the work will be performed) with an EPA-approved certification plan and certified in the category in which a pesticide will be applied.

Subsistence. Stored food items.

Surveillance. The use of surveys over a period of time to monitor the increase and decrease of pest populations over time. Often used as a means of "early warning" of increase in pests or risk of disease and as a means of determining efficacy of pest management operations.

Survey. Observing, collecting, quantifying, identifying and analyzing a pest population.

Ultra-low volume (ULV). A method of applying a pesticide as a space spray. This method involves applying fine droplets of concentrated pesticide.

Uncertified pesticide applicators. Individuals who have not successfully completed certification training. Uncertified military and DOD civilian personnel who are in training to become certified pesticide applicators may apply pesticides when under the direct line-of-sight supervision of a DOD-certified pesticide applicator. Uncertified personnel may apply self-help or personal relief pesticides when the operation has been approved by a command pest management consultant.

Vector/Disease Vector. Any animal capable of transmitting the causative agent of human disease; serving as an intermediate or reservoir host of a pathogenic organism; or producing human discomfort or injury, including (but not limited to) mosquitoes, flies, other insects, ticks, mites, snails, and rodents.

It is recognized that certain disease vectors are predominantly economic pests that as conditions change may require management or control as a disease vector.

Vector-borne disease. A disease transmitted by a vector.

Zoonosis. A disease that normally occurs in animals that can be transmitted to humans.

List of Acronyms and Abbreviations

AFPMB	Armed Forces Pest Management Board
AHB	Africanized Honey Bee
AUL	authorized use list
Bti	<i>Bacillus thuringiensis israelensis</i>
BUMED	Navy Bureau of Medicine and Surgery
CAMA	calcium acid methanearsonate
CFR	Code of Federal Regulations
CO	commanding officer
COR	contracting officer representative
CNIC	Commander, Navy Installations Command
CRPM	cultural resources program manager
CWP	Contractor Work Plan
DNA	Dam Neck Annex
DOD	Department of Defense
DODI	Department of Defense instruction
DON	Department of the Navy
DSMA	disodium methanearsonate
E	endangered
EA	environmental assessment
EEE	Eastern Equine Encephalitis
EMS	Environmental Management System
EO	executive order
EPA	Environmental Protection Agency
ESA	Endangered Species Act

EDVCP	Emergency Disease Vector Control Plan
FAA	Federal Aviation Administration
FAP	Functional Assessment Plan
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FSC/BOS	Facilities Support Contract/Base Operation Support
GRX	GeoReadiness Explorer
IAP	Internal Assessment Plan
ICRMP	Integrated Cultural Resources Management Plan
IH	industrial hygiene
INRMP	Integrated Natural Resources Management Plan
IPM	integrated pest management
IPMC	integrated pest management coordinator
IPMP	Integrated Pest Management Plan
KO	contracting officer
MoM	measure of merit
MRE	meal, ready to eat
MSMA	monosodium methanearsonate
MWR	morale, welfare, & recreation
NAVMED	Navy Medical (Command)
NAFI	Non-Appropriated Fund Instrumentality
NALFF	Naval Auxiliary Landing Field Fentress
NAS	Naval Air Station
NASO	Naval Air Station Oceana
NECE	Navy Entomology Center of Excellence
NEPMU	Navy Environmental and Preventive Medicine Unit
NEX	Navy Exchange
NISH	National Institute of Severely Handicapped

NMCI	Navy and Marine Corps Intranet
NPDES	National Pollutant Discharge Elimination System
NOPRS	NAVFAC Online Pesticide Reporting System
OPNAVINST	Chief of Naval Operations instruction
OPNAV M	Chief of Naval Operations manual
ORM	operational risk management
OSHA	Occupational Safety and Health Administration
PAI	pounds of active ingredient
PAR	performance assessment representative
PMPAR	Pest Management Performance Assessment Representative
PMSP	Pest Management Service Provider
PMT	preventive medicine technician
POC	point of contact
PPE	personal protective equipment
PPMC	professional pest management consultant
PPV	public-private venture
PREVMED	Preventive Medicine Department
RTU	ready-to-use
SDS	safety data sheet
sq ft	square feet
T	threatened
TG	technical guide
UFGS	Unified Facilities Guide Specifications
ULV	ultra-low volume
U.S.	United States
U.S.C.	United States Code
USDA	United States Department of Agriculture

USDA-WS	United States Department of Agriculture-Wildlife Services
USF&WS	U.S. Fish and Wildlife Service
USN	United States Navy
VPDES	Virginia Pollutant Discharge Elimination System
WNV	West Nile Virus

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Enclosure 17. Conservation Law Enforcement Program Needs Assessment

NAVFAC Atlantic Biological Resource Services

Contract: N62470-13-D-8016; Task Order: WE13

FINAL - August 2016



Conservation Law Enforcement Program Needs Assessment

Naval Air Station Oceana,
Naval Air Station Oceana - Dam Neck Annex,
Naval Auxiliary Landing Field Fentress, and
Naval Support Activity Hampton Roads -
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NAVFAC Atlantic Biological Resource Services

Contract: N62470-13-D-8016; Task Order: WE13

Conservation Law Enforcement Program Needs Assessment

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ACRONYMS AND ABBREVIATIONS

ARPA	Archaeological Resources Protection Act
ACHP	Advisory Council on Historic Preservation
BCC	USFWS Birds of Conservation Concern
BLM	U.S. Bureau of Land Management
BO	Biological Opinion
BST	Biological Science Technician
CFI	Certified Firearm Instructor
CFR	Code of Federal Regulations
CLE	Conservation Law Enforcement
CLEO	Conservation Law Enforcement Officer
CLEP	Conservation Law Enforcement Program
CNRMA	Commander, Navy Region Mid-Atlantic
CRP	Cultural Resources Program
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Plan
DOD	Department of Defense
DODI	Department of Defense Instruction
DODD	Department of Defense Direction
EFH	Essential Fish Habitat
EO	Executive Order
ESA	Endangered Species Act
FLETC LMTP	Federal Law Enforcement Training Center Land Management Training Program
GIS	Geographical Information Systems
ICO	Installation Commanding Officer
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
MBTA	Migratory Bird Treaty Act
MOA	Memorandum of Agreement
MWR	Morale, Welfare, and Recreation
NALFF	Naval Auxiliary Landing Field Fentress
NASO	Naval Air Station Oceana
NASO-DNA	Naval Air Station Oceana Dam Neck Annex
NAVFAC	Naval Facilities Engineering Command
NAVMC DIR	Department of the Navy Marine Corps Directive
NCIS	Navy Criminal Investigative Services
NCWRC	North Carolina Wildlife Resources Commission
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NMFWA	National Military Fish and Wildlife Association
NRS	Natural Resources Specialist
NRP	Natural Resources Program
NSAHR-NWA	Naval Support Activity Hampton Roads Northwest Annex

NOAA-NMFS	National Oceanic and Atmospheric Administration National Marine Fisheries Service
OC	oleoresin capsicum
OPNAVINST	Chief of Naval Operations Instruction
RHPO	Regional Historic Preservation Office
RT&E	Rare Threatened and Endangered Species
SAIA	Sikes Act Improvement Act
SHPO	State Historic Preservation Office
SOP	Standard Operating Procedure
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
V.A.C.	Virginia Administrative Code
VDCR-DNH	Virginia Department of Conservation and Recreation Department of Natural Heritage
VDGIF	Virginia Department of Game and Inland Fisheries
VMRC	Virginia Marine Resources Commission

1.0 INTRODUCTION

This document identifies policies and provides direction for the Regional Navy Conservation Law Enforcement Program (CLEP) in accordance with Department of Defense Instruction (DODI) 5525.17. This CLEP Needs Assessment applies to the following four facilities: Naval Air Station Oceana (NASO), Naval Air Station Oceana-Dam Neck Annex (NASO-DNA), Naval Auxiliary Landing Field Fentress (NALFF), and Naval Support Activity Hampton Roads- Northwest Annex (NSAHR-NWA).

The Sikes Act Improvement Act (SAIA) requires that Conservation Law Enforcement (CLE) be provided on military lands, and that each military department ensure that professionally trained natural resources and CLE personnel are assigned responsibility to protect and manage natural resources found on Department of Defense (DOD) installations, including implementation of Integrated Natural Resource Management Plans (INRMP) and Integrated Cultural Resources Management Plans (ICRMP, DOD Legacy Program 2009). DOD installations must coordinate with the appropriate agencies to support CLE and enforce federal and applicable state laws and regulations that pertain to the management and use of the natural resources under their jurisdiction. This has included a variety of law enforcement options including employment of Conservation Law Enforcement Officers (CLEOs), game wardens, military police, or combinations of civilian CLEOs and military police. The DOD utilizes a combination of support options including cooperative agreements with State, other DOD Departments, and other federal partners to provide such oversight. DODI 5525.17 establishes overall policy and provides guidance for the DOD CLEP, in accordance with National Resources Conservation Program Policy (DODI 4715.03).

The Navy currently has one regional Biological Science Technician (BST), whose position also includes CLEO duties. The BST/CLEO has the authority to enforce federal laws and state laws at the four facilities where there is no corresponding federal law. The BST/CLEO currently does not maintain state credentials, so all other state laws must be enforced by a state commissioned officer, unless a Memorandum of Agreement (MOA) is put in place to authorize enforcement of both federal and state regulations (CEMML 2015). CLE responsibility at NASO, NASO-DNA, NSAHR-NWA and NALFF is jointly held by state commissioned officers and the Navy.

Currently the installations predominantly fall under either concurrent or proprietary jurisdiction. However, jurisdictional boundaries are being revised, which will likely change many installation parcels to concurrent and/or exclusive law-enforcement oversight (Personal communication, M. Wright, March 2016). Navy enforcement personnel cooperate with state and federal CLEOs, as needed, to enforce state and federal wildlife laws. The BST/CLEO is required to be trained in law enforcement and federal and state wildlife regulations, and must attend annual wildlife law enforcement refresher training in order to stay current on changes in regulations and enforcement policies.

1.1 PURPOSE

The purpose of the CLEP is to ensure the enforcement of federal conservation statutes set forth in DODI 5525.17 and applicable state and installation laws (described in Section 2.0 of this document), and to protect sensitive natural and cultural resources in order to sustain use of military lands for readiness activities. The CLEOs conduct a range of complex law enforcement activities to enforce natural and cultural resources laws, including but not limited to the following:

conducting field checks of individuals; investigating fish and wildlife crimes; patrolling; surveillance; interviewing witnesses; interrogating suspects; searching for physical evidence and clues; seizing wildlife or archaeological contraband, equipment, and vehicles; searching and serving warrants; making arrests; and testifying in federal and when authorized, state courts, for violations of any of the federal conservation laws provided in DODI 5525.17, state and installation laws described in section 2.0 of this instruction, and other applicable laws not listed in this instruction.

1.2 POLICY

The Navy does not have a formal guidance document dedicated to the implementation of CLEPs on Navy installations. However, the U.S. Marine Corps (USMC) Guide to Conservation Law Enforcement Program (NAVMC DIR 5090.4A) outlines the procedural guidance, directions, and details to establish and implement a CLEP, and to implement the provisions of a current MOA between the USMC and the U.S. Fish and Wildlife Service (USFWS). This directive outlines duties, position descriptions, procedures, training, equipment, etc., and was useful towards the development of this document. Other notable and successful DOD CLEPs that may be useful guides towards the development of a Navy or regional CLEP include: Joint Base Elmendorf-Richardson CLEP, Vandenberg Air Force Base CLEP, and Fort Carson CLEP. Additional information regarding these programs is available in the 2015 CLE Vulnerability Assessment for Front Range Air Force Bases (CEMML 2015).

In accordance with DODI 5525.17, it is Navy policy that the protection of property and natural and cultural resources under Navy control is accomplished through the enforcement of all applicable federal, state, and local/installation laws and regulations. The CLEP is used to support decisions and management actions by the Navy's natural and cultural resources managers regulating the users of these resources to achieve specific goals and objectives. Navy Component law enforcement officials exercise functional oversight over the CLEP and the CLEO(s) carrying out the program. A CLEO assigned to Navy Component law enforcement elements may be co-located with the conservation program manager at the installation.

The Navy Component's law enforcement and conservation functions will establish, and mutually support, an implementation method which defines roles, internal and external support agreements, funding responsibilities, accountability, command and control, and expectations which will provide for an effective and efficient CLEP. CLEP roles and responsibilities will be integrated into an installation's INRMP and ICRMP. The implementation method(s) for each installation CLEP should be proportionate to the CLE needed at the installation. Although the specific implementation methods at installations can vary, those details should be clearly defined at the appropriate command level and address at a minimum, consistent with DODI 5525.17, roles and responsibilities, internal and external support agreements, funding responsibilities, accountability, and command and control. Mutual assistance agreements with other agencies and organizations may be used to maximize enforcement capabilities, when authorized by law. To the extent practicable using available resources, the Navy shall ensure that sufficient numbers of professionally trained natural resource management personnel and natural resources law enforcement personnel are available and assigned the responsibility to perform tasks necessary to execute the requirements of Title 16 U.S.C. (Conservation) and DODI 5525.17. Enforcement of laws primarily aimed at protecting cultural/natural resources is an integral part of a cultural/natural

resource program and shall be coordinated with or be under the direction of the cultural/natural resources manager for the affected area.

2.0 STATUTORY AND REGULATORY AUTHORITY

Per DODI 5525.17, the protection of property and natural and cultural resources under Navy control is accomplished through the enforcement of all applicable federal and state laws and regulations. Federal natural and cultural resources laws that may be applicable to the CLEP are listed and briefly described below. A list of relevant state and installation laws/regulations is also provided.

Federal Cultural Resource Statutes, Executive Orders, and Laws

- Abandoned Shipwreck Act; *Title 43 U.S.C. §2101-§2106*. Establishes government ownership over the majority of abandoned shipwrecks located in waters of the United States of America and creates a framework within which shipwrecks are managed. State governments have authority to claim and manage abandoned shipwrecks on State submerged lands. There are no shipwrecks at any of the installations, so this is unlikely to apply to the regional CLEP.
- American Indian Religious Freedom Act; *Title 42 U.S.C. §1996*. Restored religious rights to Indian religions which include, but are not limited to, access to sacred sites, freedom to worship through ceremonial and traditional rights, and use and possession of objects considered sacred.
- Antiquities Act; *Subchapter LXI of chapter 1 of Title 16 U.S.C., beginning with §431*. The Act requires that a permit be obtained for examination of ruins, excavation of archaeological sites and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army, and provided penalties for violations.
- Archaeological Resources Protection Act; *Chapter 1B of Title 16 U.S.C., beginning with §470aa*. This Act established detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from federal or Indian lands. It also established civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resources; for any trafficking in such resources removed from federal or Indian land in violation of any provision of federal law; and for interstate and foreign commerce in such resources acquired, transported or received in violation of any State or local law.
- Archaeological and Historic Preservation Act; *Subchapter I of chapter 1A of Title 16 U.S.C., beginning with §461*. Declares it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provided procedures for designation, acquisition, administration and protection of such sites.
- Curation of Federally Owned and Administered Archeological Collections; *(36 CFR 79)*. Provides minimum standards for the long-term management and care of archeological collections, including the associated records and reports. The regulation considers actions that need to be taken for both new and existing collections. This act is unlikely to apply directly to the CLEP, as there is no Law Enforcement aspect of the law.
- Executive Order (EO) 13287; Preserve America. Provides leadership in preserving America's heritage by actively advancing the protection, enhancement, and contemporary use of the historic properties owned by the federal government, and promotes

intergovernmental cooperation and partnerships for the preservation and use of historic properties.

- Executive Order 11593; Protection and Enhancement of the Cultural Environment. Mandates that all Executive Branch agencies, bureaus, and offices compile an inventory of the cultural resources (archaeological, architectural and historical properties, sites and districts) for which they are trustee; nominate all eligible government properties to the National Register of Historic Places; preserve and protect their cultural resources; and insure that agency activities contribute to the preservation and protection of non-federally owned cultural resources.
- Executive Order 13007; Indian Sacred Sites. Intended to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites on federal lands.
- National Historic Preservation Act (NHPA); Subchapter II of chapter 1A of Title 16 U.S.C., beginning with §470. This act created the National Register of Historic Places, the list of National Historic Landmarks, and the State Historic Preservation Offices, in order to continue the preservation of historic resources. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register. This law provides guidance to federal land managers, but does not have any role for law enforcement; instead, it is enforced primarily through recourse to the Advisory Council on Historic Preservation (ACHP).
- Native American Graves Protection and Repatriation Act; Title 25 U.S.C. §3001. Requires any agency, which receives federal funding, to return Native American cultural items to lineal descendants and culturally affiliated Indian tribes and Native Hawaiian organizations. This law provides guidance to federal land managers, but does not have any role for law enforcement; instead, it is enforced primarily through recourse to the ACHP.
- Paleontological Resources Preservation Act; P.L. 111-011 §6301-§6312 (components are applicable to both NR and CR programs, as such Navy requires coordination between both program managers when such resources are found). Directs the Secretaries of the Interior and Agriculture to implement a comprehensive paleontological resource management program on federal lands.

State, Installation, and DOD Cultural Resource Laws and Regulations

- The Cave Protection Act (§ 10.1-1000 through 10.1-1008 Code of Virginia). Secures, protects, and preserves significant caves on federal lands for the perpetual use, enjoyment, and benefit of all people.
- The Virginia Antiquities Act (§ 10.1-2302 through 10.1-2306). Prohibits damage to or removal of objects of antiquity from archaeological sites on all state-controlled land.
- Permit Required for the Archaeological Excavation of Human Remains (§ 10.1-2305)
- Trespass at night upon any cemetery (§ 18.2-125)
- Violation of sepulture; defilement of dead human body (§ 18.2-126)
- Injuries to churches, church property, cemeteries, burial grounds, etc. (§ 18.2-127)
- DODD 4165.06; Real Property. Provides DOD policy on the acquisition, management, and disposal of real property, and delegates statutory and regulatory authorities and responsibilities relating to the acquisition, management, and disposal of real property.

- DODI 4165.70; Real Property Management. Implements policy and assigns responsibility, for managing real property and re-delegates various statutory and regulatory authorities and responsibilities relating to real property management.
- DODI 4715.03; Natural Resources Conservation Program. Implements policy for the integrated management of natural resources (including biological and earth resources) on property and lands managed and/or controlled by the DOD.
- DODI 4715.16; Cultural Resources Management. Establishes DOD policy and assigns responsibilities to comply with applicable federal statutory and regulatory requirements, EO's, and Presidential memorandums for the integrated management of cultural resources on DOD-managed lands.
- DODI 4715.9; Environmental Planning and Analysis. Implements policy and assigns responsibilities for integration of environmental considerations into DOD activity and operational planning.
- OPNAV Instruction 5090.1D; Environmental Readiness Program Manual. Discusses requirements, delineates responsibilities, and issues implementing policy guidance for the management of the environmental, natural, and cultural resources for all Navy ships and shore activities.
- SECNAV Instruction 4000.35A; Department of the Navy Cultural Resources Program.

CLEOs support the Cultural Resources Program (CRP) by overseeing and enforcing applicable federal, state, and local laws and regulations pertaining to the protection of archaeological sites and other cultural resources. Cultural resources, including archaeological sites, historic structures, buildings, landscapes, objects, and districts are nonrenewable resources that illustrate the historical development of the U.S. federal facilities. As stewards of cultural resources; this responsibility is recognized in the National Historic Preservation Act (NHPA) of 1966 as amended; EO 11593 Protection and Enhancement of the Cultural Environment, and EO 13287 Preserve America; in other federal laws and regulations (listed above), and other DOD and Navy policies (OPNAVINST 5090.1B, Environmental and Natural Resources Program Manual, Chapter 23, Historic and Archeological Resources Protection; SECNAVINST 4000.35, Department of the Navy Cultural Resources Program).

Under the NHPA each federal agency is tasked with the responsibility of establishing a preservation program to identify and evaluate cultural resources that may be eligible for listing on the National Register of Historic Places (NRHP). Properties under a federal agency's jurisdiction that are listed or eligible for listing on the National Register of Historic Places shall be managed and maintained in a way that considers the preservation of their historic, archaeological, architectural, and cultural values.

Archaeological sites on all four installations are protected under the Archaeological Resources Protection Act (ARPA). ARPA built on the Antiquities Act of 1906, which required permitting before ruins could be examined, archaeological sites could be excavated, or "objects of antiquity" could be gathered on lands administered by the DOD or by other federal agencies. However, "objects of antiquity" was not clearly defined, which led to the passage of ARPA. ARPA "prohibits the unauthorized excavation, removal, or damage of archaeological resources on federal and Indian lands" (King 2013), and defines "archaeological resource" as "any material remains of past human life or activities which are of archaeological interest" (National Center for Cultural Resources 2006). These include, but are not limited to "pottery, basketry, bottles, weapons,

weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal materials, or any portion or piece of any of the foregoing items ... that are at least 100 years old” (King 2013). ARPA is the law most directly relevant to law enforcement, and it protects all archaeological resources that are over a century old, regardless of their significance or NRHP eligibility. The NHPA and other federal laws largely provide guidance to federal managers, and are enforced primarily through recourse to the ACHP.

In Virginia, further protection of archaeological and cultural resources is provided by various state laws that apply to all lands within the Commonwealth, including federal and federally-managed lands. The Cave Protection Act (§ 10.1-1000 through 10.1-1008 Code of Virginia) requires permitting before the excavation or removal of archaeological, paleontological, prehistoric, or historic features in any “naturally occurring void, cavity, recess, or system of interconnecting passages beneath the surface of the earth or within a cliff or ledge including natural subsurface water and drainage systems, but not including any mine, tunnel, aqueduct, or other man-made excavation, which is large enough to permit a person to enter,” while various cemetery laws prohibit the excavation of human remains, damage to cemeteries or burial grounds, and trespass at night upon cemeteries. In North Carolina, no state laws applicable on federal lands were found that add additional protection to cultural resources.

Federal Natural Resources Statutes, Executive Orders, and Laws

- Airborne Hunting; *Title 16 U.S.C. §742j-1*. Prohibits shooting or attempting to shoot or harassing any bird, fish, or other animal from aircraft except for certain specified reasons, including protection of wildlife, livestock, and human life as authorized by a federal or state issued license or permit.
- Animal Damage and Control Act; *Title 7 U.S.C., beginning with § 426*. Provided broad authority for investigation, demonstrations and control of mammalian predators, rodents and birds.
- Bald and Golden Eagle Act; *Subchapter II of Chapter 5A of Title 16 U.S.C., beginning with §668*. Prohibits the take, sell, and other derivative actions in regards to Bald and Gold Eagles unless provided exemption (science, exhibition, and religion) by the Secretary of the Interior. Enforceable with maximum fine and/or imprisonment.
- Cave Resources Protection Act; *16 U.S.C. §4301*. Secures, protects, and preserves significant caves on federal lands for the perpetual use, enjoyment, and benefit of all people.
- Coastal Barrier Resources Act; *Chapter 55 of Title 16 U.S.C., beginning with §3501*. Designated various undeveloped coastal barrier islands for inclusion in the Coastal Barrier Resources System (System). Areas so designated were made ineligible for direct or indirect federal financial assistance that might support development.
- Coastal Zone Management Act (CZMA); *Chapter 33 of Title 16 U.S.C., beginning with §1451*. Provides for the management of the nation’s coastal resources through development of regulating entities.
- Clean Water Act of 1977; *33 U.S.C. §1251 - §1376, P.L. 95-217*. Extensive series of regulations that guide federal agencies in the regulating of water, water quality, and commerce based water courses. This includes testing for water contamination and preservation of wetlands.

- Data Quality Act; *44 U.S.C. §3504*. Provides policy and procedural guidance to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by federal agencies.
- Endangered Species Act; *Chapter 35 of Title 16 U.S.C., beginning with § 1531*. Provides a program in which endangered and threatened species can be designated and defines prohibited acts. It is unlawful to import or export; deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of a commercial activity; sell or offer for sale in interstate or foreign commerce; take (includes harm, harass, pursue, hunt, shoot, wound, kill, trap, capture, or collect any wildlife within the United States); take on the high seas; possess, ship, deliver, carry, transport, sell, or receive unlawfully taken wildlife; remove and reduce to possession any plant from areas under federal jurisdiction; maliciously damage or destroy an endangered plant on areas under federal jurisdiction; and remove, cut, dig up, or damage or destroy any endangered plant in knowing violation of any State law or regulation or in the course of a violation of a State criminal trespass law. These prohibitions apply to live or dead animals or plants, their progeny (seeds in the case of plants), and parts or products derived from them. Certain actions (scientific research, incidental take are exempt with a permit through the USFWS. Criminal violations can be met with maximum fines and/or imprisonment.
- Estuary Protection Act; *Chapter 26 of Title 16 U.S.C., beginning with §1221*. Authorizes the Secretary of the Interior, in cooperation with other federal agencies and the states, to study and inventory estuaries of the United States, including land and water of the Great Lakes, and to determine whether such areas should be acquired by the Federal Government for protection.
- EO 12962; Recreational Fisheries. Mandates that federal agencies, to the extent permitted by law and where practicable, improve the quality, function, and sustainable productivity and distribution of U.S. aquatic resources for increased recreational fishing opportunities. It also established the National Recreational Fisheries Coordination Council.
- EO 13186; Migratory Birds. Directs federal agencies that take actions that either directly or indirectly effect on migratory birds to develop a Memorandum of Understanding (MOU), and to work with the U.S. Fish & Wildlife Service, and other federal agencies to promote the conservation of migratory bird populations.
- Federal Insecticide, Fungicide, and Rodenticide Act; *Chapter 6 of Title 7 U.S.C., beginning with §136*. Regulates the sale and distribution of pesticides, described specifically within this act.
- Federal Land Policy and Management Act; *Chapter 35 of Title 43 U.S.C., beginning with §1701*. Allows for the use of federally owned lands for public access while simultaneously preserving natural resources tied to said lands.
- Fish and Wildlife Conservation Act; *Chapter 49 of Title 16 U.S.C., beginning with §2901*. Promotes the continued protection of non-game species by agencies, to the extent of their jurisdiction. Deals largely with development of conservation plans.
- Forest and Rangeland Renewable Resources Planning Act; *Chapter 36 of Title 16 U.S.C., beginning with §1601*. Authorizes planning and development of management plans that ensure the future supply of forest resources while maintaining a quality environment.
- Forest Management Act; *10 U.S.C. §2665*. Allows for the regulation of sale of lumber or forest products from lands leased to the Federal Government or military.

- Forest Resource Conservation and Shortage Relief Act of 1990/Domestic Allotment Act; 16 U.S.C. §620. Promotes the conservation of forest resources in conjunction with State and federal resources management plans, and other actions or decisions, affecting the use of forest resources while also promoting the use and acquisition of timber vital to the United States, particularly in the West.
- Game, Fur-Bearing Animals, and Fish Act; Subchapter I of chapter 5A of Title 16 U.S.C., beginning with §661. Directs federal agencies that have programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.
- Hunting, Fishing, and Trapping on Military Installations; Title 10 U.S.C. § 2671. Establishes that the DOD require all hunting, fishing, and trapping at an installation or facility be in accordance with the fish and game laws of the State in which it is located, require that an appropriate license for hunting, fishing, or trapping on that installation or facility be obtained, and develop, subject to safety requirements and military security, and in cooperation with the Governor (or his designee) of the State in which the installation or facility is located, procedures under which designated fish and game or conservation officials of that State may, at such time and under such conditions as may be agreed upon, have full access to that installation or facility to effect measures for the management, conservation, and harvesting of fish and game resources.
- Lacey Act; Chapter 53 of Title 16 U.S.C., beginning with §3371. Prohibits the trade, sell, or reception of illegally acquired wild life and acts in congruence with already established protection acts. Enforceable powers are consistent with suspected felony offenses.
- Magnuson-Stevens Fishery Conservation and Management Act; 16 U.S.C. §1801. Substantial Act that allows for the conservation of marine fisheries through prevention of overfishing, via development of regional councils over bodies of water.
- Marine Mammal Protection Act; Chapter 31 of Title 16 U.S.C., §1361 – §1384 and §1401-§1407. Establishes an increased need for protection and understanding in regards to Marine Mammals. Establishes regulations and enforcement protocol for the taking of marine mammals.
- Migratory Bird Treaty Act (MBTA); Subchapter II of chapter 7 of Title 16 U.S.C., beginning with §703. Makes the taking, killing, or possession of migratory birds an unlawful act, barring exceptions provided in this act. Enforceable with maximum fine and/or imprisonment.
- Migratory Bird Conservation Act; Subchapter III of chapter 7 of Title 16 U.S.C., beginning with §715. Establishes a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds.
- Migratory Bird Hunting and Conservation Stamps Act; Subchapter IV of chapter 7 of Title 16 U.S.C., beginning with §718. Clarifies the distribution, validation, requirements, and enforcement of hunting stamps used in conjunction with taking of migratory waterfowl.
- Military reservations and facilities: hunting, fishing, and trapping; 10 U.S.C. §2671. Establishes general requirements for hunting, fishing, and trapping on military installations.

- Multiple Use Sustained Yield of Forests Act; Title 16 U.S.C. §§ 528-531. Development of natural resources for the presence and establishment of resources such as range, timber, outdoor recreation, watershed protection, and wildlife and fish purposes.
- National Environmental Policy Act; *Chapter 55 of Title 42 U.S.C., beginning with § 43421*. Requires that all federal agencies prepare detailed environmental impact statements for "every recommendation or report on proposals for legislation" and other major federal actions significantly affecting the quality of the human environment.
- National Forest Management Act; *Chapter 36 of Title 16 U.S.C., beginning with §1600*. Act requires that the Secretary of Agriculture shall develop, maintain, and, as appropriate, revise land and resource management plans for units of the National Forest System, coordinated with the land and resource management planning processes of State and local governments and other federal agencies.
- National Invasive Species Act; *16 U.S.C. §4701*. Identifies the problematic introduction on non-indigenous life forms through ship ballasts, particularly in reference to lake systems.
- National Marine Sanctuaries Act; *33 U.S.C. §1431*. Regulates the transport of materials for the purpose of ocean dumping and establishes a permitting system to override said prohibited acts.
- National Wildlife Refuge System Improvement Act; *16 U.S.C. §668dd - §668cc*. Amends the National Wildlife Refuge System Administration Act of 1966, ensuring that the Refuge System is managed as a national system of related lands, waters, and interests for the protection and conservation of the Nation's wildlife resources.
- National Trails System Act; *Chapter 26 of Title 16 U.S.C., beginning with §1241*. Provides for establishment of National Recreation and National Scenic trails.
- Noxious Weeds Act; *Chapter 61 of Title 7 U.S.C., beginning with §2809*. Provides authority to inspect, seize and destroy products, and to quarantine areas, if necessary to prevent the spread of noxious weeds. Established federal program to control spread of noxious weeds.
- Recreational Hunting Safety Act; *Chapter 72 of Title 16 U.S.C., beginning with §5201*. Makes it unlawful to physical hinder a lawful hunt, enforceable via maximum fine.
- Rivers and Harbors Act of 1899; *Title 33 U.S.C. §401 and §403*. Prohibits the construction of any bridge, dam, dike or causeway over or in navigable waterways of the U.S. without Congressional approval.
- Refuge Recreation Act; *Subchapter LXVIII of chapter 1 of Title 16 U.S.C., §§ 460-460k-4*. Authorizes the Secretary of the Interior to administer refuges, hatcheries and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes.
- Sikes Act; *Subchapter I of chapter 5C of Title 16 U.S.C., beginning with §670*. Provides for cooperation by the Departments of the Interior and Defense with State agencies in planning, development and maintenance of fish and wildlife resources on military reservations throughout the United States.
- Soil and Water Conservation Act; *Chapter 40 of Title 16 U.S.C., beginning with §2001*. Requires planning and development of plans in regards to conservation of water, soil, and reliable natural resources.
- Taylor Grazing Act; *Chapter 8A of Title 43 U.S.C., beginning with §315*. Regulates the overgrazing and deterioration of public lands, in order to improve rangeland conditions.

- Wild and Scenic Rivers Act; *Chapter 28 of Title 16 U.S.C., beginning with §1274.* Establishes a National Wild and Scenic Rivers System and prescribes the methods and standards through which additional rivers may be identified and added to the system.
- Wild Bird Conservation Act; *Chapter 69 of Title 16 U.S.C., beginning with §4901.* Law prohibits the removal of wild birds for trade, particularly when due harm is caused to wild bird populations, and endeavors to improve conservation of wild bird populations.
- Wild Horses and Burros Act; *Chapter 30 of Title 16 U.S.C., beginning with §1331.* Provides for protection of wild, free-roaming horses and burros.
- Wilderness Act; *Chapter 23 of Title 16 U.S.C., beginning with §1131.* Provides for the designation, protection, and administration of “wilderness areas.”

State, Installation, and DOD Natural Resource Laws and Regulations

- Game, Inland Fisheries and Boating; *§29.1-100 through §29.1-829 Code of Virginia.* Establishes the VDGIF as the regulatory authority for fish and game in Virginia.
- Virginia Department of Game and Inland Fisheries (VDGIF) Regulations; *4 V.A.C. beginning with §15.* Establishes hunting and fishing regulations for Virginia, with the VDGIF as the regulatory authority.
- Virginia Marine Resources Commission (VMRC); *Code of Virginia beginning with §28.2-100.* Establishes the VMRC as the regulatory authority for marine fisheries in Virginia.
- Virginia Marine Resources Commission; *4 V.A.C. beginning with §20.* Establishes regulations for marine fisheries in Virginia.
- North Carolina Wildlife Resources Commission (NCWRC); *15A N.C.A.C. §10A-10K.* Establishes hunting and fishing regulations for North Carolina, with the NCWRC as the regulatory authority.
- CNRMA Instruction 11015.1; Fishing. Establishes policy and rules for regional installation fishing programs. Contents subject to change.
- CNRMA Instruction 11015.2A; Hunting and Trapping Program. Establishes regulations for hunting and trapping on regional installations. Contents subject to change.
- CNRMA Instruction 11015.3; Natural Resources Management for Fish and Wildlife, Feral Animals, Invasive Species, and Certain Pests. Establishes policy and assigns responsibility for management of fish and wildlife, feral animals, invasive species, and pest response for regional installations.
- NASO Instruction 5090.2E; Establishes procedures for cutting firewood and use of tree products on NASO.
- NASO SOP for Sea Turtles; (*Appendix F, 2015 NASO INRMP*). Establishes SOP for sea turtle stranding response and nest monitoring.
- Northwest Annex Instruction 11015.1; Establishes procedures for cutting firewood and use of tree products on NSAHR-NWA.

The regional CLEO(s) supports the Natural Resources Program (NRP) by overseeing and enforcing federal, state, and local laws and regulations pertaining to installation hunting & fishing programs, the protection of rare, threatened and endangered species (RT&E) and significant ecological communities, and in some cases assistance with the management of nuisance wildlife. Many of the federal, state, and installation laws/regulations provided in the above lists may be applicable to the duties and responsibilities of the regional CLEO(s). In accordance with DODI

5525.17, one objective of the CLEP is to clearly define areas to prevent hunting, fishing, and other outdoor recreational activities in unauthorized areas.

The SAIA requires that military installations provide for the sustainable multipurpose use of resources, to include hunting, fishing, trapping, and recreational access, as consistent with the military mission, the INRMP, and installation security and safety requirements. The Natural Resources Manager is responsible for direction and oversight of hunting and fishing programs, and multiple other natural resources programs. Current permits sold by the installations requiring enforcement include: Hunting, Trapping, Archery, Fishing, and Firewood Collection. Installations may institute General Wildlife Recreation Permits (trail use, wildlife observation, etc.) in the future, similar to other installations, which would warrant additional enforcement permit checks.

Installation hunting and fishing programs are subject to all state and installation laws and regulations as contained in the Code of Virginia, the VDGIF as referenced in the Virginia Administrative Code (V.A.C.), NCWRC regulations (for NC portions of NSAHR-NWA), CNRMA Instruction 11015.2B (subject to change), Installation INRMPs, OPNAVINST M-5090.1B, and the annual installation hunting rules and regulations (Navy 2015a, subject to change). It is important to note that all hunting, fishing, and trapping on an installation are to be in accordance with the laws of the State in which it is located, and according to Title 10 U.S.C. §2671, “Offenders who are guilty of a like offense are subject to a like punishment for an act or omission on the installation that would be punishable if committed within the jurisdiction of the state.” Game management on installations is also subject to the Game and Fish Act, the Lacey Act, the Migratory Bird Act, and the Migratory Bird Hunting and Conservation Stamps Act. Policy and procedures for the registration, transportation, and storage of private firearms for hunting (or other purposes) on the installations is provided in COMNAVREGMIDLANTINST 5820.2.

Recreational fisheries management on the four installations is also governed by several authorities including EO 12962 Recreational Fisheries, CNRMA Instruction 11015.1 (subject to change), and the 1996 DOD Addendum to the National Recreational Fisheries Resources Management Plan. For installations with access to marine fisheries (NASO and NASO-DNA), the regulatory authority is the VMRC, and installations are subject to all VMRC rules and regulations as contained in the V.A.C. and Code of Virginia. In accordance with these authorities, Navy installations must improve the quantity, function, sustainable productivity, and distribution of aquatic resources for increased recreational fishing opportunities by restoring degraded habitat, fostering conservation, and providing access to and awareness of opportunities for recreational fishing.

The primary regulatory protection for threatened and endangered species on military installations is the Federal Endangered Species Act (ESA). The Federal ESA requires all federal agencies to ensure that any action undertaken is not likely to jeopardize the continued existence of a federally listed threatened or endangered species. Section 9 of the ESA prohibits the taking of any endangered species without special exemption. The ESA is administered by the USFWS and the Commerce Department’s National Marine Fisheries Service, part of the National Oceanic and Atmospheric Administration (NOAA-NMFS). The USFWS has primary responsibility for terrestrial and freshwater organisms, while the responsibilities of NMFS are mainly marine wildlife.

The Virginia ESA grants the VDGIF regulatory authority over federally or state-listed fish or wildlife species in Virginia, and the North Carolina ESA grants the NCWRC regulatory authority over federally or state-listed fish or wildlife species in North Carolina. Therefore, coordination

with the USFWS, NOAA NMFS, VDGIF and/or NCWRC (in NSAHR-NWA) is required when actions have the potential to affect federal and state listed species. The CLEO may also serve to ensure that Navy units that are training comply with requirements of Biological Opinions (BOs) issued by the USFWS, in accordance with consultation requirements in Section 7 of the ESA. BOs are provided in installation INRMPs. Bald eagles, marine mammals, migratory birds, and other wildlife that are present or that may occur on installations are also protected through the enforcement of the Lacey Act, MBTA, Bald and Golden Eagle Act and the Marine Mammal Protection Act.

Migratory birds are a large, diverse group of birds that utilize breeding grounds in the U.S. and Canada, and overwinter in southern North America, Central and South America, the West Indies, and the Caribbean. The MBTA (16 USC §703–711) is the primary legislation in the U.S. established to conserve migratory birds. The MBTA prohibits the taking, killing, or possessing of migratory birds, their eggs, parts, and nests unless permitted by regulation. The Final Rule on Take of Migratory Birds by the Armed Forces (50 CFR Part 21) allows for the incidental take of migratory birds by DOD during military readiness activities, provided a permit authorizing such activities has been received. To address the unintentional take of migratory birds as a result of activities necessary to support the military mission, a MOU was adopted between the DOD and the USFWS, as required by EO 13186, Migratory Birds, on 31 July 2006. This MOU allows the military to obtain permits for the “unintentional take” of a migratory bird if it is in support of a military readiness operation.

Per CNRMA Instruction 11015.3, some of the regional CLEOs responsibilities are tied into nuisance wildlife and pest management, through the use of depredation trapping, pesticide application, and responding to complaints about nuisance wildlife. Applicable federal, state, and local regulations for pesticide application apply, as detailed in the installation Integrated Pest Management Plans. The current BST/CLEO is a Navy Certified Pesticide Applicator, and also has surveying and data recording responsibilities for various species. Appropriate permits must be acquired before trapping game and non-game wildlife.

Nuisance wildlife is defined in 4 V.A.C. §15-20-160, and lists those species that are considered by Virginia as nuisance species; however feral pets, Canada goose and other waterfowl are not considered nuisance wildlife by this code. The code further states that “It shall be unlawful to take, possess, transport, or sell all other wildlife species not classified as game, furbearer or nuisance, or otherwise specifically permitted by law or regulation.” To ensure compliance with this law, any nuisance wildlife removal or control activities performed by the environmental staff will be coordinated with VDGIF or NCWRC as necessary, to make certain that methods employed do not violate Virginia or North Carolina law.

3.0 INSTALLATION DESCRIPTIONS

A brief description of each of the four installations and the natural and cultural resources they contain is provided in the sections below. Additional information is contained in each installation INRMP and ICRMP (Navy 2014 a-c, Sadler & Whitehead Architects 2012). A location map containing all four installations is included in Figure 1.

3.1 NASO

NASO is approximately 5,800 acres (ac) (2,347 hectares [ha]), and is located in the Tidewater region of southeastern Virginia, also referred to as the Hampton Roads area. NASO is located within the bounds of the City of Virginia Beach near what was formerly the Village of Oceana, Virginia. NASO is bounded by the Norfolk and Southern Railroad to the north, Oceana Boulevard to the east, Harper's Road to the south, and London Bridge Road to the west. Several additional parcels lie north of the railroad tracks, east of Oceana Boulevard, and west of London Bridge Road (Midway Manor Housing parcel).

Approximately one third of the installation consists of maintained airfield and urban areas. The rest of the installation consists of maintained open areas, agricultural areas, forested areas, open water and recreational areas. Many natural resources worthy of protection exist at NASO, including wetlands, coastal resources, and wildlife/plant species of concern and their habitat.

Outdoor recreational opportunities supported at NASO including hiking, nature trails, picnicking, horseback riding, golfing, tennis, swimming, athletic field sports, skeet and trap shooting, archery, hunting, fishing, and trapping. The NRP manages the hunting and fishing programs. Both MWR and the NRP provide management oversight of facilities/programs that provide wildlife viewing/watching opportunities. Because of mission constraints, there are limited opportunities for public access to outdoor recreational programs at NALFF. The hunting program is open to active duty and retired military personnel and their dependents, current civilian employees of NALFF and their dependents, and reservists.

NASO land ownership falls mostly under concurrent jurisdiction, whereby both state and federal officers have authority to enforce regulations on the site. The commissary and Owl's Creek parcels are under propriety jurisdiction, whereby state and local law enforcement officers handle calls for service as if the land were privately owned. Appropriate state or federal law enforcement authorities are contacted and consulted when an incident occurs, per federal and state regulations.

Cultural Resources

The CRP at NASO is the responsibility of NAVFAC Mid-Atlantic (Code EV2) under the Regional Historic Preservation Officer (RHPO). There are 54 archaeological sites on NASO, all of which are protected under ARPA. Of the 54 sites, 37 are not eligible for National Register of Historic Places (NRHP) listing and are not managed by the CR Program, but remain protected under ARPA. The additional 17 have not been assessed for eligibility but are managed by the CRP.

An architectural survey and assessment was conducted at NASO in 1996 (Navy 2014a). With the exception of the Bell House, there are no historic properties at NASO eligible for listing in the NRHP. The Bell House is considered to be an important historic resource; however, the property was transferred from the Navy to the Mid-Atlantic Military Family Communities, LLC as part of a family housing project. The property is included in a 2005 Programmatic Agreement between

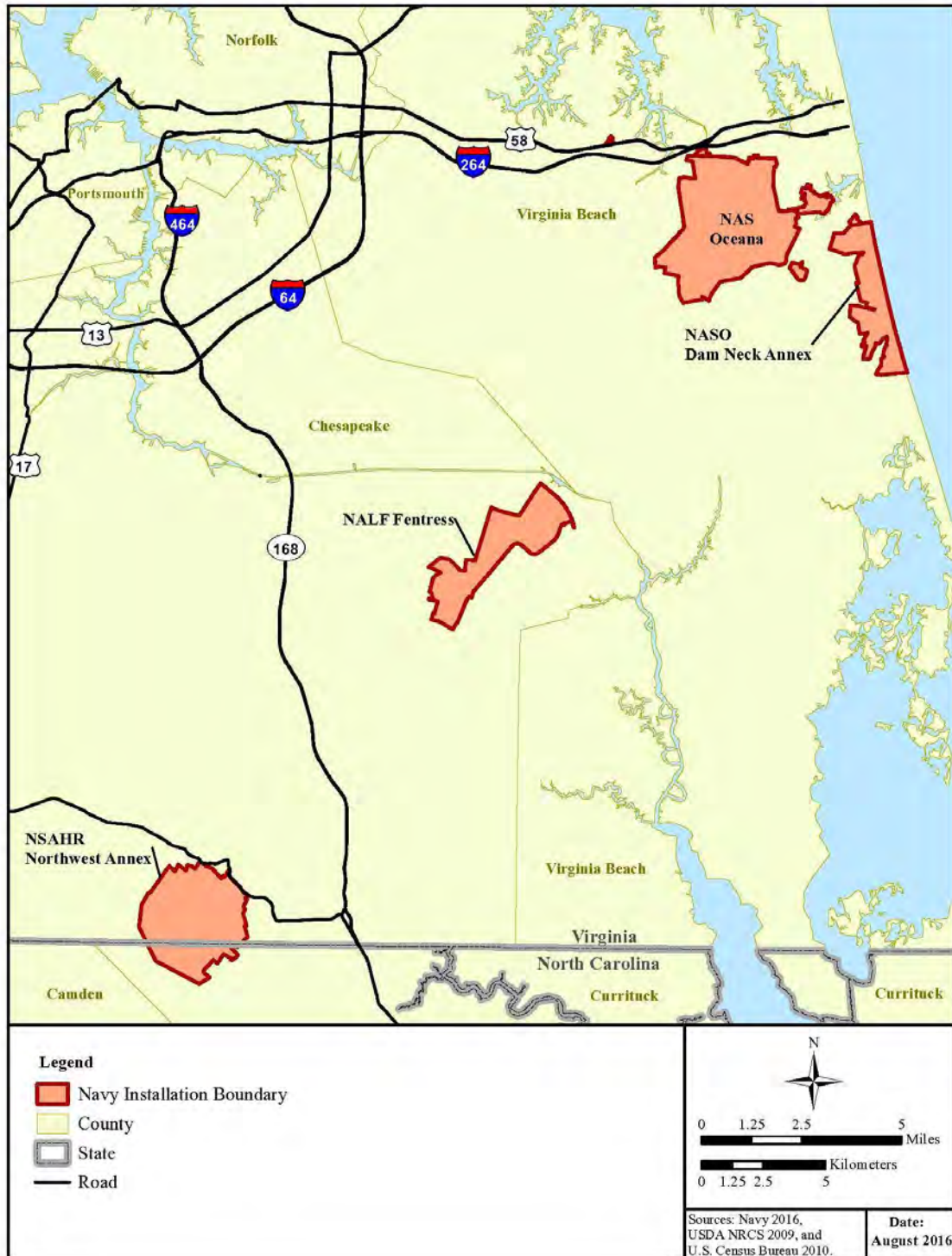


Figure 1. Location of NASO, NASO-DNA, NALFF, and NSAHR-NWA. NASO Midway Manor Parcel not included.

the Navy, SHPO, and Mid-Atlantic Military Family Communities, LLC, which establishes a process for considering effects on historic properties after conveyance.

The survey confirmed the presence of five previously identified architectural resources predating development of NASO, including the early 19th century Bell-Taylor house, an early 20th century agricultural complex, the circa 1929 Oceana High School and circa 1920s gymnasium, and the Old Bowmans Building. None of the additional pre-1940s resources are listed, or have been determined eligible for listing in the NRHP. The survey determined that World War II-era buildings located at NASO do not represent architectural, engineering, technological, or scientific examples significant for their period, style, or method of construction. Although the Cold War-era buildings evaluated during this survey were not yet 50 years old, the survey did not anticipate that any resources built from 1947–1959 would possess qualities of significance applying NRHP criteria when they reached 50 years of age (Sadler & Whitehead Architects, PLC 2012). No formal architectural survey has been conducted on the Owls Creek parcel at NASO; however all buildings on this parcel were constructed by the Navy after 1992, and are assumed to be ineligible for listing in the NRHP (Sadler & Whitehead Architects, PLC 2012).

While there is a small possibility of artifacts washing up along Owl's Creek, this would be a rare occurrence. Nevertheless, such artifacts are protected by ARPA and other regulations described in Section 2.0 of this document. Each installation should have as part of its ICRMP a monitoring program for cultural resources and should also provide coordination requirements if such artifacts are discovered. Beach combing or collection of such artifacts by the general public is prohibited.

The cultural resources information identified in Figure 2 is not reflective of all known cultural resources at NASO. To protect the integrity of archaeological sites in accordance with the guidance provided by the RHPO and as dictated by ARPA, specific cultural resources information is not shown. The figure shown does not include all of the archaeological sites on the installation and the sensitive areas are comprised of both identified cultural resources and unsurveyed areas. Because NRHP-ineligible sites are still protected under ARPA, if CLEOs encounter illicit digging in areas outside the sensitive areas on the maps there may still be an ARPA violation. The Cultural Resource Manager maintains a record of their locations in a Geographic Information Systems (GIS) format. CLEOs will coordinate directly with the installation Cultural Resources Manager to address conservation law enforcement and protection of archaeological and cultural sites. NASO was included in the 2012 regional ICRMP prepared for Naval Installations in Hampton Roads (Sadler & Whitehead Architects, 2012), and this document provides additional information and guidance on cultural resources management.

Natural Resources

Hunting and Fishing

Hunting opportunities are available at NASO through a regional deer and small game recreational hunting program shared by NASO, NASO-DNA, NALFF, and NSAHR-NWA, though the regional instruction is out of date and does not accurately reflect current SOPs. The most current information available to the public is the NAS Oceana/NASO Dam Neck Annex/NALF Fentress/NSAHR Northwest Annex Deer Hunting Rules and Regulations 2015-2016 season (Navy 2015). Various additional educational outreach brochures and materials are contained in the installation INRMP. All hunting areas/stands, parking locations, and access roads are subject to change, and hunters are required to obtain the most current maps before any hunt (available at the Natural Resources Center on Oceana Blvd., Bldg. 78). In accordance with Title 10 U.S.C. § 2671,

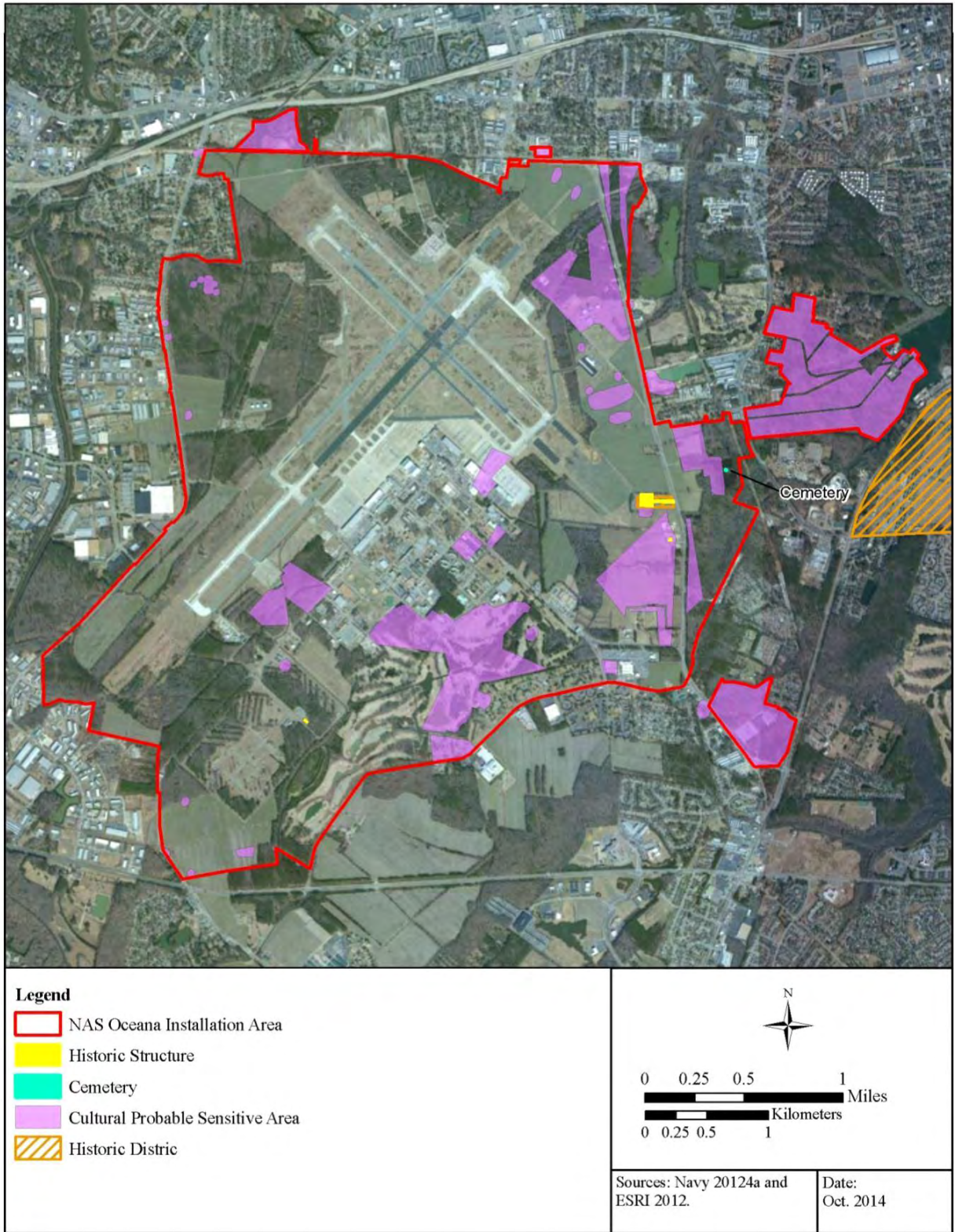


Figure 2. NASO Cultural Resources Sensitive Areas. From NASO INRMP. Not all cultural resource areas are depicted, map is subject to annual updates.

all hunting, fishing, and trapping on military installations are to comply with the federal and state laws and regulations (See Section 2.0 of this document).

At NASO, approximately 1,157 ac (469 ha) are available for muzzleloader and archery hunting, though this is subject to change (Figure 3). The provided map (Figure 3) may not reflect current hunting type designations, as changes are typically made during annual INRMP updates. Small game hunting areas, in which the use of shotguns is permitted, are also present, but not shown in Figure 2. Small game hunters may hunt during the appropriate season on most of the agricultural fields and woodlands. Game species at NASO include a variety of small mammals, furbearers, birds, and whitetail deer. Whitetail deer are the most popular game species. Other small game species that occur, but are not intensively hunted, are eastern cottontail, raccoon, Virginia opossum, red fox, gray fox, northern bobwhite, and mourning dove.

Shotguns may be used for small game hunting at NASO. Muzzleloading firearms and bow hunting are permitted. Handheld and hand drawn equipment must be used. Waterfowl hunting is prohibited due to shot size restrictions that are necessary to ensure aircraft and personnel safety, and to reduce the potential for user conflicts. Trapping is generally not pursued as a recreational activity, but is used to control populations of invasive and nuisance wildlife species. Typically one recreational trapper is authorized per installation annually. If more than one trapper request is received for a particular installation a random lottery selection is conducted to select the trapper who will trap that installation for the year.

At NASO, fishing is currently authorized at Oceana Pond only, although providing access to other ponds is under consideration. One boat ramp is currently available for non-motorized boating at Oceana Pond, and parking is permitted in the designated cul-de-sac area, and requires an additional parking permit that is issued along with the NASO fishing permit. Installation permits can be purchased at the NASO MWR ticket office. NASO fishing permits are valid at all of the regional Navy installations that participate in the fishing program. The outdoor recreational and hunting areas map for NASO is provided in Figure 3, and all areas are subject to change. The boy scout hunting area is located to the south of Archery Only area 43 on Figure 3.

The regional CLEO serves as a game warden and has the authority to apprehend and arrest all violators of federal, state, or installation fish and game laws and regulations on NASO. The presence of trained CLEOs is an important component of the hunting and fishing programs as it greatly reduces the potential for fish and game violations on the Installation. Routinely the CLEO patrols fishing and hunting areas of the installation to ensure people recreating are complying with natural resources regulations and policies. All firearm users must demonstrate weapons utilization competency by completing weapons qualifications administered by the NRP staff/CLEO, show proof of completion of a state-certified hunter safety course, attend a hunter indoctrination. In addition, all bowhunters must show proof of completion of an International Bowhunter Education Program and demonstrate competence through a qualification test with natural resources staff.

Rare, Threatened, and Endangered Species

Rare, threatened, and endangered species surveys of NASO have not identified any species that are listed under the federal ESA (Navy 2014a, Navy 2014d, Derge and Belden 2002, VDCR–DNH 1990a and VDCR–DNH 1990b). The installation supports populations of one state-listed threatened species, the upland sandpiper (*Bartramia longicauda*). Eight plants and two wildlife species that are considered rare in Virginia are known to occur at NASO.

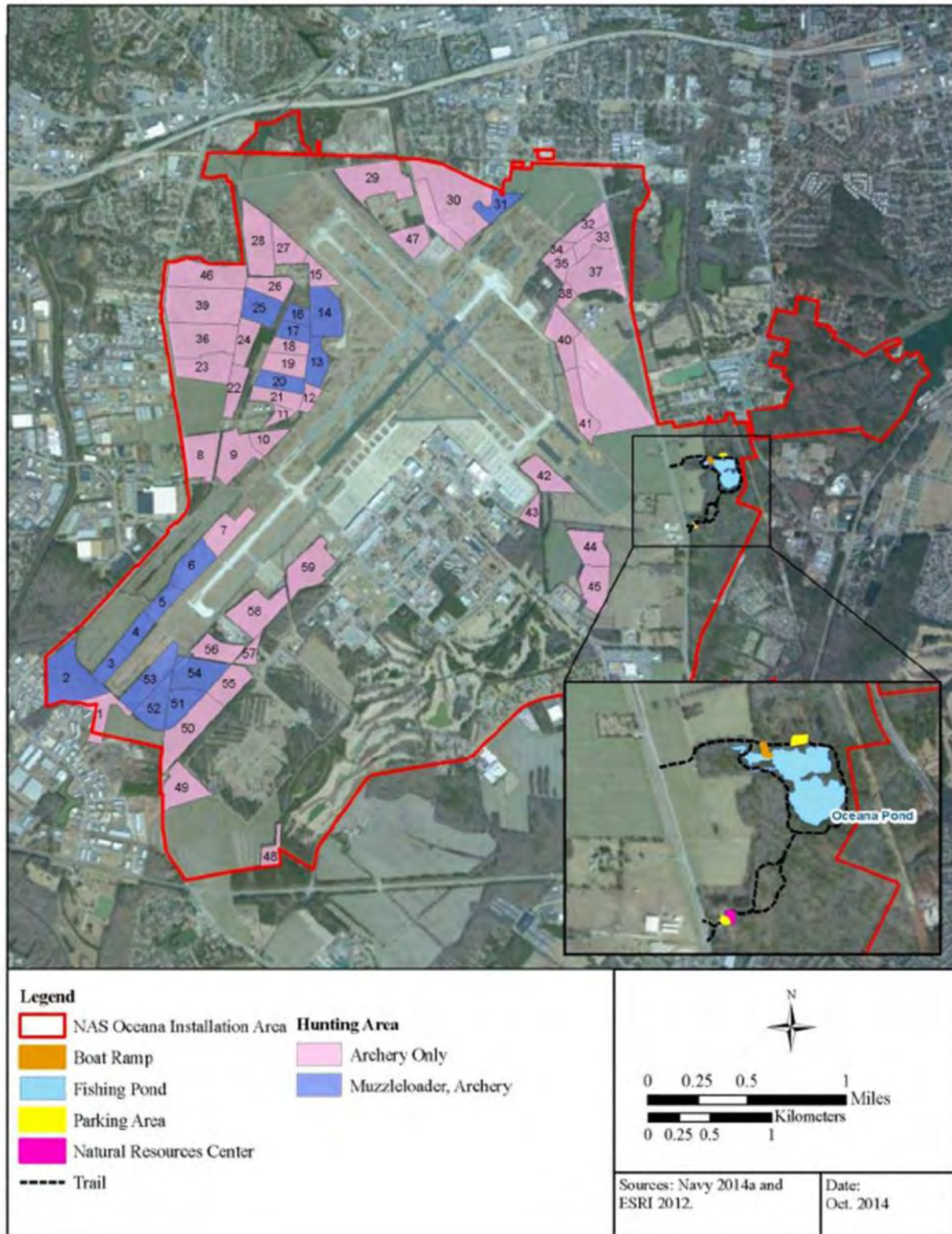


Figure 3. Outdoor Recreation Facilities and Hunting Areas of NASO. From NASO INRMP. Small game areas not depicted. Map is subject to annual updates

In addition, six bird species that are considered rare in Virginia, and four bird species that are listed as USFWS Birds of Conservation Concern (BCC) are known to occur at the installation.

There were no state or federally threatened or endangered fish species collected during stream and fish surveys in 2014. Federally endangered Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*) have the potential to occur in the nearshore environment off of NASO's Owls Creek parcel and within the Rudee Inlet area; however, this is not considered ideal habitat for these species.

Neither the federally threatened Northern long-eared bat (*Myotis septentrionalis*) nor the state endangered Rafinesque's big-eared bat (*Corynorhinus rafinesquii macrotis*) were captured in 2015 during mist net surveys; however, suitable habitat for both are located on the installation and both species have been documented west and east of the installation on other Naval installations (NALFF and NASO-DNA). Acoustic monitoring was completed in 2016 and results are pending.

Designated rare species and species of concern are granted no special legal protection. Tables listing all RT&E species that have been observed on the installation can be found in the NASO INRMP (Navy 2014a). NASO has one confirmed eagle nest recorded fall 2014, along the Owl's Creek waterway, and bald eagles have been observed flying over the airfield and golf course. Additionally, numerous birds regulated under the MBTA are present or known to occur on the installation (Avian Species List Study, Navy 2014e), and marine mammals and other protected marine species such as sea turtles may occasionally enter the nearshore environment of the installation.

Wetlands and Coastal Zone Management

NASO contains wetlands which are conserved and/or mitigated based on impact through installation activities. Results of the wetland delineations for which a preliminary jurisdictional determination has been received from USACE identified approximately 572 ac (231 ha) of wetlands at NASO. In addition to the 572 ac (231 ha) of jurisdictional wetlands identified at NASO, an additional 1,115 ac (451 ha) of National Wetlands Inventory wetlands have been mapped at NASO. Natural Resources Personnel on the Installation are trained in wetland delineation and permitting in regards to wetland conservation. Wetland maps are provided in the NASO INRMP (Navy 2014a).

As a federal installation, NASO is exempted from inclusion in the state-designated coastal zone; however management of coastal zone resources does occur across the installation. Although federal lands are excluded from state-designated coastal resources management areas, activities on federal lands that are reasonably likely to affect land or water use or natural resources of coastal zones must be consistent, to the maximum extent practicable, with the enforceable policies of the Virginia's Coastal Zone Management Program (CZMP). All installation activities are reviewed for their potential impact to coastal zone resources and their compliance with the state's enforceable policies of the CZMA. The Navy strives to avoid and minimize impacts to coastal zone resources to the extent practicable when conducting activities that have the potential to impact these resources. Management actions include monitoring non-point source pollution, marine fish and wildlife species and habitat, and wetlands. The installation has implemented numerous management practices that benefit the coastal zone and nearshore environment, including protection of stormwater quality, erosion and sediment controls, and measures to protect marine resources. These management techniques directly and indirectly benefit plant and wildlife species,

water resources, and habitat that exist in the watershed and nearshore environments of the installation.

Special Interest Areas

Special Interest Areas (SIA) that are present at NASO provide habitat for several of the RT&E species and species of special concern that occur at the Installation. As specified in the facility INRMP, with the exception of the select management actions, little active management of the SIAs at NASO is conducted, as these areas are allowed to persist naturally. However, on a case-by-case basis, active management of these may be implemented to address issues such as erosion or invasive species. The SIAs at NASO include Aeropines Mitigation SIA, Oceana Ponds SIA, Owl Creek SIA, VACAPES Restoration SIA, and Northwest Woods SIA. The SIA locations, boundaries, and descriptions are provided in the 2014 Natural Heritage Inventory Report for NASO and NALFF (Navy 2014d).

3.2 NASO-DNA

NASO-DNA is located in the southeastern portion of the City of Virginia Beach, Virginia, and encompasses approximately 1,900 ac. The installation is bounded by the community of Sandbridge to the south; the Atlantic Ocean to the east; Hampton Roads Sanitation Division, City of Virginia Beach Properties, and private properties to the west; and Virginia Army National Guard - Camp Pendleton to the north. A majority of the area immediately surrounding the installation includes industrial, commercial, residential, recreational, and agricultural land uses. However, most of the agricultural lands are rapidly being converted to residential and recreational developments.

The installation contains 1,115 ac of natural areas, 271 ac of beaches and dunes, and 444 ac of urban areas. The northern portion of NASO DNA remains largely undeveloped and is dominated by forested wetlands. The southern portion of NASO-DNA contains a large portion (approximately 386 ac) of developed and urban landscape that consists of impermeable surface, mowed lawn, shade trees, and ornamental trees and shrubs.

Recreational opportunities at NASO-DNA include camping, swimming, surfing, hunting, fishing, various sports fields and courts, wildlife viewing, and recreational trails. NR personnel are consulted on issues pertaining to natural resources management and environmental regulation. MWR provides instructions and maps for users of recreational facilities of the installation that describe accepted and prohibited uses, and identify approved recreational areas. Because of mission constraints, there are limited opportunities for public access to outdoor recreational programs at NASO-DNA. The hunting program is open to active duty and retired military personnel and their dependents, current civilian employees of NASO-DNA and their dependents, and reservists.

NASO-DNA land ownership is mostly under concurrent jurisdiction, whereby both state and federal officers have authority to enforce regulations on the site. One parcel located on the southwestern portion of the installation (Ethel Kesler property), is under propriety jurisdiction, whereby state and local law enforcement officers handle calls for service as if the land were privately owned. Appropriate state or federal law enforcement authorities are contacted and consulted when an incident occurs, per federal and state regulations.

Cultural Resources

The CRP at NASO-DNA is the responsibility of NAVFAC Mid-Atlantic (Code EV2) under the RHPO. There are 14 archaeological sites on NASO-DNA, all of which are protected under ARPA. One of those sites have been determined eligible for listing in the National Register of Historic Places, and this site is managed by the CRP. The remaining 13 sites are not eligible for NRHP listing and are not managed by the CR Program, but remain protected under ARPA.

Several cultural resources surveys were conducted at NASO-DNA during the 1980s (Navy 1983a, 1983b, 1983c, 1987a, 1987b, and 1987c). These surveys were conducted in the southern portion of NASO DNA and did not include the northern portion of the installation. In October 2008, the Navy performed an additional archaeological survey, prepared by Southeastern Archaeological Research Inc. The Virginia Department of Historic Resources, also known as the State Historic Preservation Office (SHPO), concurred with the findings of the report in a letter dated 11 December 2007. Additionally in January 2010, the southern area of the installation was surveyed and two archaeological sites were evaluated.

An archaeological survey of the northern portion of NASO-DNA found no archaeological sites and recommended no further investigation (Navy 1987d). However, formal concurrence on this finding has not been obtained from the Virginia SHPO. The most recent architectural survey, Phase I Architectural Survey of Potentially Significant Cold War Era Resources (1948–1962) at Navy Hampton Roads Bases, identified a potential historic district associated with the Surface Launched Guided Missile School. The potential historic district consists of three buildings: Buildings 586, 543 and 572. The findings of the Phase 1 Architectural Survey are currently under review by Virginia Department of Historic Resources (Sadler & Whitehead Architects, 2012). The northernmost portion of NASO-DNA, adjacent to Camp Pendleton, has not yet been surveyed for cultural resources (Personal communication, R. Hobgood, 28 April 2016).

While there is a small possibility of shipwrecks, artifacts, or archaeological resources washing ashore along the beaches at NASO-DNA (due to storm erosion or wave action), this would likely be a rare occurrence. Nevertheless, such artifacts are protected under ARPA and other regulations described in Section 2.0 of this document. Each installation should have as part of its ICRMP a monitoring program for cultural resources and should also provide coordination requirements if such artifacts are discovered. Beach combing or collection of such artifacts by the general public is prohibited.

The cultural resources information identified in Figure 4 is not reflective of all known cultural resources at NASO-DNA, and is subject to annual updates and modifications. To protect the integrity of archaeological sites in accordance with the guidance provided by the RHPO some cultural resources information is not shown. The figure shown does not include all of the archaeological sites on the installation and the sensitive areas are comprised of both identified cultural resources and unsurveyed areas. Because NRHP-ineligible sites are still protected under ARPA, if CLEOs encounter illicit digging in areas outside the sensitive areas on the maps there may still be an ARPA violation.

The Cultural Resource Manager maintains a record of culturally sensitive resource locations in a GIS format. Two cemeteries are located at NASO-DNA, and any proposed action located within or adjacent to the boundaries of a cemetery shall be coordinated with the installation facilities management division and the RHPO. CLEOs will coordinate directly with the installation Cultural Resources Manager to address conservation law enforcement and protection of archaeological and cultural sites. NASO-DNA was included in the 2012 regional ICRMP prepared for Naval



Figure 4. NASO-DNA Cultural Resources Sensitive Areas. From NASO-DNA INRMP. Not all cultural resource areas are depicted, map is subject to annual updates.

installations in Hampton Roads (Sadler & Whitehead Architects, 2012), and this document provides additional information and guidance on cultural resources management.

Natural Resources

Hunting and Fishing

Hunting opportunities are available at NASO-DNA through a regional deer and small game recreational hunting program shared by NASO, NASO-DNA, NALFF, and NSAHR-NWA, though the regional instruction is out of date and does not accurately reflect current SOPs. The most current information available to the public is the NAS Oceana/NASO Dam Neck Annex/NALF Fentress/NSAHR Northwest Annex Deer Hunting Rules and Regulations 2015-2016 season (Navy 2015). Various additional educational outreach brochures and materials are contained in the installation INRMP. All hunting areas/stands, parking locations, and access roads are subject to change, and hunters are required to obtain the most current maps before any hunt (available at the Natural Resources Center on Oceana Blvd., Bldg. 78). In accordance with Title 10 U.S.C § 2671, all hunting, fishing, and trapping on military installations are to comply with the federal and state laws and regulations (See Section 2.0 of this document).

Hunting opportunities at NASO-DNA include hunting for deer and waterfowl. Hunting is permitted in three separate areas of the Installation; the north end, which includes the wooded area north of the firing ranges; the central area of the installation, which includes South Marsh and the adjacent forested areas; and within the southern-most portion of the installation. The hunting areas map provided in Figure 5 may not reflect current hunting type designations, as changes are typically made during annual INRMP updates. Natural Resources Educational Trails are not shown. Approximately 535 ac (217 ha) are included in the hunting areas. The hunting areas are divided into approximately 60 compartments that can accommodate one to two hunters each depending on the type of hunting and size of the compartment, however, some areas have been closed. Most forested land on the installation is considered huntable land. Hunting Areas north of Dam Neck Blvd. are designated "Restricted Area Recreational Hunting." These are hunted by recreational hunters, though additional access restrictions are required compared to the "Open" Recreation Hunting Areas. The area to the north of hunting area 35 (see Figure 5) is also currently hunted, but is an escorted managed hunt area. It is being considered for being opened to unescorted recreational hunting opportunities. Authorized hunting areas change annually and sometimes seasonally. Hunting area 25 was closed to hunting in 2014. It will be reopened to hunting once approval has been obtained indicating sufficient UXO clean-up has been completed.

Popular recreational activities include saltwater fishing along the shoreline and freshwater fishing at the freshwater lakes of NASO-DNA. Saltwater shore fishing is allowed between Labor Day weekend and Memorial Day weekend at designated locations, and a beach utilization map is provided by MWR that identifies areas approved for these activities. Freshwater fishing is permitted at Sadler Pond, and fishing also is allowed in the ditches that drain the installation. Appropriate state licenses and an installation permit for freshwater fishing are required for fishing at NASO-DNA. Installation permits can be purchased at the NASO MWR ticket office.

The Regional CLEO serves as a game warden and has the authority to apprehend and arrest all violators of federal, state, or Installation game laws and regulations on NASO-DNA. The presence of a trained CLEO is an important component of the hunting and fishing programs as it greatly reduces the potential for fish and game violations on the installation. Routinely the CLEO patrols fishing and hunting areas of the installation to ensure people recreating are complying with natural

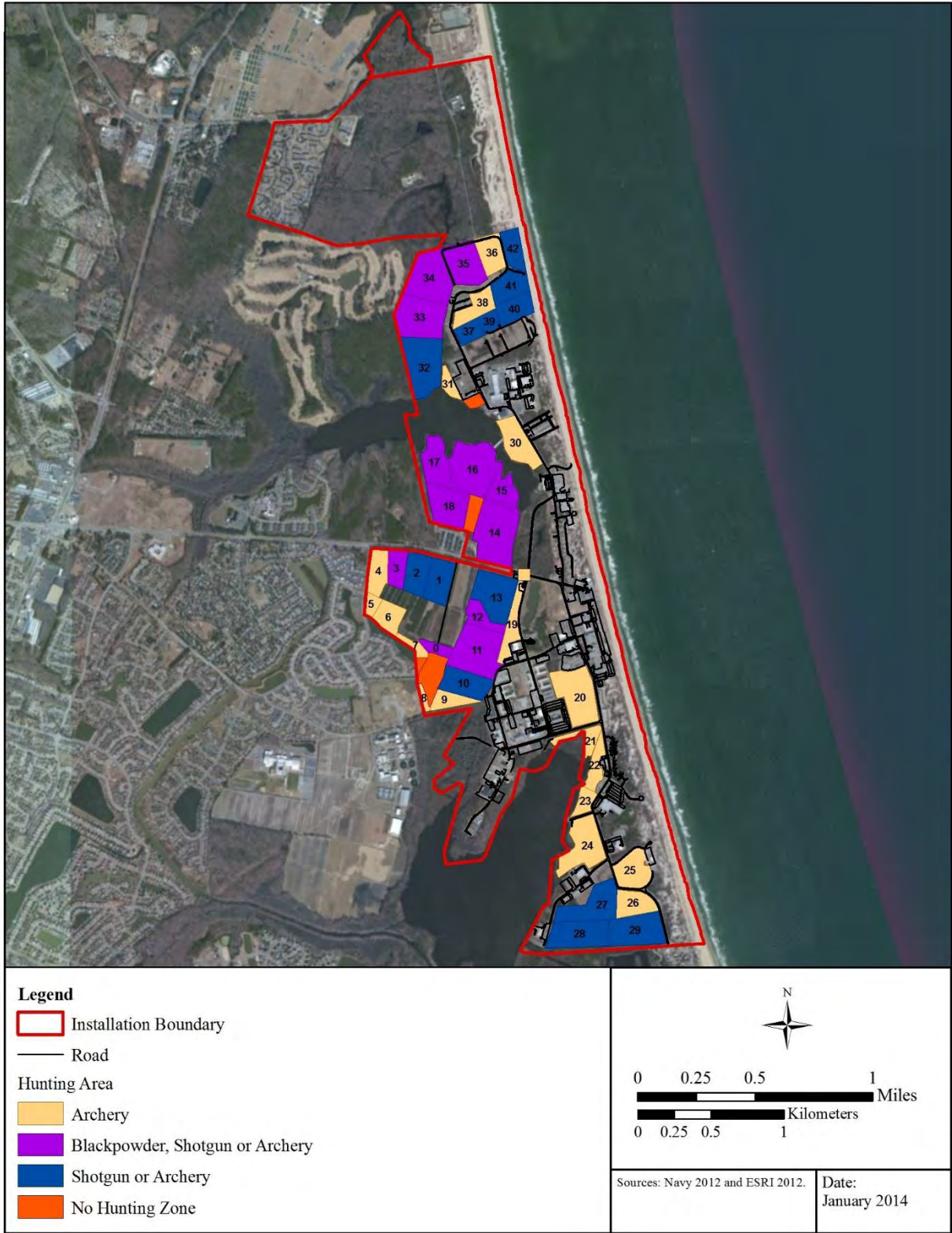


Figure 5. NASO-DNA Hunting Map. From NASO-DNA INRMP. Map is subject to annual updates, and all hunting areas subject to change.

resources regulations and policies. All firearm users must demonstrate weapons utilization competency by completing weapons qualifications administered by the NRP staff/CLEO, show proof of completion of a state-certified hunter safety course, attend a hunter indoctrination. In addition, all bowhunters must show proof of completion of an International Bowhunter Education Program and demonstrate competence through a qualification test with natural resources staff.

Rare, Threatened and Endangered Species

NASO-DNA supports 40 rare plant occurrences, and 10 rare animals, including the state-listed least bittern (*Ixobrychus exilis*), state-listed canebrake rattlesnake (*Crotalus horridus* ssp. *atricaudatus*), state-listed eastern glass lizard (*Ophisaurus ventralis*), federally listed piping plover (*Charadrius melodus*), federally-listed loggerhead sea turtle (*Caretta caretta*), and federally-listed Kemp's ridley sea turtle (*Lepidochelys kempii*). These species were identified during several inventories of rare, threatened, and endangered species conducted at NASO-DNA from 1968 through 2010 (Buhlmann et al. 1992, Corning 1968, Evans and Belden 2010, Galvez and Swihart 2000, Geo-Marine Inc. 2003, Swihart 1982, USFWS, Office of Fishery Assistance 1985 and 1988, Van Alstine et al. 2001, and VDCR-DNH 1990). RT&E species tables can be found in the NASO-DNA INRMP (Navy 2014b).

Through survey and research efforts conducted in 2015, a number of additional protected species were identified as occurring or historically occurring on the installation, including the federally threatened northern long-eared bat, state endangered Rafinesque's big-eared bat, state threatened peregrine falcon (*Falco peregrinus*), state threatened gull-billed tern (*Gelochelidon nilotica*), and species of concern Brimley's assassin bug, *Pnirontis brimlyii* (Navy 2015b, Navy 2016). Designated rare species and species of concern are granted no special legal protection. Federally listed Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) have been known to strand on the beaches of NASO-DNA (Personal communication with Michael Wright, March 2016). The installation also supports habitat that may be utilized by the federally threatened red knot (*Calidris canutus rufa*) as a winter stop-over.

Numerous birds regulated under the MBTA are present or known to occur on the installation (Navy 2015b), and marine mammals/other marine species that are protected may occasionally enter the nearshore environment of the installation. While no longer federally listed, bald eagles (*Haliaeetus leucocephalus*) have been observed on the installation, and are protected by the Bald and Golden Eagle Protection Act.

Significant and Rare Natural Communities

Several of the ecological communities that occur on NASO-DNA are considered significant, rare natural communities in Virginia. The maritime wet grasslands, maritime upland forests, maritime dune woodlands, and interdune swales that occur in the beach and dune area are rare natural communities that are severely threatened by coastal development throughout their natural range. VDCR-DNH descriptions of the ecological community groups identified at NASO DNA in surveys conducted in 1992, 2001, and 2010 (Buhlmann et al. 1992, Van Alstine et al. 2001, and Evans and Belden 2010) are provided in the NASO-DNA INRMP (Navy 2014b).

The primary dunes located at NASO-DNA are an important protected natural resource. Dune utilization activities within this unit should be consistent with the state's Coastal Zone Management Program. NR staff will review proposed projects for coastal consistency. Routinely the CLEO patrols the beaches to ensure people recreating are complying with natural resources

regulations and policies. Recreational beach users are limited to use of pedestrian walkways, which were constructed to minimize unauthorized access and erosion of the dunes. Installation residents and volunteers also are encouraged to participate in habitat conservation efforts in the beaches and dunes area. Education and outreach regarding the importance of dunes and what is or is not authorized in dune areas, coupled with increased security and CLE patrols of this area are needed to stop/minimize the unauthorized dune access contributing to the degradation and destabilization of the dunes.

Special Interest Areas (SIA) that are present at NASO-DNA provide habitat for several of the RT&E species and species of special concern that occur at the Installation. As specified in the installation INRMP, with the exception of the select management actions, little active management of the SIAs at NASO-DNA is conducted, as these areas are allowed to persist naturally. However, on a case-by-case basis, active management of these may be implemented to address issues such as erosion or invasive species. SIAs at NASO-DNA include: Lovetts Marsh SIA, Southeast Redwing Lake Wetlands SIA, Middle Beach Dunes Special Interest Area, Helicopter Pad Wetlands SIA, and Interdunal Swales, Dune, and Freshwater Marsh SIA. The SIA locations, boundaries, and descriptions are provided in the 2015 Listed Species Surveys at NASO-DNA (Navy 2015b).

Wetlands, Coastal Zone Management, and Marine Species Conservation

A large portion of the installation consists of undeveloped forested wetlands and marshes. Wetland delineations were recently completed at NASO DNA, for which preliminary jurisdictional determinations were received in 2011 and 2012. Wetland delineations identified approximately 922 ac (373 ha) of wetland habitats. Of the 922.0 ac (373.0 ha) of wetland habitat that have been mapped at NASO DNA, approximately 254.5 ac (102.9 ha) of wetlands are located at the northern portion of NASO DNA, and approximately 667.5 ac (270.1 ha) of wetlands are located at the southern portion of NASO DNA.

As a federal facility NASO-DNA is exempted from inclusion in the state-designated coastal zone; however management of coastal zone resources does occur across the installation. All Installation activities are reviewed for their potential impact to coastal zone resources and their compliance with the state's enforceable policies of the Coastal Zone Management Act (CZMA).

A large number of saltwater species also are known to occur in the coastal waters offshore of NASO-DNA. Because the area is in a transition zone between temperate and subtropical regions, fish fauna is extremely diverse, with approximately 685 species known to occur (Navy 2003). The NOAA-NMFS has designated essential fish habitat (EFH) for fish species of particular economic or ecological importance in the area. The Magnuson-Stevens Fishery Conservation and Management Act requires that EFH be identified for all fish which are federally managed.

It is not uncommon to observe marine mammals, reptiles, fishes, and birds along NASO-DNA beaches and within the Navy's defined nearshore environment. Marine mammals are protected under the Marine Mammal Protection Act, and any marine animal (e.g., mammal, bird, fish, herpetofauna) sighted on NASO-DNA beaches must be reported to NR staff, who will respond, as appropriate, to the site and report the sighting to the Virginia Aquarium and Marine Science Center and additional points of contact.

3.3 NALFF

NALFF is approximately 2,600 ac (1,052 ha), and is located in the Tidewater region of southeastern Virginia, also referred to as the Hampton Roads area. NALFF is located approximately 7 miles (mi) (11 kilometers [km]) southwest of NASO near the community of Fentress in what is now the City of Chesapeake. NALFF is generally bounded by Mount Pleasant Road to the north, Carter Road to the west, Long Ridge Road to the south, and Fentress Airfield Road to the southeast.

The installation consists of an airfield and small developed area on the North side of the installation, and the rest of NALFF is made up of large agricultural and forested areas. Vegetation in agricultural and urban areas primarily include mowed turf grasses and row crops, and support very limited natural communities. The remaining undeveloped areas, however, support a variety of vegetation communities including forests, early successional habitat, and emergent and scrub-shrub wetlands.

Recreational opportunities at NALFF primarily consist of hunting. Because of mission constraints, there are limited opportunities for public access to outdoor recreational programs at NALFF. The hunting program is open to active duty and retired military personnel and their dependents, current civilian employees of NALFF and their dependents, and reservists.

NALFF land ownership is entirely under concurrent jurisdiction, whereby both state and federal officers have authority to enforce regulations on the site. Appropriate state or federal law enforcement authorities are contacted and consulted when an incident occurs, per federal and state regulations.

Cultural Resources

The CRP at NASO is the responsibility of NAVFAC Mid-Atlantic (Code EV2) under the RHPO (Navy 2014a). There are 23 archaeological sites on NALFF, all of which are protected under ARPA. One of those sites have been determined eligible for listing in the National Register of Historic Places, while 21 have not been assessed for eligibility; these 22 sites are managed by the CRP. The remaining site is not eligible for NRHP listing and is not managed by the CR Program, but remains protected under ARPA.

An architectural survey and assessment was conducted at NALFF in 1996. The 1996 architectural survey concluded that the major buildings constructed at NALFF during the World War II- and Cold War-eras were not directly associated with nationally important identified themes, critical events, or persons with exceptional significance. The survey did not anticipate that any resources built from 1947–1959 would possess qualities of significance applying NRHP criteria when they reached 50 years of age (Sadler & Whitehead Architects, PLC 2012).

The cultural resources information identified in Figure 6 is not reflective of all known cultural resources at NASO DNA, and are subject to annual updates and modifications. Several archeological sites are located at NALFF; to protect the integrity of archaeological sites in accordance with the guidance provided by the RHPO and as dictated by ARPA, some cultural resources information is not shown. The figure shown does not include all of the archaeological sites on the installation and the sensitive areas are comprised of both identified cultural resources and unsurveyed areas. Because NRHP-ineligible sites are still protected under ARPA, if CLEOs encounter illicit digging in areas outside the sensitive areas on the maps there may still be an ARPA violation.

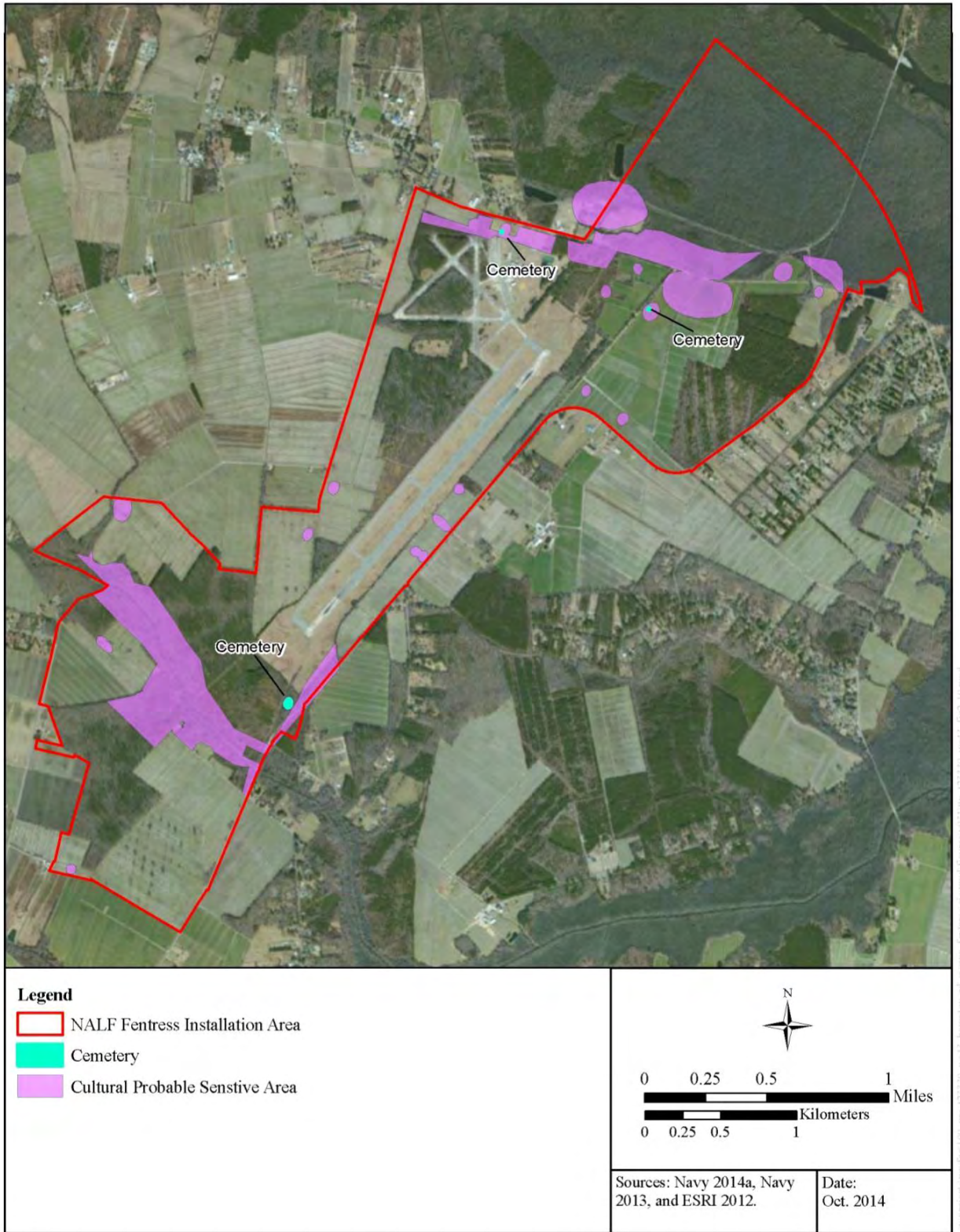


Figure 6. NALFF Cultural Resources Sensitive Areas. From NALFF INRMP. Not all cultural resource areas are depicted, map is subject to annual updates.

The Cultural Resource Manager maintains a record of cultural resource locations in a GIS format. CLEOs will coordinate directly with the installation Cultural Resources Manager to address conservation law enforcement and protection of archaeological and cultural sites.

Four cemeteries are located at NALFF, and any proposed action located within or adjacent to the boundaries of a cemetery shall be coordinated with the Installation facilities management division and the NAVFAC Mid-Atlantic RHPO. NALFF was included in the 2012 regional ICRMP prepared for Naval Installations in Hampton Roads (Sadler & Whitehead Architects, PLC 2012), and this document provides additional information and guidance on cultural resources management.

Natural Resources

Hunting opportunities are available at NASO through a regional deer and small game recreational hunting program shared by NASO, NASO-DNA, NALFF, and NSAHR-NWA, though the Regional Instruction is out of date and does not accurately reflect current SOPs. The most current information available to the public is the NAS Oceana/NASO Dam Neck Annex/NALFF Fentress/NSAHR Northwest Annex Deer Hunting Rules and Regulations 2015-2016 season (Navy 2015). Various additional educational outreach brochures and materials are contained in the Installation INRMP. All hunting areas/stands, parking locations, and access roads are subject to change, and hunters are required to obtain the most current maps before any hunt (available at the Natural Resources Center on Oceana Blvd., Bldg. 78). In accordance with Title 10 U.S.C § 2671, all hunting, fishing, and trapping on military installations are to comply with the federal and state laws and regulations (See Section 2.0 of this document).

Approximately 2,481 ac (1,004 ha) are available for hunting at NALFF (Figure 7). The hunting areas map provided in Figure 7 may not reflect current hunting type designations, as changes are typically made during annual INRMP updates. The woods between B-6 and B-3 cannot currently be hunted at NALFF due to UXO status, but once cleared hunting will likely resume in this area. Natural Resources Educational Trails are not shown. Archery areas are closed on a rotational basis during small game season. Game species at NASO and NALFF include a variety of small mammals, furbearers, birds, and whitetail deer. Whitetail deer are the most popular game species. Other small game species that occur, but are not intensively hunted, are eastern cottontail, raccoon, Virginia opossum, red fox, gray fox, northern bobwhite, and mourning dove. In support of conserving and managing the timber (canebrake) rattlesnake population on the installation, the hunting program does not authorize the take of squirrels as this prey is one of the primary diet sources of these snakes on the Installation.

Shotguns may be used for small game hunting and for deer hunting in designated areas at NALFF. Muzzleloading firearms and bow hunting are permitted. Handheld and hand drawn equipment must be used. Waterfowl hunting is prohibited due to shot size restrictions that are necessary to ensure aircraft and personnel safety, and to reduce the potential for user conflicts. Trapping is generally not pursued as a recreational activity, but is used to control populations of invasive and nuisance wildlife species. Typically one recreational trapper is authorized per installation annually. If more than one trapper request is received for a particular installation a random lottery selection is conducted to select the trapper who will trap that installation for the year.

NALFF is primarily landlocked, and the installation does not support recreational fishing. Potential fisheries exist via the natural and channelized stream courses of Pocatoy Creek, drainage ditches, and the flooded forest tracts associated with the North Landing River. Fishing is not currently

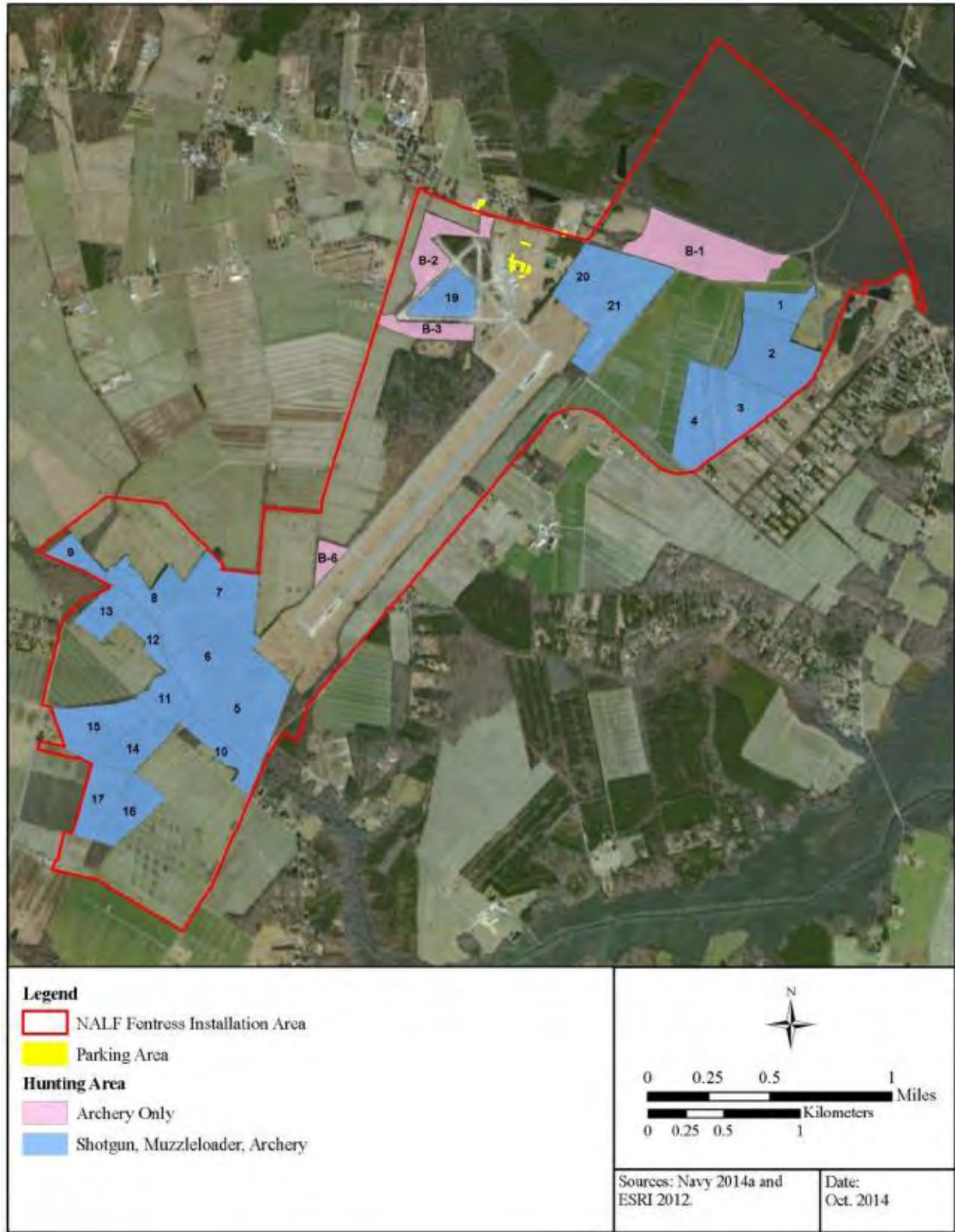


Figure 7. NALFF Hunting Map. From NALFF INRMP. Map is subject to annual updates, and all hunting areas are subject to change.

authorized in these areas, though poaching/unauthorized fishing occurs in these areas, and as such, require CLE oversight and response (Personal communication, Michael Wright, NRS, March 2016).

The Regional CLEO serves as a game warden and has the authority to apprehend and arrest all violators of federal, state, or installation game laws and regulations on NALFF. The presence of a trained CLEO is an important component of the hunting and fishing programs as it greatly reduces the potential for fish and game violations on the installation. Routinely the CLEO patrols fishing and hunting areas of the installation to ensure people recreating are complying with natural resources regulations and policies. All firearm users must demonstrate weapons utilization competency by completing weapons qualifications administered by the NRP staff/CLEO, show proof of completion of a state-certified hunter safety course, attend a hunter indoctrination. In addition, all bowhunters must show proof of completion of an International Bowhunter Education Program and demonstrate competence through a qualification test with natural resources staff.

Rare, Threatened, and Endangered Species

Past rare, threatened, and endangered species surveys of NALFF did not identify any species listed under the Federal ESA occurring on the installation (Navy 2014a, Derge and Belden 2002, VDCR–DNH 1990a and VDCR–DNH 1990b). However, the federally threatened northern long-eared bat was discovered on the installation as a result of mist-netting surveys conducted in summer 2015. One plant, silky camellia (*Stewartia malacodendron*), and two wildlife species, Tri-colored bat (*Perimyotis subflavus*) and Southeastern myotis (*Myotis austroriparus*), are considered rare in Virginia and are known to occur at NALFF. The installation supports populations of two state listed wildlife species, Rafinesque’s big-eared bat, and canebrake rattlesnake (Navy 2015b). In addition, three bird species considered rare in Virginia, and three bird species that are listed as USFWS Birds of Conservation Concern (BCC) are known to occur at the installation. Designated rare species and species of special concern are granted no special legal protection. RT&E species tables can be found in the NALFF INRMP (Navy 2014a).

Wetlands and Coastal Zone Management

Results of the wetland delineations for which a preliminary jurisdictional determination has been received from USACE identified approximately 1,126 ac (456 ha) at NALFF. Of the 1,126.1 (456 ha) of jurisdictional wetlands delineated at NALFF, a majority (94.4%) are classified as palustrine forested, approximately 3.0% were not classified in the Navy GIS dataset (uncoded), and approximately 2.6% were classified as palustrine emergent. In addition to jurisdictional wetlands, approximately 738.0 ac (298.7 ha) of National Wetlands Inventory wetlands have been mapped at NALFF.

The installation has implemented numerous management practices that benefit the coastal zone and nearshore environment, including protection of stormwater quality, erosion and sediment controls, and measures to protect marine resources. These management techniques directly and indirectly benefit plant and wildlife species, water resources, and habitat that exist in the watershed and nearshore environments of NALFF.

Special Interest Areas and Ecological Reserve Area

The SIAs that are present at NALFF provide habitat for several of the rare, threatened, and endangered fauna that occur at the installation. With the exception of the management actions described in this section, little active management of the SIAs of NASO and NALFF is conducted,

as these areas are allowed to persist naturally. However, on a case-by-case basis, active management of these may be implemented to address issues such as erosion or invasive species.

The SIAs at NALFF include the Pocatay Creek SIA, Tip-of-Runway SIA, and North Landing Swamp SIA. The designations of conservation sites and/or SIA are not legal definitions tied to specific federal or state regulations but do provide valuable information to NRMs in regards to the extent and locations of significant ecological areas. The SIA locations, boundaries, and descriptions are provided in the 2014 Natural Heritage Inventory Report for NASO and NALFF (Navy 2014d).

3.4 NSAHR-NWA

NSAHR-NWA is approximately 3,600 ac (1,457 ha) and is located along the border of Southeastern VA and Northeastern North Carolina. Three-quarters of the installation is in Chesapeake, Virginia, and one-quarter is in Currituck County, North Carolina. The area immediately surrounding NSAHR-NWA is largely undeveloped and is comprised of agricultural land and forested wetlands. In the last several years, however, residential development has expanded along the Ballahack Road corridor to the northeast of the installation. NSAHR-NWA is located within the historic boundaries of the Great Dismal Swamp, which once extended from the James River to the Albemarle Sound.

The installation consists of a few developed and urban areas (271 ac), including ROTH arrays and several training and operational facilities. The majority of NSAHR-NWA is made up of agricultural outlease parcels (750 ac), forested communities (2,345 ac; bottomland forest, loblolly pine forest, mesic mixed hardwood forests, pine-hardwood forest, and swamp forest), and early successional communities or maintained open areas (295 ac).

Recreational opportunities at NSAHR-NWA include hunting, picnicking, wildlife watching, hiking, jogging, and camping; and may include fishing in future years. The MWR Department administers picnicking and camping activities. The Installation also provides access to a 1-mile (2-km) long boardwalk through a portion of the Great Dismal Swamp that offers a self-guided educational wetlands tour. The NRP manages the hunting program. Both MWR and the NRP provide management oversight of facilities/programs that provide wildlife viewing/watching opportunities. The hunting program is available to active duty and retired military personnel and their dependents, civilian employees of the Installation and their dependents, reservist military personnel, and one sponsored guest for each of the aforementioned.

NSAHR-NWA land ownership is entirely under proprietary jurisdiction, whereby state and local law enforcement officers handle calls for service as if the land were privately owned. Appropriate state or federal law enforcement authorities are contacted and consulted when an incident occurs, per federal and state regulations.

Cultural Resources

The CRP at NSAHR-NWA is the responsibility NAVFAC Mid-Atlantic (Code EV2) under the RHPO (Navy 2014c). There are 54 archaeological sites on NSAHR-NWA, all of which are protected under ARPA. Eight of those sites have been determined eligible for listing in the National Register of Historic Places, while one has not been assessed for eligibility; these 9 sites are managed by the CRP. The remaining 45 sites are not eligible for NRHP listing and are not managed by the CR Program, but remain protected under ARPA.

A phased survey is being conducted of resources at the Installation constructed from 1948–1962 to determine if any resources are eligible for listing on the NRHP. Several areas have been identified as potential historic districts that warrant additional evaluation, although no potentially significant properties have been identified. Several resources were identified which were constructed after the study period but may be of interest for later studies, including the relocatable over-the horizon radar (ROTHR) antenna system and satellite reception, and transmission equipment related to important technological developments during the later years of the Cold War era. A report has been submitted to the Virginia SHPO for review and concurrence is pending (Sadler & Whitehead Architects 2012).

Archaeological surveys were conducted at NSAHR-NWA between the early 1980s and 2000. Several Phase I surveys were performed on proposed construction sites, and though some artifacts were found, no sites were determined to be eligible for the NRHP (Couch and Cottrell 1994, Fesler and Lucchetti 1992, and Morehead et al. 1987). Subsequent surveys determined there are seven sites at NSAHR NWA that are eligible for the NRHP and two additional sites that require Phase II surveys (Lowthert et al. 2000, McDonald et al. 1999, and Sheehan et al. 1999). No additional archaeological testing is necessary unless land disturbance is proposed in (1) areas that require additional Phase II testing, (2) areas of eligible sites, or (3) along Mill Stream (Anderson 2004). Any proposed ground-disturbing activities in previously undisturbed areas should be coordinated with the RHPO to ensure there is no potential to affect archaeological resources. An architectural survey completed in 1996 concluded no architectural resources at NSAHR-NWA are eligible for listing on the NRHP, but recommended that Installation buildings and structures be re-evaluated when they reached the 50-year criteria (R. Christopher Goodwin & Associates 1997).

The cultural resources information identified in Figure 8 is not reflective of all known cultural resources at NSAHR-NWA, and is subject to annual updates and modifications. To protect the integrity of archaeological sites in accordance with the guidance provided by the RHPO and as dictated by ARPA, some cultural resources information is not shown. The figure shown does not include all of the archaeological sites on the installation and the sensitive areas are comprised of both identified cultural resources and unsurveyed areas. Because NRHP-ineligible sites are still protected under ARPA, if CLEOs encounter illicit digging in areas outside the sensitive areas on the maps there may still be an ARPA violation.

The Cultural Resource Manager maintains a record of cultural resource locations in a GIS format. CLEOs will coordinate directly with the installation Cultural Resources Manager to address conservation law enforcement and protection of archaeological and cultural sites. Five cemeteries are located at NSAHR-NWA, and any proposed action located within or adjacent to the boundaries of a cemetery shall be coordinated with the Installation facilities management division and the NAVFAC Mid-Atlantic RHPO. NSAHR-NWA was included in the 2012 regional ICRMP prepared for Naval Installations in Hampton Roads (Sadler & Whitehead Architects 2012), and this document provides additional information and guidance on cultural resources management.

Natural Resources

Hunting opportunities are available at NSAHR-NWA through a regional deer and small game recreational hunting program shared by NASO, NASO-DNA, NALFF, and NSAHR-NWA, though the Regional Instruction is out of date and does not accurately reflect current SOPs. The most current information available to the public is the NAS Oceana/NASO Dam Neck Annex/NALF Fentress/NSAHR Northwest Annex Deer Hunting Rules and Regulations 2015-

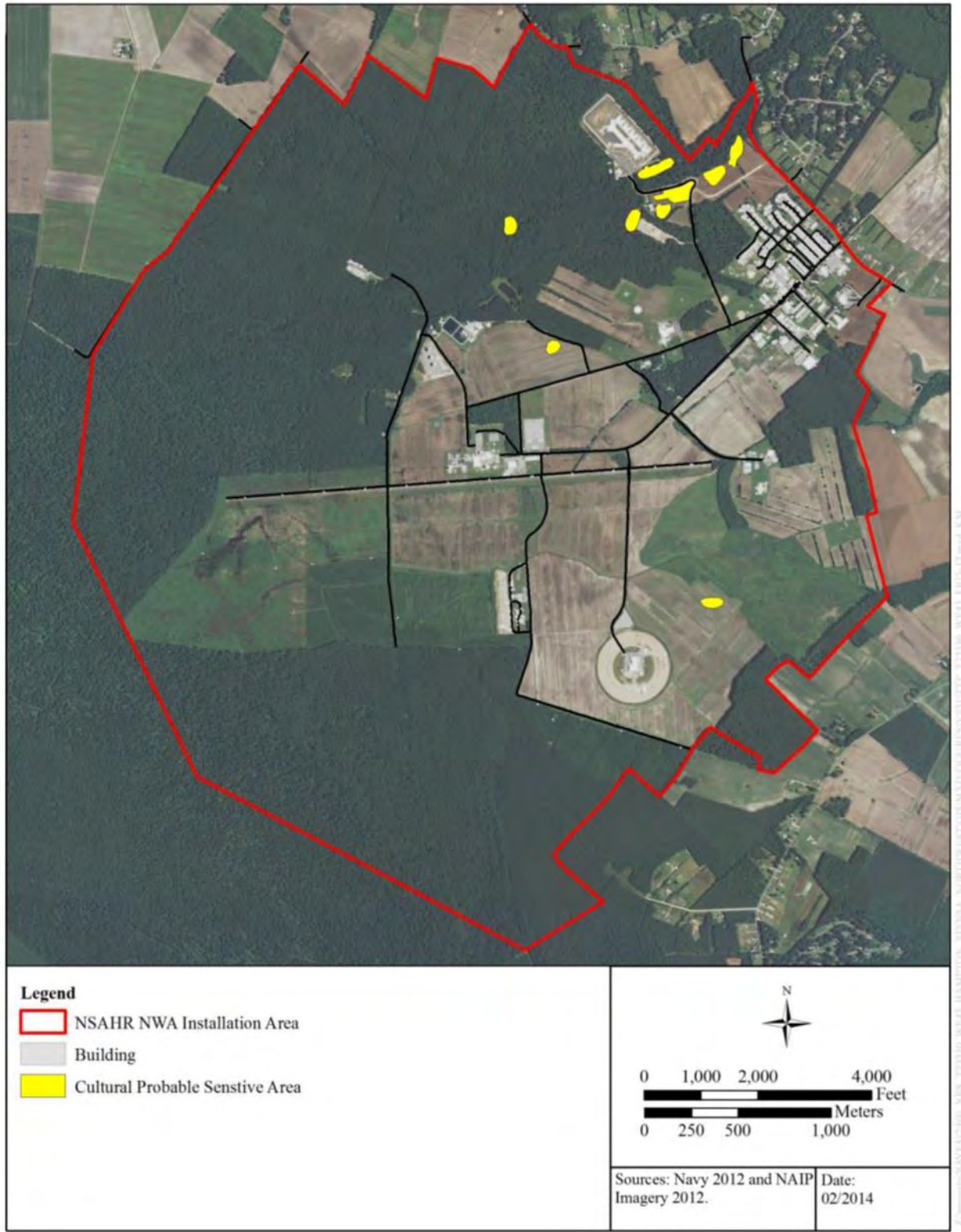


Figure 8. NSAHR-NWA Cultural Resources Sensitive Areas. From NSAHR-NWA INRMP. Not all cultural resource areas are depicted, map is subject to annual updates

2016 season (Navy 2015). Various additional educational outreach brochures and materials are contained in the Installation INRMP. All hunting areas/stands, parking locations, and access roads are subject to change, and hunters are required to obtain the most current maps before any hunt (available at the Natural Resources Center on Oceana Blvd., Bldg. 78). In accordance with Title 10 U.S.C § 2671, all hunting, fishing, and trapping on military installations are to comply with the federal and state laws and regulations (See Section 2.0 of this document).

Hunting is permitted throughout the undeveloped portions of the Installation. Deer hunting is the most popular sport, with between 350 and 500 permits sold annually for the region and daily use of NSAHR-NWA by 10–30 hunters. In support of conserving and managing the timber (canebrake) rattlesnake population on the Installation, the hunting program does not authorize the take of squirrels as this prey is one of the primary diet sources of these snakes on the installation.

The hunting areas map provided in Figure 9 may not reflect current hunting type designations, as changes are typically made during annual INRMP updates. Authorized hunting areas change annually and sometimes seasonally. Natural Resources Educational Trails are not shown. NR staff and volunteers maintain 113 permanent tree stands. Eighty-two (82) tree stands exist on the Virginia portion of the Installation and 31 are on the North Carolina portion of the Installation. In addition to these stands, bowhunters are permitted to use personal temporary tree stands. Barracks Woods and Supply Woods are designated only as bowhunting areas, whereas bowhunting, black powder, and shotgun are permitted in the remaining hunting areas. While the INRMP does not provide specific fishing details for the Installation, Lunger Lake is currently being investigated for inclusion as a recreation fishing area (Personal communication, Michael Wright, NRS, March 2016).

The Regional CLEO serves as a game warden and has the authority to apprehend and arrest all violators of federal, state, or installation game laws and regulations on NSAHR-NWA. The presence of a trained CLEO is an important component of the hunting and fishing programs as it greatly reduces the potential for fish and game violations on the Installation. Routinely the CLEO patrols fishing and hunting areas of the Installation to ensure people recreating are complying with natural resources regulations and policies. All firearm users must demonstrate weapons utilization competency by completing weapons qualifications administered by the NRP staff/CLEO, show proof of completion of a state-certified hunter safety course, attend a hunter indoctrination. In addition, all bowhunters must show proof of completion of an International Bowhunter Education Program and demonstrate competence through a qualification test with natural resources staff.

Rare, Threatened, and Endangered Species

Two rare plants and 41 wildlife species have been identified at the Installation that are considered rare, threatened, or endangered under federal or state ESAs, or global or state conservation rankings. The federally endangered northern long-eared bat is known to occur on the installation as a result of mist-netting surveys conducted in summer 2013, 2014, and 2015 (Navy 2015c). The Virginia state endangered Rafinesque's big-eared bat, the state endangered canebrake rattlesnake, and the state threatened Dismal Swamp southeastern shrew (*Sorex longirostris fisheri*) were also observed on the Installation during 2013 surveys. Two plants listed as rare (S1S2) in Virginia have been observed on the Installation (Wright 2013a and Belden 1993): highland dog-hobble (*Leucothoe fontanesiana*) and Spanish moss (*Tillandsia usneoides*). Designated rare species and species of special concern are granted no special legal protection, though their habitat is maintained and/or enhanced to the maximum extent practicable by the NRP.

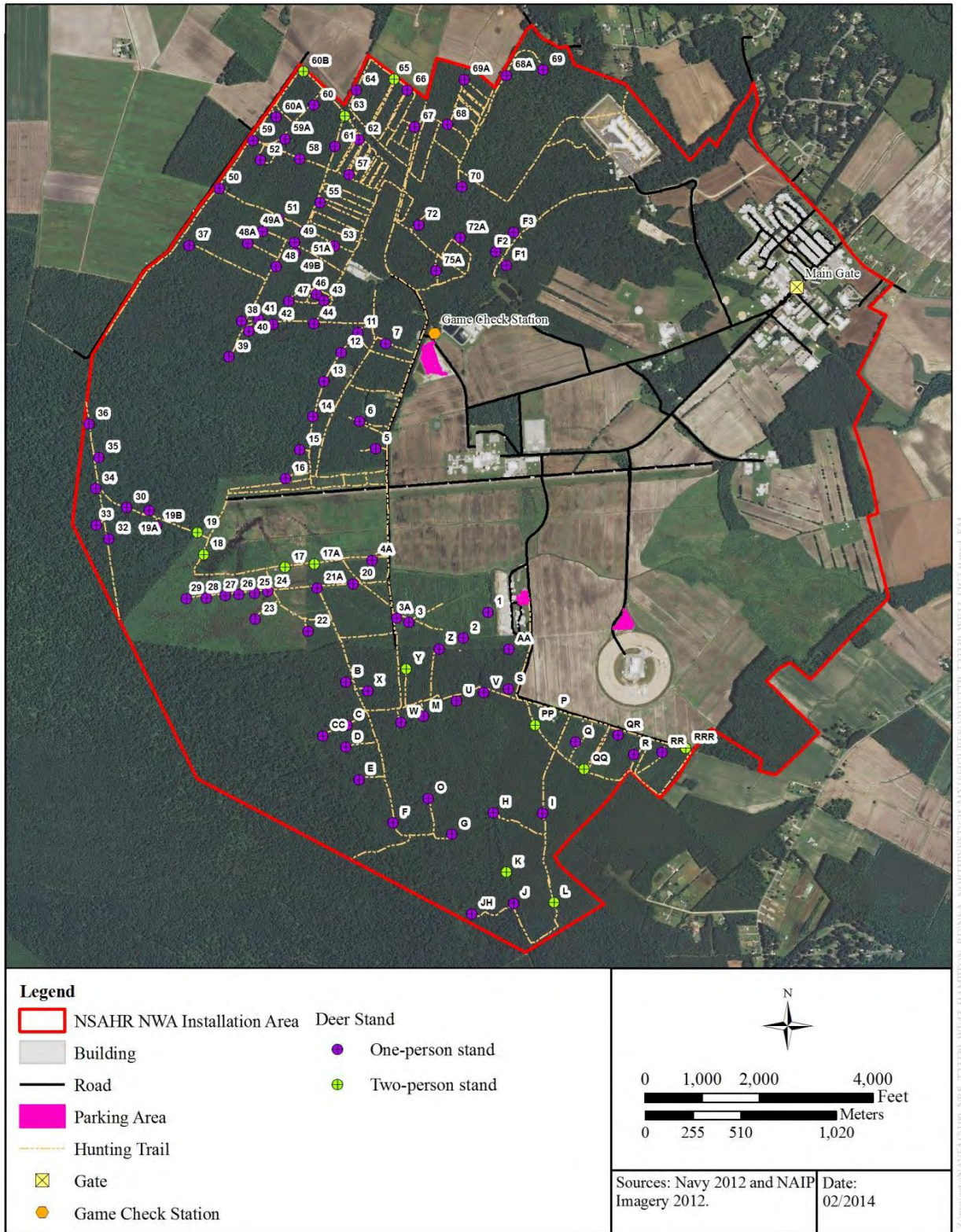


Figure 9. NSAHR-NWA Hunting Map. From NSAHR-NWA INRMP. Subject to annual updates, and all hunting areas subject to change. Lunker Lake not shown.

Observations and identification of rare species for the Installation is based on data collected during rare, threatened and endangered plant and animal surveys, and significant ecological communities surveys completed at the Installation (Rose et al. 1988, Belden 1993, Schwab 2003a, Schwab 2003b, Quillen 2013, and Watts 2013). RT&E species location maps can be found in the NSAHR-NWA INRMP (Navy 2014c). Numerous birds regulated under the MBTA are present or known to occur on the installation (Navy 2014e).

Wetlands and Coastal Zone Management

An Installation-wide wetland delineation was completed in May 2012 for NSAHR-NWA (Navy 2014c). A preliminary jurisdictional determination received from USACE in 2012 identified 2,203.98 ac (891.92 ha) of wetlands at NSAHR-NWA, of which 127.82 ac (51.73 ha) are located in North Carolina. Wetland delineations were completed pursuant to methods outlines in the 1987 Corps of Engineers Wetland Delineation Manual and The Regional Supplement to the Wetland Delineation Manual: Atlantic and Gulf Coastal Plan Region.

NSAHR-NWA must comply with the state Coastal Zone Management requirements of Virginia and/or North Carolina, where applicable. All Installation activities are reviewed for their potential impact to coastal zone resources and their compliance with the state's enforceable policies of the CZMA. The Navy strives to avoid and minimize impacts to coastal zone resources to the extent practicable when conducting activities. All development or other activities that are likely to impact land or water use or natural resources within state coastal management areas (coastal zones) require a coastal consistency determination. Federal lands, the use of which is by law subject solely to the discretion of or which is held in trust by the federal government, its officers or agents, are excluded from state coastal zone requirements. However, activities on federal lands with any reasonably foreseeable effects to state-designated coastal zone areas must be consistent to the maximum extent practicable with the state's coastal zone management program.

NR staff must review plans and proposed actions at the installation to ensure consistency with the Virginia and North Carolina coastal zone management programs and help obtain a consistency determination when required. Management actions include monitoring nonpoint source pollution, marine fish and wildlife species and habitat, and wetlands. The installation has implemented numerous management practices that benefit the coastal zone environment, including protection of stormwater quality, erosion and sediment controls, and riparian buffer restoration. These management techniques directly and indirectly benefit plant and wildlife species, water resources, and habitat that exist in the coastal zone at NSAHR-NWA.

Invasive/Feral Communities

Feral pigs that have existed in the region since early European settlement are a problem species for native habitats and wildlife. Feral pigs (or Eurasian feral hogs) were first identified on the installation in October 2012 (Navy 2014c). One pig was removed from the installation in 2012 and additional removal efforts were completed by VDGIF on their Cavalier Wildlife Management Area. In March of 2013 the NRS and VDGIF partnered to conduct a helicopter survey of the VDGIF Cavalier Property and NSAHR-NWA to identify any active sign of the pig. It appeared from the helicopter survey effort and the lack of sightings by Installation NR staff, volunteers, hunters, and military personnel in 2013 that the Rapid Response and Removal efforts by the Navy and VDGIF personnel removed the immediate threat from feral pigs at the installation. The Navy continues to coordinate with VDGIF to determine the presence of the species on the installation

and its rapid removal. The installation NRS actively participated in VDGIF's September 2013 Feral Hog Stakeholder's meeting.

Special Interest Areas

The SIAs that are present at NSAHR-NWA provide habitat for several of the rare, threatened, and endangered fauna that occur at the installation. With the exception of the management actions described in this section, little active management of the SIAs of NSAHR-NWA is conducted, as these areas are allowed to persist naturally. However, on a case-by-case basis, active management of these may be implemented to address issues such as erosion or invasive species.

The SIAs at NSAHR-NWA include the Great Dismal Swamp Natural Heritage Resource Area and the Potential Dismal Swamp Southeastern Shrew Habitat. The designations of conservation sites and/or SIA are not legal definitions tied to specific federal or state regulations but do provide valuable information to NRMs in regards to the extent and locations of significant ecological areas. The SIA locations, boundaries, and descriptions are provided in the 2015 Natural Heritage Inventory Report for NSAHR-NWA (Navy 2015c).

4.0 PROCEDURES

4.1 OBJECTIVE AND PLANS

The objectives of the CLEP in accordance with DODI 5525.17 are to:

- Conserve and direct the use of natural and cultural resources in accordance with the INRMP and ICRMP.
- Ensure installations and military and public users remain in compliance with appropriate environmental, natural, and cultural resource laws and regulations.
- Provide specialized law enforcement expertise regarding natural and cultural resource matters and protection of government property.
- Improve inter-jurisdictional conservation law enforcement among the military departments, federal, state, tribal, and local law enforcement and land management agencies, and
- Collect and track data on violations.

Each installation that is required to prepare an INRMP or ICRMP in accordance with DODI 4715.03 will incorporate within the INRMP or ICRMP the methods, techniques, and strategies that will be utilized to provide law enforcement services to the federal lands, complementing the resource management objectives of the installation.

The CLEP section will provide specific goals and objectives to ensure compliance with laws and regulations; to support the overarching goals of the INRMP and ICRMP; and to integrate with other installation security and emergency services plans. These objectives will include:

- Providing education and training to the installation populace, workforce, and general public to prevent inadvertent violation of natural resource and cultural resource laws;
- Defining areas clearly to prevent hunting, fishing, and other outdoor recreational activities in unauthorized areas.
- Reporting non-compliance with laws and regulations in accordance with military service criminal data reporting procedures.
- Encouraging coordination with the USFWS and NMFS.
- Reporting and tracking natural and cultural resources crimes and their disposition (both military and civil).

CLEPs and personnel may be co-located with the installation Conservation Program Manager. This best serves the installation commanders in implementing the INRMP and ICRMP and promoting the maximum availability of land, waters, and airspace to accomplish mission and training requirements.

Frequency of reporting criminal activity to the installation Security/Law Enforcement Office will be determined at the installation level and identified in the respective installation order or standard operating procedure (SOP). Normally, incidents will be reported to Security within 24 hours. Communication between conservation officers and the military police is paramount. The installation Law Enforcement Office shall provide continuous access to the Security first responder communication to the conservation officers. The rapport between conservation officers and military police must be fostered to ensure proper support and safety for all agencies (Base Police, Chesapeake Police, Virginia Beach Police, animal control, and the NCWRC). CLEOs will be responsible for investigating and arresting anyone suspected of violating the Federal Statutes listed in DODI 5525.17.

4.2 CLEO AUTHORITY AND POWER

Title 10 U.S.C. §2671 requires that all hunting, fishing, and trapping on an installation be in accordance with the laws of the state in which it is located. It also states that offenders are guilty of a like offense and subject to a like punishment for an act or omission on the installation that would be punishable if committed within the jurisdiction of the state. On installations under either proprietary or concurrent legislative jurisdiction, state laws may be directly enforceable under state authority. Per the Assimilative Crimes Act, 18 U.S.C §13, in areas of exclusive or concurrent federal jurisdiction, state law may be used where no federal law governs the particular conduct on involved federal lands, and where there is an applicable state law. Under the act, the state law is adopted and used to prosecute the defendant in federal court as a federal offense. Currently all four of these installations fall within proprietary or concurrent jurisdictions, though jurisdictional boundaries may be subject to change.

The Secretary of Defense may enforce all natural resources management laws, pursuant to the authority of Title 16 U.S.C. §670e-l and cultural resources management laws, pursuant to the authority of §470ff on military installations within the United States. Although Title 16 U.S.C. provides authority to enforce natural and cultural resources laws, it does not expressly grant powers to search, seize, or arrest with regard to each statute. Military and civil service law enforcement personnel may temporarily detain civilian offenders until civilian law enforcement authorities arrive. The natural and cultural resource management laws are numerous and are listed in Section 2.0 for informational purposes.

The United States District Court Violation Notice is used as the charging document to notify the magistrate court of misdemeanor offenses that occur within its jurisdiction; however, felonies committed on Navy lands are referred to the local United States Attorney's Office. Felony violations on the installation are within the investigative purview of the Navy Criminal Investigation Services (NCIS). Coordination will be conducted with both the NCIS and the USFWS before proceeding beyond the preliminary stages of a felony investigation so that appropriate coordination can be made with the responsible assigned Assistant United States Attorney. For paleological resources violations, coordination with U.S. Bureau of Land Management (BLM) is required. For marine resources violations, coordination with the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA-NMFS) is required. For cultural resources violations, coordination with the SHPO is required. Each installation should have as part of its ICRMP a monitoring program for cultural resources and also provides coordination requirements.

Title 16 U.S.C. §3375 allows the Secretaries of Interior and Commerce to use (via agreement) Navy personnel, services, and facilities to the extent necessary for enforcement of any laws relating to fish and wildlife. The agreements are accomplished at the local level under the guidance of the responsible Navy Component. Navy Component heads may enter into standard agreements with the USFWS for CLEOs to exercise authority under USFWS commission for those laws for which the USFWS is the regulating authority.

In accordance with CNRMA Instruction 11015.3, management and control of fish and wildlife, feral animals, invasive species, and certain pests within Commander, Navy Region, Mid-Atlantic Area of Responsibility is assigned to the Regional Environmental Program Manager, and may be sub-delegated to a properly trained Regional Natural Resources Program Manager, under the supervision of the Regional Environmental Group Head. Under the direction of the Regional

Natural Resource Program Manager, the installation Natural Resource Specialist (NRS) uses integrated management practices and procedures to manage fish and wildlife and control certain feral, nuisance, and invasive species. CLEOs enforce fish and wildlife and other natural and cultural resource laws and regulations under the direction of the installation NRS, in addition to conducting field inspections and approved species control methods, wildlife forensic investigations, and responding to wildlife damage complaints.

The CLEOs draw their powers, when delegated, from the installation commander's authority to protect or secure an installation in accordance with the authority in Title 50 U.S.C. §797. A CLEO may use necessary and appropriate force to apprehend suspects in accordance with DODD 5210.56 and OPNAVINST 5530.14E (Navy Physical Security and Law Enforcement Program). The primary consideration in the use of force is the timely and effective application of an objectively reasonable level of force required to establish and maintain lawful control. A paramount consideration is the preservation of life and prevention of bodily injury.

Conservation law enforcement positions are generally posted under the following job series: GS-0025 – Park Ranger Series, GS-0083 – Police Series, GS-1801 – General Inspection, Investigation, Enforcement, and Compliance Series, and GS-1811 – Criminal Investigation Series (CEMML 2015). In certain cases, CLEO duties may be included in the position description of a GS-0404 – Biological Science Technician position. As such, the billet/position description is not classified as a 100% law-enforcement position (Personal communication, M. Wright, March 2016).

The Navy has not yet officially decided whether the CLEP should reside under Environmental or Security Forces. Currently it is implied that the program should be housed under Security/Law-enforcement and officers should be co-located with the installation Conservation Managers (Personal communication, M. Wright, March 2016). According to a recent CEMML study, implementing a CLEP under Security Forces has the advantage of equipping the position more easily, though a disadvantage is that natural and cultural resources rank lower in security priority and programs might suffer a loss of focus on natural and cultural resource protection (CEMML 2015). Regardless of where the CLEP resides, ongoing and consistent collaboration between Security Forces and Environmental are necessary for an effective program.

4.3 LAW ENFORCEMENT AGREEMENTS

Per DODI 5525.17, installations may enter into appropriate agreements, when authorized by law, with local law enforcement agencies, state fish and game agencies, sheriff's offices, or other federal agencies, on a reimbursable basis for the purpose of CLEP support. Appropriate agreements are available for use on installations and ranges that require Navy CLEOs and contain complex natural and cultural resource issues such as endangered species, coastal resources, or cultural resources, such that the installation(s) require an INRMP and ICRMP. Installation-specific agreements may be developed to address complex or multi-jurisdictional issues such as border patrol, coastal zone management, and shared land use.

Three types of agreements may be used by the DOD to implement and/or support CLE. MOA are commonly used to issue a special commission to confer authority to an appropriate agency, such as the USFWS, with the purpose being to clarify and avoid confusion regarding jurisdiction and authority over many federal wildlife statutes. Because the language of the Sikes Act does not adequately define which statutes are considered "related to the management of natural resources," some interpret the phrase as referring only to statutes that address land management, while others

believe it refers to statutes addressing wildlife management (CEMML 2015). MOAs are also used to define enforcement responsibilities among agencies. For instance, a MOA may be used to confer state and federal authority from other agencies to NAVY CLEOs, or to confer DOD/Navy authority to commissioned CLEOs from other federal agencies such as the USFWS, or commissioned CLEOs from state agencies such as the VDGIF and NCWRC.

Memorandum of Understanding (MOU) typically establish a cooperative relationship (authorized by the CO) between a DOD component and an agency such as the USFWS, VDGIF, or NCWRC for a specific purpose, such as personnel providing CLEP support on DOD installations. An Interagency Agreement (IA) is used in conjunction with an appropriate MOU to facilitate the transfer of funds between agencies (for example, a DOD component and the VDGIF) in order for CLE support position(s) to be funded.

These agreements should identify the roles and responsibilities of the installation and the cooperating agency or agencies where the cooperating agency is the lead in all CLE activities. An example of an installation agreement template is provided in Appendix A (DODI 5525.17) and a copy of the 2003 Memorandum of Agreement (MOA) between the USMC and the USFWS can be found in NAVMC DIR 5090.4A (Appendix B).

5.0 TRAINING, CREDENTIALS, EQUIPMENT, AND USE OF FORCE

5.1 TRAINING AND CREDENTIALS

The SAIA (16 U.S.C. §670e-2) requires sufficient numbers of professionally trained natural resources personnel and CLE personnel to be available and assigned responsibility to perform tasks necessary to carry out Title I of the SAIA, including the preparation and implementation of INRMPs.

The Federal Law Enforcement Training Center (FLETC) provides training for CLEOs. Basic training requirements for a federally certified CLEO are identified in DODI 5525.17 and are provided through the FLETC Land Management Police Training Program (LMPT). The DOD also developed a CLEO Pilot Training Course in 2007, which tailors the BLM law enforcement managers course to meet DOD CLEP policy and guidance. Additional training opportunities include, but are not limited to, the following:

- NEC 9545 Navy Law Enforcement Specialist Phase I (Base Police Law-enforcement training);
- NEC 9545 Navy Law Enforcement Specialist Phase II (Command Specific Law-enforcement training);
- NEC 9575 Correctional Custody Specialist Ashore;
- FLETC Criminal Investigation Training Program (CITP);
- State Police Academies
- National Military Fish and Wildlife Association (NMFWA) Conservation Officer Refresher Training; and
- Weapons qualifications biannually with the Navy Security Department.

Per DODI 5525.17, the CLEO should complete at least 40 hours of annual refresher training specialized to CLE, in addition to having first completed the FLETC LMPT. Annual refresher training is also available through FLETC for CLEOs. Annual firearm familiarization training, live-fire training, and use-of-force training are required yearly per DODD 5210.56.

Seasonal hires assigned to the CLEP are not required to have completed the FLETC LMPT training, but they must be supervised by and receive on the job training specific to CLE by a full-time, fully certified, and FLETC LMPT trained CLEO. Non-law-enforcement seasonal/temporary CLEP personnel may assist conservation officers with case-specific investigations and education and awareness activities, but they may not carry out direct law enforcement duties (unless their core personnel document or position description includes law enforcement duties and they have completed LMPT at FLETC or equivalent), or carry weapons in performance of this duty (unless so authorized and provided by the ICO after individuals have received appropriate training and are qualified with the authorized weapon).

In accordance with DODI 5525.17, all full-time conservation officers must complete LMPT at the FLETC or equivalent training as required by the DOD Peace Officers Standards and Training (POST) Commission within 1 year of being hired. The DOD POST Commission, in accordance with the authority in DODI 5525.17, are responsible for certifying CLEP equivalent training standards. The USMC CLEP detailed in NAVMC DIR 5090.4A also provides a “grandfather clause,” for CLEOs who were trained, qualified, and authorized to carry firearms at their installation as of 6 Oct 2003 (before the NAVMC DIR 5090.4 or DODI 5525.17 requirements took

effect). In accordance with the NAVMC 5090.4A, these individuals should be considered fully qualified and issued credentials, however, those who have not yet completed the FLETC LMPT are highly encouraged to do so. Grandfathered CLEO must complete FLETC LMPT in order to meet position requirements to receive a promotion in the conservation officer field. While USMC requirements are not necessarily consistent with Navy CLEP requirements, the NAVMC DIR 5090.4 is a useful resource since the Navy has not yet issued formal CLEP direction.

DOD CLEO officers have highly specialized duties, and as such, require specialized training to develop the required knowledge and expertise in environmental laws and natural and cultural resource protection and use, troop training and outreach for compliance with environmental laws and regulations, and specialized investigative responsibilities beyond basic law enforcement patrol.

5.1.1 Natural and Cultural Resources Training

CLEOs must be trained to enforce natural resource laws including the Marine Mammal Protection Act, ESA, MBTA, and any other laws identified in section 2.0 as applicable to resources found on the installations described in Section 3.0. As a result of specialized knowledge and training, CLEOs should serve to ensure that Navy units that are training comply with requirements of BOs issued by USFWS, in accordance with the ESA (and as described in Section 2.0). NOAA-NMFS, U.S. BLM, and other State Agencies may also provide recommended training courses. Officers may need training for additional skills associated with equipment utilization for wildlife capture and/or removal, which may warrant training from the U.S. Department of Agriculture (USDA) or other agency/educational institution.

Installations that have cultural resources that warrant resource protection and enforcement under the ARPA (Title 16 U.S.C. § 470aa-mm) shall ensure CLEOs receive applicable training to enforce these laws. The CLEO should be familiar with provisions of the Native American Graves and Repatriation Act of 1990 and the American Antiquities Act of 1906, as amended, and other applicable State and local cultural resource protection laws (described in Section 2.0) for the identification of illegal trafficking of Native American human remains or unauthorized excavation activities, to be reported to the Installation Cultural Resource Manager for administrative action. The CLEO should be familiar with the NHPA of 1966, as amended, to identify vandalism to protected historic resources on the base, for reporting to the Cultural Resources Manager for administrative action. Installations shall determine the frequency and type of training courses for the CLEO to meet historic and archaeological resource protection requirements.

Additional suggested agency offered training courses include, but are not limited to:

- CECOS – Civil Engineer Corps Officer School (CECOS), Natural Resources Compliance, Environmental Law, Environmental Negotiation, CZMA, Cultural Resources, and other courses as applicable to the installation(s).
- Department of Interior – National Conservation Training Center, fish, wildlife and archaeological resources courses.
- USFWS National Conservation Training Center Courses.
- FLETC Courses: ARPA, NHPA Council, Introduction to Federal Projects, and Historic Preservation Law.

5.1.2 Use of Firearms and Training

Use of firearms by law enforcement personnel on DOD Installations is governed by 10 U.S.C. §1585 (Carrying of firearms), which is implemented by DODD 5210.56 (Carrying of Firearms and the Use of Force by DoD Personnel Engaged in Security, Law and Order, or Counterintelligence Activities). DODD 5210.56 states that qualified personnel shall be armed when required for assigned duties and there is reasonable expectation that DOD installations, property, or personnel lives or DOD assets will be jeopardized if personnel are not armed. DOD Components must also comply with provisions in DOD 5200.2-R (Personnel Security Program) and 18 U.S.C. §922, to ensure appropriate background investigation and screening procedures.

In accordance with DODD 5210.56, CLEOs and other law enforcement personnel who routinely engage in duties or activities where firearms proficiency is required shall satisfactorily complete DOD Component-approved training at least every 12 months, including firearms familiarization (classroom academic), live-fire qualification, and use-of-force training. In addition, DOD Components will consider periodic sustainment training for personnel to maintain firearms familiarization and proficiency. Regional CLEOs must maintain weapons qualifications biannually with the Navy Security department. Navy small arms training and qualification requirements can be found in OPNAVINST 3591.1F. Navy small arms and weapons management policy and guidance may be found in NAVSEA Instruction 8370.2D.

CLEOs and NR staff also require a letter of authorization from the Installation Commanding Officer (ICO) to carry firearms on installations in performance of official duties. In accordance with DODD 5210.56, all arming authorizations shall be in writing and signed (e.g., ink or digitally) by the appropriate authorizing official(s) before a firearm is issued to an individual. Written authorization is not required to be maintained by the individual carrying a firearm, unless determined necessary or appropriate by the issuing authority. Current individual qualification results, including authorized extensions, are to be documented and retained by the issuing authority for as long as the individual has authorization to be armed.

In accordance with DODD 5210.56, DOD personnel shall carry only Government-issued firearms and ammunition when performing official duties. The carrying of personal firearms and ammunition while on duty are prohibited from use by a CLEO. Individuals who are authorized to be armed must comply with DOD Component implementing safeguards to prevent loss, theft, and unauthorized use of firearms and ammunition. Personnel must return firearms to a designated armory or secure storage area for accountability and safekeeping upon completion of their official duties or training, in accordance with DOD Component procedures, or as specified in written authorization letters.

Per DODD 5210.56, the Heads of the DOD Components, or their designees, may authorize DOD personnel to carry and retain a Government-issued firearm off DOD property for official purposes, and shall prescribe specific guidance governing DOD jurisdiction, authority, and lawful use of force. The Heads of the DOD Components, or their designees, may authorize personnel to retain, transport, and store Government-issued firearms at Government or non-government locations for situations that warrant immediate action to protect DOD assets or person's lives.

In accordance with DODD 5210.56, personnel authorized to retain, transport, and store Government-issued firearms at Government or non-government locations must be provided a safety-lock device and instructions for its proper use. DOD Components are responsible for providing guidance and procedures to prevent loss, theft, and unauthorized carrying or use of

firearms. A CLEO must safely and securely store all firearms assigned. Government firearms that are not routinely carried should be stored at base facilities in a vault, gun locker, or other location that is secured in such a manner as to substantially reduce the possibility of theft or unauthorized removal and that meets physical security requirements.

Firearms must be returned or retrieved for DOD Component accountability and safekeeping when, at any time, the security of the firearm could be compromised. Firearms and ammunition accountability and losses must be reported in accordance with DOD 5100.76-M (Physical Security of Sensitive Conventional Arms, Ammunition, and Explosives). Immediately upon the loss or theft of any government firearm, the CLEO must verbally inform his or her immediate supervisor, the Installation Security, the Naval Criminal Investigation Service, and the pertinent local police jurisdictions. The firearm make, model number, serial number, and caliber will be provided and a memo for the record will be prepared within 48 hours.

5.1.3 Credentials

The Navy will issue an official CLEO identification card and a Federal badge of commission to new hire conservation officers who have completed FLETC LMPT. Supervisors of the qualified CLEO shall submit a request letter for badges and identification card to be issued to each qualifying CLEO at the installation. The full name, GS series, grade, date of birth, color of eyes, hair, weight, two standard passport photos 1 inch by 1 inch in size, and a copy of the FLETC LMPT certificate shall be included with the letter. The Navy shall send the badges and identification card to the installation, or present them to the CLEO during the FLETC graduation ceremony. The Navy will keep records of all personnel, badges, and identification cards issued and returned for 5 years following employment termination of the CLEO. The Navy will issue three badges to each qualified conservation officer.

The installation will also issue an identification card to the CLEO using a template provided to the installations by the Navy which is not shown in this document for security purposes. The purpose of the installation identification card is to permit conservation officers to enter restricted areas on installations that require such authorization. Although the installation identification card is written to grant authority to enforce installation regulations and applicable federal and state laws under the Uniform Code of Military Justice, 10 U.S.C. 807.(b), U.S.C. Title 16, Chapter 5C, Subchapter 1, §670e-1, and the Assimilative Crimes Act, 18 U.S.C. §13 and those pertaining to the federal laws set forth in DODI 5525.17, the CLEO shall carry the installation identification card at all times when on official duty and whenever armed. Additional credentials may be required by CLEO personnel, dependent on terms and requirements negotiated in applicable MOA or MOU. For instance, under the terms of a MOA between the USMC and the USFWS (NAVMC DIR 5090.4A), USMC CLEO are also issued a USFWS Law Enforcement Officer identification card.

Both federal and state credentials may be required by Navy CLEOs, as many state laws may only be enforced by a state commissioned officer unless a Memorandum of Agreement (MOA) is put in place to authorize enforcement of both federal and state regulations (CEMML 2015). If a CLEO is commissioned from a state agency (VDGIF, NCWRC), an MOA may need to be put in place to confer DOD/Navy/Federal authority.

Upon termination from a CLEO position, that individual will surrender all badges and identification cards to his or her supervisor who shall return the badges to the Navy within 30 days by certified mail and return receipt.

5.2 EQUIPMENT

Title 10 U.S.C. §1585 and DODD 5210.56 authorize a CLEO to carry firearms. In accordance with DODI 5525.17, no CLEO will be issued a firearm until he or she has completed FLETC LMPT (unless so authorized and provided by the commander after individuals have received appropriate training and are qualified with the authorized weapon). The NAVMC DIR 5090.4A provides additional direction regarding equipment, which has been adapted below to be relevant to the regional CLEP:

A CLEO who has completed FLETC LMPT [or other equivalent training] shall be issued vehicles, a radio; a cellular telephone; firearms; ammunition; and support equipment 24 hours a day, seven days per week, to meet routine surveillance, duty, and emergency response requirements. CLEOs are authorized to have access to and use standard Government issued equipment, firearms, and ammunition to perform duty requirements and for their safety.

For required weapons that are not standard issue with the Navy Safety Center, a letter of authorization by the ICO is required. When the installation utilizes equipment such as watercraft, all-terrain vehicles (ATV), chainsaws, radios, batons, oleoresin capsicum (OC) spray, etc., the chief CLEO or Installation Component Law Enforcement Official shall ensure applicable training, instruction, certification and recertification requirements are met for such equipment. Each installation will have a directive reflecting SOP in the proper and safe use of such equipment, to include vehicle pursuit, boat pursuit, ATV use, etc. These SOPs are coordinated and/or developed through or in coordination with the Installation Safety Office.

Table 1 provides details on equipment requirements for the CLEP (adapted from NAVMC DIR 5090.4A). Ammunition that the installation CLEP is currently using is presented in Appendix C.

5.2.1 Firearms

The Navy is authorized to procure firearms, ammunition, and equipment through the Navy Munitions Command in Crane, Indiana. The Navy complies with standards set by the Navy Safety Center, in accordance with OPNAVINST 5530.14E. The Navy Safety Center has not made all of the weapons and ammunition required for CLEP/INRMP implementation available for acquisition, as it typically focuses on non-conservation law enforcement firearm requirements. For this reason, the CLEP currently utilizes all donated weapons that have cleared background checks and have been authorized by the ICO for use on installation, and purchasing required ammunition is problematic (Personal communication, M. Wright, August 2016). The Chief CLEO or the designated Certified Firearm Instructor (CFI) for each installation is responsible for reporting expended rounds and qualification sheets to the designated office. Expenditures of ammunition shall be reported within three working days after shooting, so that accurate records of ammunition balances can be maintained.

The standard issue firearm for the CLEP shall be assigned based on regional department need and accessibility. There are currently no existing Navy guidelines for designating CLEP firearm specifications. According to a FY04/05 DOD Legacy Project to standardize the DOD Conservation Law Enforcement Program (Rogers 2004), the most common service sidearm is a 9mm. The USMC lists the preferred standard issue firearms for their CLEP in NAVMC DIR 5090.4A, which are detailed below:

Table 1. Authorized CLEP Equipment

Firearm	Model	Caliber
Safe action system. Polymer frame. Magazine capacity 15 rounds with 1 in chamber	Glock 22 Corrosive resistant/tenifer finish	0.40 cal
Shotgun - 12 guage	Semi-automatic 18 to 21 inch barrel length	00 buck or rifled slugs
Rifle - Colt M-4 carbine or M16-A2	Semi-automatic 18 to 21 inch barrel length	0.223 (5.56mm)
Safe action system, polymer frame. Small capacity secondary handgun, magazine capacity 6 rounds, with 1 in chamber	Glock 27 Corrosive resistant/tenifer finish	0.40 cal
Rifle- short action, hunting		0.308
Ammunition		
Metal jacketed or semi-jacketed expanding bullets (0.40 cal hollow points)	12 Gauge Shot, #1, #2, #6	0.177 caliber pellets
12 Gauge Bangers (shell crackers, birdfrite scare cartridges, etc.)	0.22 caliber pellets 0.22 caliber shot shell	7mm rifle cartridges 0.308 rifle cartridges
Vehicles		
4-wheel drive truck	All-terrain vehicle (ATV)	Canoe, John-boat with motor
Equipment		
Handcuffs, flex-cuffs, leg cuffs and body chains to control, restrain, and transport persons	Black nylon tactical gear with level 2 or 3 security holster and magazine pouches	Batons, belts, holsters which are required to carry and transport firearms and ammo
Storage safe unit/container with locking mechanisms	Brackets or safety rack for securing firearms inside government vehicles	Night sight, rifle sight, or optical/electronic sight
Vehicle emergency code lights	Radios, cell phones	Chemical agent Oleoresin Capsicum (OC)
field cameras; remote access lap-top computers	*various sized noose poles; various snake hooks; various sized capture nets	*various sized animal transport crates/cases/bags; various sized animal traps
bean bags, noise makers/bangers/flash-bangs, pellets, starter caps, screamers etc.		
<i>*animal trapping and capture equipment may be owned by the NR program and checked out by the CLE program, if such supplies do not exist within the CLE program.</i>		

“The standard issue sidearm (primary weapon) for a CLEO shall be a Glock model 22, which is of a composite constructed (steel alloy and or polymer frames) safe action, or semi-automatic pistol of 0.40 caliber. The semi-automatic sidearm has a magazine capacity of 15 rounds with one in the chamber; a magazine release mounted on the side of the frame; no external safety, which would require manipulation prior; and no magazine disconnect that would prevent the weapon from being fired with the magazine removed. Due to environmental conditions, the firearm is made of a high corrosive resistant tenifer finish and of a composite lower receiver. Black accessory gear required to carry and transport sidearms and ammunition, such as magazine pouch, holster and belt, are considered equipment items that will be purchased by the CLEO using funds provided by the installation.

A CLEO will have a secondary handgun available, to be issued by the Conservation Law Enforcement Office. The firearm will be a Glock 27, safe action system, polymer frame, magazine capacity six rounds with one in the chamber, 0.40 caliber.

The standard issue shotgun shall be a 12-gauge semi-automatic police type weapon with a barrel length of 18 to 21 inches, and fitted with rifle sights or optical/electronic sights. After market replacement barrels are authorized. The standard issue rifle for law enforcement purposes shall be an M-16A2 or M-4 colt type semi-automatic in 0.223 caliber (5.56 mm). For non-law enforcement application, such as depredation and predator control, use of other weapons, and other caliber ammunition is advised and authorized through the local purchase procedure and/or through the installation contract office.”

Contracts awarded for nuisance animal control or bird-aircraft strike reduction on the installation may authorize contract staff to utilize firearms. Only those weapons that are needed to meet contract objectives are to be authorized, and any weapon brought onto the installation shall meet federal, state, and installation orders/SOP requirements, as applicable. Contract personnel must meet credentials and training requirements of their employer and the Navy.

Additional weapons policies can be found in OPNAVINST 5530.14E (Navy Physical Security and Law Enforcement Program).

5.2.2 Ammunition

Only government issued ammunition is authorized by DODD 5210.56. There are currently no existing Navy guidelines for designating CLEP firearm/ammunition specifications. The USMC lists the ammunition specifications for their CLEP in NAVMC DIR 5090.4A, which are detailed below:

Only new, commercial factory, or military arsenal manufactured, center-fire rifle ammunition of full metal jacket or jacketed mushrooming or expanding design will be carried or used for law enforcement purposes. Ammunition shall be loaded with metal jacketed or semi-jacketed mushrooming or expanding bullets (hollow-points), 0.40 caliber. Ball ammunition may be used for practice, but not when firing a qualification or requalification score for record, nor may it be carried for duty purposes.

A CLEO will qualify and requalify with the same or ballistically equivalent ammunition, which they normally carry on duty. Shotgun ammunition utilized for CLEO duty purposes shall be factory manufactured 12 gauge, number 00 buck, rifled slugs, or other suitable rounds, as recommended by the training officer, and ultimately chosen by the CLEO. Less

lethal or specialty rounds needed for non-law enforcement purposes, such as wildlife damage control, are authorized to be purchased by the installation chief CLEO, or his/her designee, and stored in the same conditions as other ammunition.

To ensure that a CLEO remains proficient with his/her weapons, each officer should be provided with an appropriate number of rounds to meet all requalification requirements and to practice with each weapon carried. This ammunition should be in addition to any ammunition provided to the officer for the annual 4-hour firearms training, bi-annual requalification, and once every 3 years for the CFI, for each weapon used. It shall be the responsibility of the training officer to ensure that this ammunition is provided and fired on an annual basis.

5.2.3 Standard Issue Equipment and Uniform

In accordance with DODD 5210.56, DOD personnel will have available and use appropriate personal protective equipment commensurate with the duty or task assigned for individual safety and mission assurance. There are currently no existing Navy guidelines for designating CLEP standard issue equipment or uniform specifications. Equipment requirements will vary by installation, based on existing natural and cultural resources, available programs, and frequency of infractions. The USMC lists standard issue equipment for their CLEP in NAVMC DIR 5090.4A, provided below:

A CLEO shall be authorized to obtain at government expense, carry, and store the following equipment: handcuffs, flex-cuffs, leg cuffs, and body chains to control, restrain, and transport persons; chemical agent OC, cuff case, magazine pouch, keepers, badge wallet, pancake holster, batons, belts, and holsters required to carry and transport firearms and ammo; storage-safe unit/container with locking mechanisms; brackets or safety rack for securing firearms inside Government vehicles; night sight, rifle sight, or optical/electronic sight; and emergency code lights for vehicles. Associated firearms black gear required, such as holsters, belts, magazine cases, and cuff cases, shall be considered authorized equipment to be purchased using installation operations and maintenance program funds. When standard motor vehicles are not adequate to safely support monitoring, patrolling, and enforcement duties in remote locations, a CLEO is authorized to obtain all-terrain vehicles or watercraft through the local purchase procedure and/or through the installation contract office.

The USMC lists standard issue uniform requirements for their CLEP in NAVMC DIR 5090.4A, provided below:

The badge of commission shall be worn on the exterior of the left side of the uniform shirt. If a uniform jacket is worn, the second badge shall be worn on the exterior left side. The third badge will be concealed in a wallet or similar type leather holder for identification purposes. A patch signifying CLEO status of the local installation(s) shall be worn on the left shoulder of the shirt. The patch may be an existing one currently in use by all base CLEOs, or may be a new one prepared for the natural resource enforcement program. Patches will be designed to represent the local or regional natural resource or outdoor programs at the installation and may be different for each installation.

Shirts will be a stone color, with a collar, of a standard style for law enforcement. Shirts may be short or long sleeved and with or without pockets, depending on preference and

climate needs. Installations may select a polo shirt or tee shirt to be worn while conducting fieldwork. The field shirt will depict a badge, embroidered or ink-printed, of the installation patch on the upper left hand side. Pants will be a hunter green or dark brown color. Style of pants as to number of pockets, cuffs or no cuffs will depend on CLEO staff preference.

A separate set of field pants may be worn which are designed for field conditions and not suitable for professional work environments. Shorts may be worn if desired in warmer climates. Shorts will be dark, hunter green, or dark brown in color. A CLEO hat will be worn that has the conservation logo patch on the front. The installation personnel will choose hat style or design preference. Any other accessories will be chosen by preference of the CLEO at the installation.

The type of dress shirt, pants, field clothes, and overall uniform will be chosen by the chief CLEO with concurrence from his or her supervisor and based on preference, climate needs, and field conditions at the installation. Once the uniform style and color are selected, all CLEOs at the installation will wear it. An initial uniform issue cost allowance and an annual uniform maintenance cost allowance shall be given to each CLEO and funded by the installation.

5.3 USE OF FORCE POLICY

Use of force policy on DOD Installations is governed by DODD 5210.56 (Carrying of Firearms and the Use of Force by DoD Personnel Engaged in Security, Law and Order, or Counterintelligence Activities), and 10 U.S.C. 1585 (Carrying of Firearms). CLEOs should only use the amount of force reasonably necessary to carry out their duties, and must complete use-of-force training every 12 months.

In accordance with DODD 5210.56, employment of ‘less-lethal force’ may be used with a reasonable amount of force necessary to overcome resistance in a lawful arrest or apprehension, or to accomplish the lawful performance of duties. Less-lethal force and use of non-lethal weapons can cause severe injury or death. Individual(s) subject to less-lethal force must receive immediate medical attention. DODD 3000.3 establishes DOD policy for the development and employment of non-lethal weapons.

In accordance with DODD 5210.56, a CLEO may use deadly force only under conditions of necessity and may only be used when lesser means cannot reasonably be employed or have failed. An oral warning shall be given prior to the use of deadly force if the situation permits and does not increase the danger to the CLEO or others. There is no requirement to delay force or sequentially increase force to resolve a situation or threat. CLEOs will attempt to de-escalate applied force if the situation and circumstances permit. CLEOs will warn persons and give the opportunity to withdraw or cease threatening actions when the situation or circumstances permit.

Deadly force is justified when the officer reasonably believes that the officer or another individual is in imminent danger of death or serious bodily injury. A CLEO must use only that degree of force that is legally permissible; reasonably necessary to perform their duties; and is required to protect themselves and others. The level of force used by an officer must not be excessive or unjustified. A CLEO may not use deadly force to stop a fleeting suspect who is unarmed and who presents no immediate threat of harm to the CLEO or to another person.

Deadly force may also be directed against vicious animals, when necessary in self-defense or in defense of others.

6.0 NEEDS ASSESSMENT

This section provides information relative to a needs assessment for the CLEP on NASO, NASO-DNA, NALFF, and NSHR-NWA. This document performs a comparative assessment of the existing installation resources and CLEO duties and responsibilities to identify the needs of the CLEP and generate recommendations for development of a fully functioning CLEP.

6.1 EXISTING CONDITIONS

6.1.1 Methodology

The purpose for this needs assessment is to identify the levels of CLE needed for each of the installations. Because there is currently no formal Navy guidance for the determination of CLEP manpower, training, equipment, and policy requirements, the installation NRS and the Regional BST/CLEO were consulted to help determine CLE needs based on current program conditions. A similar assessment was recently conducted for six Front Range Air Force installations (CEMML 2015), the results of which were used to generate staffing recommendations.

Natural/cultural resources information from installation INRMPs/ICRMPs (Section 3.0) and applicable CLE relevant laws and regulations (Section 2.0) were reviewed and summarized, with an emphasis on resources that may routinely impact CLE (archaeological sites, artifacts, historic buildings, installation hunting/fishing programs, species of special concern, special interest areas, nuisance wildlife, wetlands, coastal zone requirements, etc.)

This document assesses current CLEP conditions, identifies needs, and considers multiple factors in order to provide recommendations for development of a more fully functioning CLEP. Factors assessed include: manpower and safety; training and equipment; installation CLE demands; and installation size/location/response time. These factors, once considered, are the basis for staffing, training, and equipment recommendations.

6.1.2 Manpower and Safety

One Biological Science Technician (BST), whose position description also includes CLEO duties, is currently responsible for providing CLE for the NAVFAC Hampton Roads IPT. The BST/CLEO services a total of 11 installations in Southeast Virginia and Northeast North Carolina. The regional BST/CLEO has arrest authority at these installations associated with the enforcement of federal, state, and installation natural and cultural resources laws and regulations, as defined in Section 2.0. The BST/CLEO is currently the only CLEP employee at these facilities, and as such, is on-call 24 hours a day, 7 days a week, and accumulates a great deal of overtime (Personal communication, M. Wright, 3 March 2016). The current CLEP has a total of 2,503 work-hours per year dedicated to law enforcement, according to installation INRMP annual metrics.

Per CNRMA Instruction 11015.4, under the direction of the NRS the BST/CLEO enforces fish and wildlife and other natural resources laws and regulations (as described in Section 2.0). The BST/CLEO may conduct field inspections and employ approved control methods for certain species. Control measures include, but are not limited to, live trapping, relocation, and lethal methods. CLEOs also perform wildlife forensic investigations and respond to wildlife damage complaints. NR personnel (including the current BST/CLEO) manage fish and wildlife and control certain feral, nuisance, and invasive species. Per NASOCEANAINST 3750.2 (series), NR personnel (including the current BST/CLEO) develop and execute depredation and dispersal

procedures for Bird Animal/Aircraft Strike Hazard (BASH) purposes, and personally supervise these actions when lethal methods are required.

Although the regional BST/CLEO enforces natural and cultural resources laws, the bulk of his duties are tied into traditional game warden tasks and feral/nuisance/invasive species control. He also conducts emergency wildlife response, nuisance wildlife response, and assists with surveys, maintenance, and implementation of various NRPs. Because there is only one BST/CLEO available for all four installations, except in the case of emergency, response to calls and reported violations is on a “first-come, first served” basis (Personal communication, M. Wright, 3 March 2016).

While on duty, for health and safety reasons the BST/CLEO is required to be accompanied by another NR employee or Security Officer for any anticipated weapons discharge (Personal communication, M. Wright, 3 March 2016). The BST/CLEO may request support if needed from Base Security, though this support is not necessarily timely (due to remote access and availability of personnel and equipment), nor have the Security Officers received specialized training, on-the-job training, or equipment for CLE (described in Section 2.0) to meet the requirements of DODI 5525.17. Installation Security Officers sometimes are the first responders to emergency wildlife complaints and service requests during “after-hours” until support arrives from the NRS, the BST/CLEO, and/or pest management personnel as appropriate.

The use of state and federal conservation officers or an interagency MOU (as recommended by DODI 5525.17) for CLEP support may be pursued in the future, but dedicated support would be needed to provide sufficient assistance on military installations. There are three state/federal conservation officers that work in Southeast Virginia and are available for CLEP assistance on military installations. However, the personnel may be too widely distributed to be effective in timely responses (Personal communication, M. Wright, March 3 2016).

6.1.3 Training and Equipment

A regional CLEO is required to be trained in CLE and state and federal wildlife regulations, and attend annual CLE NASO and NALFF Integrated Natural Resources refresher training to remain current on changes in regulations and enforcement policies (see Section 5.0). The current BST/CLEO has completed specialized training, including: EC 9545 Navy Law Enforcement Specialist Phase I (Base Police Law-enforcement training), NEC 9545 Navy Law Enforcement Specialist Phase II (Command Specific Law Enforcement Training), NEC 9575 Correctional Custody Specialist Ashore, MBTA training for DOD, a variety of CECOS and ECATTS environmental courses, and the NMFWA Conservation Officer Refresher Training (when offered and travel approved), and qualifies on his weapons biannually with the Navy Security department. Annual use-of-force training is also required per DODD 5210.56.

Per DODI 5525.17, all conservation officers (regardless of previous law enforcement training) must successfully complete LMPT at the FLETC or equivalent natural resource training as required by the DoD POST Commission within 1 year of being hired. However, the current BST/CLEO was hired before DODI 5525.17 was signed into effect, and while he has not completed FLETC LMPT training, he has been working in law-enforcement for 16 years (between military police and the Natural Resource CLEP), 13 of which have been as a BST/CLEO for the installations.

The current CLEO has not yet had an opportunity to participate in cultural resources specific training, though is planning to attend such training when available (Personal Communication M. Wright, March 2016).

While the Navy procures firearms and ammunition from the Navy Safety Center, currently weapons and ammunition used in the CLEP are not authorized by the Navy Safety Center. The result has been a shortage of ammunition available for the CLEO program. The military armory is not available for CLEO program support. The current CLEP utilizes donated weapons that have cleared background checks and obtained ICO approval for use on installation. (Personal communication, M. Wright, 3 March, 2016). Per CNRMA instruction 11015.3, Installation Security Officers assist NR personnel in obtaining required weapons qualifications. The establishment of procedures for procurement of firearms and ammunition to fulfill CLE duties has been identified as a need for the CLEP.

6.1.4 Conservation Law Enforcement Demand

Existing installation natural and cultural resources described in Section 3.0 identify the need for a fully functioning CLEP to adequately protect such resources, and to support implementation and regulation of applicable programs (hunting and fishing, outdoor recreation, etc). The installations all have a need for CLE, based on deterrence and detection. For instance, installations with higher levels of recreational use can have negative impacts on resources, thus conservation education and constant monitoring of recreational use is necessary to ensure permanent damage to natural and cultural resources does not occur at installations with higher demand.

During interviews conducted via email, the current BST/CLEO provided an observational estimate of demand for standard patrol per installation, based on his 13 years of experience performing CLE on the installations (L. McGrogan, April 25, 2016). For NASO and NASO-DNA, the estimated minimum time commitment for standard patrol is 2 days, or 16 hours per week, for each installation. For NALFF the estimated minimum time commitment for standard patrol is 2.5 days, or 20 hours per week. For NSAHR-NWA, the estimated minimum time commitment for standard patrol time is 3.5 days, or 28 hours per week, due to high user demand on the hunting program. These estimates assume a standard 8-9 hour work day.

Additional responsibilities that require a considerable amount of CLEO time and effort include, but are not limited to, administrative duties (estimated at around 10 to 30 hours per week), Annual training (40 hours annually per CLEO), maintenance training and qualification renewal (20 hours annually per CLEO), ticket/summons processing (depends, but approximately 30-40 hours a year), nuisance animal control (16 hours per week, with two officers/NRP personnel required), and after hours/weekend calls (approximately 2-4 hours per week).

With these estimated time commitments in mind, the CLEO predicts the need for a minimum of three full-time officers, with an optimum of 5-6 officers, to adequately and safely perform at a professional level.

6.1.5 Installation Size, Location, and Response Time

While NASO, NASO-DNA, and NALFF contain a relatively small acreage (5,800 ac, 1,900 ac, and 2,600 ac, respectively), because they are located in a densely populated urban area, this increases the likelihood of violations such as trespassing and poaching on these installations. NSAHR-NWA (3,600 ac) is located in a more rural area, but it does not have contiguous perimeter

fencing to prevent trespassing, and poaching is still an issue at this installation. (Personal communication, M. Wright, 3 March 2016).

The distance between installations and increased response time for the BST/CLEO due to travel between facilities should be considered to develop minimum staffing requirements. The current BST/CLEO is based out of NASO, which is approximately 14 miles driving distance from NALFF (approximately 30 minutes driving time), approximately 33 miles from NSAHR-NWA (approximately 45-60 minutes driving time), and approximately 8 miles from NASO-DNA (approximately 15-20 minutes driving time). Local traffic patterns and delays have the potential to add a great deal of variability in travel time between facilities, with the potential to increase BST/CLEO response time to reported violations.

6.2 RECOMMENDATIONS

From the summary of existing conditions above, needs for the current CLEP were identified and recommendations to address these needs are provided below:

Based on the information contained in section 3.0 and section 6.1 of this document, it was determined that the current CLEP is understaffed. Because only one BST/CLEO is available for the four target Installations, a health and safety risk exists for the current officer when back-up is not available from Installation Security or NR Personnel. Increased staffing/manpower is recommended for the CLEP at these installations. Ideally, a two-man team is recommended to be on duty at all times in order to ensure adequate back-up and increased safety for all CLEP personnel. To ensure an adequate staffing rotation, this would require a minimum of three available CLEP personnel (at least two of which being full time and fully certified), such that two officers would be on duty or on call at all times, with a rotational schedule allowing for one officer to be off-duty (for scheduled time off, sick leave, etc.). This also promotes a healthy work-life balance for CLEP personnel.

A recent CLEP vulnerability study/needs assessment conducted by Colorado State University Center for Environmental Management of Military Lands (CSU CEMML) for six Air Force installations in Colorado and Wyoming concluded that those installations containing significant natural resources such as wetlands, species of special concern, natural areas, cultural resources, and recreational opportunities should be provided with the placement of a CLEO (CEMML 2015).

One of the installations assessed in CEMML's study, F.E. Warren Air Force Base, contains 5,866 ac, and is similar to NASO in size and available natural resources. CEMML concluded that F.E. Warren should receive a dedicated CLEO based on presence of significant natural and cultural resources. Other assessed installations (Buckley Air Force Base, Cheyenne Mountain Air Force Station, Peterson Air Force Base, and Schriever Air Force Base) containing a combination of fewer natural/cultural resources and less recreational access were determined to not require a dedicated CLEO, and instead it was recommended that they receive support on an as-needed basis from the placement of full-time CLEOs at F.E. Warren and at the U.S. Air Force Academy. It was also recommended that the Air Force implement a job-sharing situation with environmental programs or cooperating agencies.

Taking CEMML's method for assessing manpower need into consideration, the recommendation for placement of at least two dedicated full-time CLEO to be shared between the four installations assessed in this document is reasonable, with the additional option of a cooperative agreement with the USFWS, VDGIF, and/or NCWRC to meet staffing needs or provide additional support. Ideally,

Navy CLEO personnel would be hired under the GS-1801 or GS-1811 series, as the position descriptions are best suited for CLEO responsibilities (Personal Communication, Michael Wright, March 2016). According to CEMML's study, the hiring of full-time CLEO officers is preferred, as part-time employment of a CLEO is not as conducive to a career-focused professional program and retention becomes problematic if a trained CLEO can find full-time employment elsewhere (CEMML 2015).

The use of seasonal law-enforcement employees (military conservation agents, security forces, master-at-arms, component civilian police, or other law enforcement personnel) to augment the CLEP during times of increased demand (such as during the hunting season) would be another option to help meet staffing recommendations. However, per DODI 5525.17, personnel temporarily or seasonally assigned to CLEPs are not required to complete FLETC LMPT but should be supervised by a fully certified conservation officer and receive on-the-job training specific to conservation law enforcement, and are not to be used to fulfill the full-time CLEO requirement.

It is important to note that, per DODI 5525.17, non-law-enforcement personnel (including General Services 400 series civilians and active duty personnel) may assist conservation officers with case-specific investigations and education and awareness activities, but are not permitted to perform direct law enforcement duties (unless their core personnel document or position description includes law enforcement duties and they have completed LMPT at FLETC) nor are they permitted to carry weapons (unless so authorized and provided by the commander after having received appropriate training and qualification with the authorized weapon).

Clarification regarding requirements for a conservation officer to be considered "fully certified" has been identified as a need for the CLEP. Because the current BST/CLEO has been a CLEP employee prior to DODI 5525.17 being signed into effect, he was not required to receive the FLETC LMPT, and therefore does not currently meet requirements to be considered a designated CLEO. However, he has received additional highly specialized training in natural resources management and CLE, and has served as the BST/CLEO on these installations for 13 years. A grandfather clause is currently in place for the USMC CLEP, which allows for CLEOs hired before DODI 5525.17 and NAVMC DIR 5090.4A to be issued and maintain CLEO credentials. It is recommended that the Navy adopt a similar clause for their CLEP.

This also highlights a need for identification in regards to what trainings qualify as equivalent to the FLETC LMPT, when funding and availability do not allow for completion. This may impact whether an officer may be considered a "fully certified" CLEO to meet the full-time requirements of DODI 5525.17. Per DODI 5525.17, equivalent basic natural resources management training must meet the standards of the natural resources management program of instruction of FLETC LMPT. The DOD POST Commission, in accordance with the authority in DODI 5525.17, are responsible for certifying CLEP equivalent training standards.

Additional cultural resources training has been determined a need for the CLEP based on feedback from the installation NRS. It is recommended that all CLEOs receive cultural resources specific training in order to enforce applicable cultural resources laws and regulations identified in Section 2.0 of this document.

A cooperative agreement with additional federal or state agencies has been identified as an additional resource with which to supplement the CLEP, and is recommended to increase CLEP effectiveness, jurisdictional authority, and manpower requirements. Installations under proprietary

or concurrent jurisdiction may require an MOA in place to authorize enforcement of both federal and state regulations. An MOU could provide increased manpower support and increase jurisdictional authority using outside agency personnel. For instance, an MOA with the VDGIF and NCWRC could provide state authority to full-time NAVY CLEOs, or alternatively, provide state commissioned CLEOs with DOD/Navy law enforcement authority.

Because the Navy has not yet provided a formal instruction or regional CLEP that identifies CLEO training requirements and specific CLEP obligations, the development of such a document is recommended in order to define and clarify the roles and responsibilities for CLE at regional installations, and for incorporation into INRMPs/ICRMPs as directed by DODI 5525.17. This needs assessment provides necessary background information and framework helpful towards the development of a regional instruction.

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APPENDIX A

(DODI 5525.17)



Department of Defense

INSTRUCTION

NUMBER 5525.17

October 17, 2013

USD(P&R)

SUBJECT: Conservation Law Enforcement Program (CLEP)

References: See Enclosure 1

1. PURPOSE. This instruction:

a. Establishes policy, assigns responsibilities, and provides direction for the CLEP in accordance with the authority in DoD Directive (DoDD) 5124.02 (Reference (a)).

b. Defines the organization and authorities of CLEP.

2. APPLICABILITY. This instruction applies to OSD, the Military Departments, the Office of the Chairman of the Joint Chiefs of Staff and the Joint Staff, the Combatant Commands, the Office of the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the DoD (referred to collectively in this instruction as the "DoD Components").

3. POLICY. It is DoD policy that:

a. The protection of property and natural and cultural resources under DoD control is accomplished through the enforcement of all applicable federal and State laws and regulations.

b. The CLEP is used to support decisions and management actions by DoD's natural and cultural resources managers regulating the users of these resources to achieve specific goals and objectives.

c. DoD Component law enforcement officials exercise functional oversight over the CLEP and the conservation law enforcement officers (CLEOs) carrying out the program.

d. CLEOs assigned to DoD Component law enforcement elements may be co-located with the conservation program manager at the installation.

e. CLEP Officers conducting criminal investigations will comply with the policies and procedures of DoD Instructions (DoDIs) 5505.07, 5505.11, 5505.14, 5505.16, and 5505.17 (References (b) through (f)).

f. The DoD Component's law enforcement and conservation functions will establish, and mutually support, an implementation method which defines roles, internal and external support agreements, funding responsibilities, accountability, command and control, and expectations which will provide for an effective and efficient CLEP.

g. CLEP roles and responsibilities will be integrated into an installation's Integrated Natural Resources Management Plan (INRMP) and Integrated Cultural Resources Management Plan (ICRMP), where conservation law enforcement is required.

h. The implementation method(s) for each installation CLEP should be proportionate to the conservation law enforcement needed at the installation; therefore, several implementation methods are provided for within this instruction. Although the specific implementation methods at installations can vary, those details should be clearly defined at the appropriate command level and address at a minimum, consistent with this instruction, roles and responsibilities, internal and external support agreements, funding responsibilities, accountability, and command and control.

i. Mutual assistance agreements with other agencies and organizations may be used to maximize enforcement capabilities, when authorized by law.

j. Primary (basic) training for personnel who serve as DoD CLEO is the Federal Law Enforcement Training Center (FLETC) Land Management Police Training (LMPT) Program. Equivalent basic natural resources management training must meet the standards of the natural resources management program of instruction of FLETC LMPT.

k. The DoD Peace Officers Standards and Training (POST) Commission, in accordance with the authority in DoDD 5525.15 (Reference (g)), will certify CLEP equivalent training standards.

4. RESPONSIBILITIES. See Enclosure 2.

5. PROCEDURES. See Enclosure 3.

6. RELEASABILITY. **Unlimited**. This instruction is approved for public release. Copies may be obtained through the Internet from the DoD Issuances Web Site at <http://www.dtic.mil/whs/directives>.

7. EFFECTIVE DATE. This instruction:

a. Is effective October 17, 2013.

b. Must be reissued, cancelled, or certified current within 5 years of its publication to be considered current in accordance with DoDI 5025.01 (Reference (h)).

c. Will expire effective October 17, 2023 and be removed from the DoD Issuances Website if it hasn't been reissued or cancelled in accordance with Reference (h).



Jessica L. Wright
Acting Under Secretary of Defense for
Personnel and Readiness

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REFERENCES

- (a) DoD Directive 5124.02, "Under Secretary of Defense for Personnel and Readiness (USD(P&R))," June 23, 2008
- (b) DoD Instruction 5505.07, "Titling and Indexing Subjects of Criminal Investigations in the Department of Defense," January 27, 2012
- (c) DoD Instruction 5505.11, "Fingerprint Card and Final Disposition Report Submission Requirements," July 9, 2010, as amended
- (d) DoD Instruction 5505.14, "Deoxyribonucleic Acid (DNA) Collection Requirements for Criminal Investigations," May 27, 2010, as amended
- (e) DoD Instruction 5505.16, "Criminal Investigations by Personnel Who Are Not Assigned to a Defense Criminal Investigative Organization," May 7, 2012
- (f) DoD Instruction 5505.17, "Collection, Maintenance, Use, and Dissemination of Personally Identifiable Information and Law Enforcement Information by DoD Law Enforcement Activities," December 19, 2012
- (g) DoD Instruction 5525.15, "Law Enforcement (LE) Standards and Training in the DoD," April 27, 2012
- (h) DoD Instruction 5025.01, "DoD Directives Program," September 26, 2012, as amended
- (i) DoD Instruction 4715.03, "Natural Resources Conservation Program," March 18, 2011
- (j) DoD Instruction 4715.16, "Cultural Resources Management," September 18, 2008
- (k) Title 16, United States Code
- (l) Title 10, United States Code
- (m) Title 42, United States Code
- (n) Title 7, United States Code
- (o) Title 43, United States Code
- (p) Title 25, United States Code
- (q) Title 33, United States Code
- (r) United States District Court Violation Notice¹
- (s) Title 50, United States Code
- (t) DoD Directive 5210.56, "Carrying of Firearms and the Use of Force by DoD Personnel Engaged in Security, Law and Order, or Counterintelligence Activities," April 1, 2011

¹ Available from the Central Violations Bureau, <http://www.cvb.uscourts.gov/index.html>

ENCLOSURE 2
RESPONSIBILITIES

1. UNDER SECRETARY OF DEFENSE FOR PERSONNEL AND READINESS (USD (P&R)). The USD(P&R):

- a. Establishes overall policy and provides guidance for the DoD CLEP.
- b. Monitors implementation of the DoD CLEP.
- c. Serves as the central point of contact for CLEP policy issues.
- d. Coordinates with other federal agencies on conservation law enforcement matters of national or regional scope.
- e. Identifies opportunities for efficiencies in providing CLEP training through increased interagency and DoD Component cooperation.
- f. Serves as the CLEP authority for and manages the partnership agreement with the FLETC, known as the Department of Defense Conservation Law Enforcement Consortium (DoDCLEC).

2. UNDER SECRETARY OF DEFENSE FOR ACQUISITION, TECHNOLOGY, AND LOGISTICS (USD(AT&L)). The USD(AT&L):

- a. Establishes and monitors Natural Resources Conservation Program policy, in accordance with DoDI 4715.03 (Reference (i)).
- b. Ensures that the CLEP is integrated into DoD Natural Resources Conservation Programs and cultural resources management policy and guidance in accordance with DoDI 4715.16 (Reference (j)).

3. DoD COMPONENT HEADS. The DoD Component heads responsible for DoD installations or sites:

- a. Establish policies and procedures to implement CLEP within their Component.
- b. Integrate CLEP into the Component law enforcement programs.
- c. Ensure that, to the extent practicable using available resources, sufficient numbers of natural resources law enforcement personnel are available and assigned responsibility to perform tasks necessary to carry out the CLEP in accordance with chapter 5C of Title 16, United States

Code (U.S.C.) (Reference (k)), including the preparation and implementation of the law enforcement portions of the integrated natural resources management plans.

d. Ensure sufficient levels of conservation law enforcement planning are incorporated into installation INRMPs and ICRMPs where necessary, and to the extent practicable using available resources, and that these plans are fully coordinated with appropriate installation offices.

e. Establish agreements with other agencies and organizations to facilitate mutual working relationships and to maximize enforcement capabilities, when authorized by law.

ENCLOSURE 3
CLEP PROCEDURES

1. OBJECTIVES. CLEP will:

- a. Conserve and direct the use of natural and cultural resources in accordance with the INRMP and ICRMP.
- b. Ensure installations and military and public users remain in compliance with appropriate environmental, natural, and cultural resource laws and regulations.
- c. Provide specialized law enforcement expertise regarding natural and cultural resource matters and protection of government property.
- d. Improve inter-jurisdictional conservation law enforcement among the Military Departments, federal, State, tribal, and local law enforcement and land management agencies.
- e. Collect and track data on violations.

2. PLANS

a. General. Each installation that is required to prepare an INRMP or ICRMP in accordance with Reference (i) will incorporate within the INRMP or ICRMP the methods, techniques, and strategies that will be utilized to provide law enforcement services to the federal lands, complementing the resource management objectives of the installation.

b. Plan Goals and Objectives. The CLEP section will provide specific goals and objectives to ensure compliance with laws and regulations; to support the overarching goals of the INRMP and ICRMP; and to integrate with other installation security and emergency services plans. These objectives will include:

(1) Providing education and training to the installation populace, workforce, and general public to prevent inadvertent violation of natural resource and cultural resource laws.

(2) Defining areas clearly to prevent hunting, fishing, and other outdoor recreational activities in unauthorized areas.

(3) Reporting non-compliance with laws and regulations in accordance with Military Service criminal data reporting procedures.

(4) Encouraging coordination with the United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service.

(5) Reporting and tracking natural and cultural resources crimes and their disposition (both military and civil).

c. Tiering CLEP to the INRMP and ICRMP

(1) Reference (i) and sections 670-670f of Reference (k) require installations that have significant natural or cultural resources to prepare and implement an INRMP or ICRMP that provides for adequate management and enforcement.

(2) The CLEP should provide the maximum feasible protection of military lands and resources under the jurisdiction of the Department of Defense within the funding and manpower levels allocated to support the mission.

(3) The INRMP provides the overall framework for implementing conservation and management activities and enforcement on DoD installations.

(4) The ICRMP provides the overall framework for implementing cultural resources management activities and enforcement on DoD installations.

(5) The conservation law enforcement plan should be an attachment to the INRMP and ICRMP.

3. PERSONNEL AND TRAINING

a. All conservation officers (regardless of previous law enforcement training) must successfully complete LMPT at the FLETC or equivalent natural resource training as required by the DoD POST Commission (Reference (g)) within 1 year of being hired.

b. Military police, security forces, master-at-arms, component civilian police, or other law enforcement personnel who are temporarily or seasonally assigned to CLEPs. These personnel are not required to complete LMPT but should be supervised by a fully certified conservation officer and receive on-the-job training specific to conservation law enforcement. Personnel augmenting CLEPs are only to be used for temporary or seasonal assignment and are not to be used to fulfill the full-time CLEO requirement.

c. DoD Component heads may authorize exceptions for smaller installations or bases that do not require the services of a full-time CLEO year-round to assign CLEP duties to specially trained, dual-function police officers.

d. DoD Components may augment CLEP forces with the following personnel and under the following restrictions:

(1) Military police, security forces, master-at-arms, component civilian police, or other law enforcement personnel who are temporarily or seasonally assigned to CLEPs are not required to complete LMPT but should be supervised by a fully certified conservation officer and

receive on-the-job training specific to conservation law enforcement. Augmented personnel are only to be used for temporary or seasonal assignment and are not to be used to fulfill the full-time CLEO requirement.

(2) Non-law-enforcement personnel, including General Services 400 series civilians and active duty personnel, may assist conservation officers with case-specific investigations and education and awareness activities. They may not:

(a) Carry out direct law enforcement duties unless their core personnel document or position description includes law enforcement duties and they have completed LMPT at FLETC.

(b) Carry weapons in performance of this duty (unless so authorized and provided by the commander after individuals have received appropriate training and are qualified with the authorized weapon).

e. The DoD is a partner organization with the FLETC for conservation law enforcement training including basic training, LMPT Program, and advanced training requirements. The partner organization status is managed through the DoDCLEC. The DoDCLEC consists of the USD(P&R) Office of Law Enforcement Policy and Support and the Military Departments.

f. DoD CLEO should complete a minimum of 40 hours of annual refresher training, specialized to conservation law enforcement. This refresher training is after completion of FLETC LMPT and is not to be considered a replacement for it.

g. DoD CLEO position descriptions, grades, and series should be developed and filled at a level of expertise and professionalism commensurate with other federal agency standards and the specialized duties of the DoD CLEO officers. These responsibilities include, but are not limited to, knowledge and expertise in environmental laws and natural and cultural resource protection and use, troop training and outreach for compliance with environmental laws and regulations, and specialized investigative responsibilities beyond basic law enforcement patrol.

4. AUTHORITY, POWERS, AND JURISDICTION

a. Conservation Officer Authority

(1) Section 2671 of Title 10, U.S.C. (Reference (l)) requires that all hunting, fishing, and trapping on an installation be in accordance with the laws of the State in which it is located. It also states that offenders are guilty of a like offense and subject to a like punishment for an act or omission on the installation that would be punishable if committed within the jurisdiction of the State. On installations under either proprietary or concurrent legislative jurisdiction, State laws may be directly enforceable under State authority.

(2) The Secretary of Defense may enforce all natural resources management laws, pursuant to the authority of section 670e-1 of Reference (k) and cultural resources management laws, pursuant to the authority of sections 470ff of Reference (k) on military installations within

the United States. Although Reference (k) provides authority to enforce natural and cultural resources laws, it does not expressly grant powers to search, seize, or arrest with regard to each statute. Military and civil service law enforcement personnel may temporarily detain civilian offenders until civilian law enforcement authorities arrive. The natural and cultural resource management laws are numerous and are listed in the Table for informational purposes.

Table. Natural and Cultural Resources Laws

NATURAL AND CULTURAL MANAGEMENT	ASSOCIATED LAWS
Airborne Hunting	Section 742j-1 of Reference (k)
American Indian Religious Freedom	Section 1996 of Title 42, U.S.C. (Reference (m))
Antiquities Act	Subchapter LXI of chapter 1 of Reference (k) beginning with section 431
Archaeological and Historic Preservation	Subchapter I of chapter 1A of Reference (k) beginning with section 461
Archaeological Resources Protection	Chapter 1B of Reference (k) beginning with section 470aa
Bald and Golden Eagle Protection	Subchapter II of Chapter 5A of Title 16, U.S.C., beginning with section 668 of Title 16, U.S.C. (Reference (k))
Coastal Barrier Resources	Chapter 55 of Reference (k) beginning with section 3501
Coastal Zone Management	Chapter 33 of Reference (k) beginning with section 1451
Endangered Species	Chapter 35 of Reference (k) beginning with section 1531
Estuary Protection	Chapter 26 of Reference (k) beginning with section 1221
Federal Insecticide, Fungicide, and Rodenticide	Chapter 6 of Title 7 U.S.C., beginning with section 136 (Reference (n))
Federal Land Policy and Management	Chapter 35 of Title 43, U.S.C., beginning with section 1701 (Reference (o))
Noxious Weeds	Chapter 61 of Reference (n) beginning with section 2809

Table. Natural and Cultural Resources Laws, Continued

Fish and Wildlife Conservation	Chapter 49 of Reference (k) beginning with section 2901
Game, Fur-Bearing Animals, and Fish	Subchapter I of chapter 5A of Reference (k) beginning with section 661
Forest and Rangeland Renewable Resources Planning	Chapter 36 of Reference (k) beginning with section 1601
Lacey Act	Chapter 53 of Reference (k) beginning with section 3371
Marine Mammal Protection	Chapter 31 of Reference (k) beginning with section 1361
Migratory Birds	Subchapter II of chapter 7 of Reference (k) beginning with section 703
Migratory Bird Conservation	Subchapter III of chapter 7 of Reference (k) beginning with section 715
Migratory Bird Hunting and Conservation Stamps	Subchapter IV of chapter 7 of Reference (k) beginning with section 718
Multiple Use Sustained Yield of Forests	Sections 528-531 of Reference (k)
National Environmental Policy	Chapter 55 of Reference (m) beginning with section 43421
National Forest Management	Chapter 36 of Reference (k) beginning with section 1600
National Historic Preservation	Subchapter II of chapter 1A of Reference (k) beginning with section 470
National Trails Systems	Chapter 26 of Reference (k) beginning with section 1241
Native American Graves Protection and Repatriation	Section 3001 of Title 25, U.S.C. (Reference (p))
Recreational Hunting Safety	Chapter 72 of Reference (k) beginning with section 5201
Rivers and Harbors Act of 1899	Sections 401 and 403 of Title 33, U.S.C. (Reference (q))

Table. Natural and Cultural Resources Laws, Continued

NATURAL AND CULTURAL MANAGEMENT	ASSOCIATED LAWS
Sikes Act	Subchapter I of chapter 5C of Reference (k) beginning with section 670
Soil and Water Conservation	Chapter 40 of Reference (k) beginning with section 2001
Taylor Grazing Act	Chapter 8A of Reference (o) beginning with section 315
Wild and Scenic Rivers	Chapter 28 of Reference (k) beginning with section 1274
Wild Exotic Bird Conservation	Chapter 69 of Reference (k) beginning with section 4901
Wild Horses and Burros	Chapter 30 of Reference (k) beginning with section 1331
Wilderness Act	Chapter 23 of Reference (k) beginning with section 1131

(3) The United States District Court Violation Notice (Reference (r)) is used as the charging document to notify the magistrate court of misdemeanor offenses that occur within its jurisdiction; however, felonies committed on military lands are referred to the local United States Attorney's Office. Felony violations on the installation are within the investigative purview of the appropriate military criminal investigative organization (MCIO). Coordination will be conducted with both the supporting MCIO and the USFWS before proceeding beyond the preliminary stages of a felony investigation so that appropriate coordination can be made with the responsible assigned Assistant United States Attorney.

(4) Section 3375 of Reference (k) allows the Secretaries of Interior and Commerce to use (via agreement) DoD personnel, services, and facilities to the extent necessary for enforcement of any laws relating to fish and wildlife. The agreements are accomplished at the local level under the guidance of the responsible DoD Component.

(5) DoD Component heads may enter into standard agreements with the USFWS for CLEOs to exercise authority under USFWS commission for those laws for which the USFWS is the regulating authority.

b. Conservation Officer Powers

(1) CLEOs draw their powers, when delegated, from the installation commander's authority to protect or secure a facility in accordance with the authority in section 797 of Title 50, U.S.C. (Reference (s)).

(2) CLEOs may use necessary and appropriate force to apprehend suspects in accordance with DoDD 5210.56 (Reference (t)). The primary consideration in the use of force is the timely and effective application of an objectively reasonable level of force required to establish and maintain lawful control. A paramount consideration is the preservation of life and prevention of bodily injury.

5. LAW ENFORCEMENT COORDINATION

a. Coordination with Other Federal and State Agencies. Each DoD Component or its designated lead office should address specific conservation law enforcement issues relevant to its component with other national headquarters offices of federal agencies such as the Departments of Interior, Homeland Security, Commerce, and Agriculture. The major command, regional office, or installation should address conservation law enforcement issues with respective regional offices of federal, State, and tribal fish and game agencies.

(1) National Level Coordination. Each DoD Component is responsible for national-level liaison and contact with the departmental law enforcement officials and all federal law enforcement, security, and intelligence agencies on all matters relating to conservation law enforcement. On national matters pertaining to DoD lands, the USD(P&R) Law Enforcement Policy and Support Office will consult with the appropriate DoD Component.

(2) International Coordination. If an international agreement permits such activity, local liaison is allowed with cooperating foreign agencies adjacent to the international border of the United States relating to matters of mutual concern and assistance. This coordination and cooperation with local foreign law enforcement officials and agencies will be in accordance with applicable legally binding international agreements between the United States and Mexico or Canada, and will be conducted in a circumspect manner to avoid violation of the sovereignty of the other country.

(3) Regional Level. The major command or regional office is the appropriate level for interagency inter-governmental coordination and environmental planning with other federal, State, and tribal agencies. The regional office or major commands should conduct all coordination and communication for regional and multi-State issues.

(4) State and Local Level. The major command or regional criminal investigative office, installation lead criminal investigator, and conservation officer are concurrently responsible for liaison with local, State, tribal, and federal agencies on matters relating to natural and cultural resource law enforcement.

(5) Individual Cooperation. Criminal investigators and conservation officers are expected to make every effort to cooperate with and assist officials of State fish and game agencies and law enforcement officials of other federal, State, tribal, and local agencies located in their geographic area of responsibility for the purpose of enforcing natural and cultural resource laws on DoD installations.

b. Law Enforcement Agreements

(1) Small Installation Agreements. Installations that do not require full-time conservation officers due to limited resources, but require periodic patrols and response as needed for enforcement of natural and cultural resource management laws, may enter into appropriate agreements, when authorized by law, with local law enforcement agencies, State fish and game agencies, sheriff's offices, or other federal agencies.

(a) Typically, these installations require an INRMP or ICRMP, but do not have large acreage or complex issues such as endangered species, coastal resources, or extensive cultural resources.

(b) These agreements should identify the roles and responsibilities of the installation and the cooperating agency or agencies where the cooperating agency is the lead in all conservation law enforcement activities. An example of an installation agreement is provided at the Figure.

(2) Large Installation Agreements. Appropriate agreements, when authorized by law, are also available for use on large installations and ranges that have DoD conservation officers. Installation-specific agreements may be developed to address complex or multi-jurisdictional issues such as border patrol, coastal zone management, and shared land use.

Figure. Sample Law Enforcement Agreement

[Date]
AGREEMENT BETWEEN THE [Insert Title of DoD Official] AND THE (FEDERAL OR STATE AGENCY) FOR THE PROVISION OF NATURAL RESOURCES LAW ENFORCEMENT
This agreement, entered into this _____ day of _____ 20____, by the [Insert DoD Component Name] for (INSTALLATION NAME) and [name of other party] (hereinafter referred to as the parties). Witnessed that:
WHEREAS, the Secretary of Defense is authorized by the Sikes Act to enforce on DoD installations all federal laws relating to the management of natural resources, and
WHEREAS, it is the responsibility of [Insert DoD Component Name] to conserve natural resources and provide adequate law enforcement on its lands; and
WHEREAS, the [Insert Name of other party] has the authority to enforce State and local laws relating to the management of natural resources on such lands; and

Figure. Sample Law Enforcement Agreement, Continued

WHEREAS, it is in the best interests of the [Insert DoD Component Name] to obtain the assistance of the [Insert Name of other party] in the enforcement of State and local laws on [Insert DoD Component Name] lands.

NOW, THEREFORE, the parties hereto mutually agree as follows:

Article 1. Plan of Operation.

(a) [Insert DoD Component Name] and the [Insert Name of other party] have agreed to a plan of operation which describes the scope and extent of natural resources law enforcement to be provided to [Insert DoD Component Name] by the [Insert Name of other party] in accordance with this agreement. Such plan of operation, as concurred in by the [Insert Name of other party], is attached hereto as Appendix A and made a part hereof. The plan of operation will be reviewed before the beginning of each federal fiscal year and the [Insert DoD Component Name] will determine if it is still current and whether there are sufficient funds available to pay the [Insert Name of other party] charges for the next fiscal year.

(b) It is recognized and understood that the [Insert DoD Component Name] and the [Insert Name of other party] may, at the request of either, renegotiate the plan of operation. The renegotiated plan of operation will, upon written acceptance thereof by both parties, supersede Appendix A.

Article 2. Obligations of the [Insert Name of other party].

(a) The [Insert Name of other party] agrees to furnish normal, emergency, and unanticipated enforcement of State and local civil and criminal laws relating to management of natural resources on [Insert DoD Component Name] lands and waters in accordance with the schedules and duties described in the plan of operation, with payment by [Insert DoD Component Name] in accordance with Article 3 of this agreement.

(b) The [Insert Name of other party] agrees to provide personnel, equipment, and supplies required to provide the natural resources law enforcement requested by the [Insert DoD Component Name] in accordance with paragraph (a) of this article.

(c) The [Insert Name of other party] agrees to prepare a daily enforcement log of a format provided or approved by the [Insert DoD Component Name] and to submit this log to [Insert DoD Component Name] at least once a month throughout the effective period of the current plan of operation.

(d) The [Insert Name of other party] agrees to assign only those personnel who are qualified and trained pursuant to the requirements of applicable federal and State laws and regulations to undertake the law enforcement to be provided under Article 2(a) of this agreement in support of [Insert DoD Component Name]. Where State and local standards for the qualifications of law enforcement personnel do not exist, the [Insert Name of other party] will advise [Insert DoD Component Name] of the experience, qualifications, and training of those personnel expected to be assigned law enforcement duties under this agreement and assign such duties to them only with the approval of the [Insert DoD Component Name].

Article 3. Obligations of the [Insert DoD Component Name].

Subject to the availability of funds, the [Insert DoD Component Name] agrees to pay the [Insert Name of other party] for the total cost of the law enforcement support to [Insert DoD Component Name], to be provided in accordance with the obligations agreed to be undertaken by the [Insert Name of other party] in Article 2 of this agreement, including the costs of operation and maintenance of such equipment as is required for the provision of such support to [Insert DoD Component Name] identified in the plan of operation under Article I of this Agreement. At the request of the [Insert Name of other party], partial payments may be made as the law enforcement support to [Insert DoD Component Name] is performed based on billings as identified in the plan of operation under Article I of this agreement and approved by the [Insert DoD Component Name].

Figure. Sample Law Enforcement Agreement, Continued

Article 4. Period of *[Insert DoD Component Name]*.

The period of this agreement is from the date of execution until terminated by mutual agreement, or on written notice from either party to the other, as set forth in Articles 6 and 10 of this agreement.

Article 5. Disputes.

(Insert clause from DoD 3210.6-R, "Department of Defense Grant and Agreement Regulations", April 13, 1998, with Change 2, October 24, 2001)

Article 6. Default.

In the event that either party to this agreement fails to meet any of its obligations hereunder, the other party may immediately terminate this agreement. Such termination will be effected by written notice of either party to the other.

Article 7. Exclusion of Federal Employee Benefits.

It is understood and agreed that the services to be provided by the *[Insert Name of other party]* and its employees are not considered to fall within the scope of federal employment, that the *[Insert Name of other party]* and its employees are not considered as agents or employees of the U.S. Government, and that none of the benefits of federal employment will be conferred under the terms of this agreement.

Article 8. Release of Claims.

The *[Insert Name of other party]* agrees to secure insurance in a form and amount satisfactory to the *[Insert DoD Component Name]* for liability arising from the negligence of *[Insert Name of other party]* in performing services under this agreement. Such insurance will name the United States as a named insured. The cost of such insurance may be included as a cost under Article 3 of this agreement.

Article 9. Transfer or Assignment.

The *[Insert Name of other party]* will not transfer or assign this agreement, nor any rights acquired thereunder, nor grant any interest, privilege, or license whatsoever in connection with this agreement without the approval of the *[Insert DoD Component Name]*.

Article 10. Termination for Convenience.

[Insert DoD Component Name] or *[Insert Name of other party]* may, on 30 days written notice, terminate this agreement without cause. If this agreement is so terminated, the *[Insert DoD Component Name]* will be liable only for payment in accordance with the payment provisions of this agreement for services rendered prior to the effective date of termination.

Article 11. Equal Opportunity.

(Insert clause from DoD 3210.6-R, "Department of Defense Grant and Agreement Regulations," April 13, 1998, as amended)

Article 12. Gratuities.

(Insert clause from DoD 3210.6-R, "Department of Defense Grant and Agreement Regulations", April 13, 1998, as amended)

Figure. Sample Law Enforcement Agreement, Continued

Article 13. Examination of Records by Comptroller General.

The [Insert Name of other party] agrees that the Comptroller General of the United States or any of his or her duly authorized representatives will, until the expiration of 3 years after final payment under this agreement, have access to and the right to examine any directly pertinent books, documents, papers, and records of the [Insert Name of other party] involving transactions related to this agreement.

Article 14. Audit by the [Insert DoD Component Name].

Upon request, the [Insert Name of other party] must provide, and the [Insert DoD Component Name] will have the right to examine, books, records, documents, and other evidence of accounting procedures and practices, sufficient to reflect properly all direct and indirect costs of whatever nature claimed to have been incurred and anticipated to be incurred for the performance of this agreement.

Article 15. Amendments.

Any changes in the provisions of this agreement must be made by formal amendment signed by both parties.

IN WITNESS HEREOF, the parties hereto have executed this agreement, as of the day and year first written above.

GLOSSARY

PART I. ABBREVIATIONS AND ACRONYMS

CLEO	Conservation Law Enforcement Officer
CLEP	Conservation Law Enforcement Program
DoDCLEC	Department of Defense Conservation Law Enforcement Consortium
DoDD	DoD directive
DoDI	DoD instruction
FLETC	Federal Law Enforcement Training Center
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Installation Natural Resources Management Plan
LMPT	Land Management Police Training
MCIO	military criminal investigative organization
POST	Peace Officers Standards and Training
U.S.C.	United States Code
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics
USD(P&R)	Under Secretary of Defense for Personnel and Readiness
USFWS	United States Fish and Wildlife Service

PART II. DEFINITIONS

Unless otherwise noted, these terms and their definitions are for the purpose of this instruction.

Defense criminal investigative organizations. The four criminal investigative organizations of DoD: Defense Criminal Investigative Service, U.S. Army Criminal Investigation Command, Naval Criminal Investigative Service, and Air Force Office of Special Investigations.

dual-function conservation officer. A natural resources professional who is assigned law enforcement duties consisting of at least 50 percent of overall duties. Dual-function conservation officers should maintain equivalent training and qualifications as full-time conservation officers.

ICRMP. A plan that defines the process for the management of cultural resources on DoD installations by integrating the entirety of the installation cultural resources program with ongoing mission activities, to allow for ready identification of potential conflicts between the installation's mission and cultural resources, and identify compliance actions necessary to maintain the availability of mission-essential properties and acreage.

INRMP. An integrated plan focused, to the maximum extent practicable, on ecosystem management that shows the interrelationships of individual components of natural resources management (e.g., fish and wildlife, forestry, land management, and outdoor recreation) to mission requirements and other land use activities affecting an installation's natural resources. INRMPs ensure natural resource conservation programs and military operations are integrated and consistent with stewardship and legal requirements through cooperation among DoD, USFWS, and State fish and wildlife agencies.

MCIOs. The three military criminal investigative organizations of DoD: U.S. Army Criminal Investigation Command, Naval Criminal Investigative Service, and Air Force Office of Special Investigations.

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APPENDIX B

(NAVMC DIR 5090.4 A, Memorandum of Agreement with the USFWS)

CONSERVATION LAW ENFORCEMENT PROGRAM

APPENDIX A

MARINE CORPS AND U.S. FISH AND WILDLIFE SERVICE MEMORANDUM OF
AGREEMENT



DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
2 NAVY ANNEX
WASHINGTON, DC 20386-1776

IN REPLY REFER TO
5090
LPL/1

21 MAY 2003

Kevin Adams, Chief,
Office of Law Enforcement
U.S. Fish and Wildlife Service
MS-118 3000
4401 N. Fairfax Drive
Arlington, VA 22203

Dear Mr. Adams:

Attached is a Memorandum of Agreement for cooperative law enforcement for the protection and conservation of fish, wildlife, archaeological, and natural resources on lands controlled by the Marine Corps. Please sign, keep a copy for your files, and return the original to my office.

I am pleased to enter into this cooperative agreement as the mutual benefits to be gained will allow us to better fulfill our resource protection obligations, while providing enhanced stewardship of the public lands entrusted to the Marine Corps.

Ms. Heidi Hirsh of my staff is available to answer any questions you may have regarding this matter. She may be reached at 703-695-8240.

Sincerely,

A handwritten signature in cursive script, appearing to read "R. S. Coleman", written over a horizontal line.

R. S. COLEMAN
Brigadier General, U.S. Marine Corps
Assistant Deputy Commandant
Installations and Logistics (Facilities)

CONSERVATION LAW ENFORCEMENT PROGRAM

APPENDIX A

MARINE CORPS AND U.S. FISH AND WILDLIFE SERVICE MEMORANDUM OF
AGREEMENT

MEMORANDUM OF AGREEMENT
for
Cooperative Law Enforcement
between the
U.S. Fish and Wildlife Service
and the
U.S. Marine Corps

This Memorandum of Agreement (MOA) is a cooperative agreement entered into under authority of the Fish and Wildlife Revenue Enhancement Act of 1998 (16 U.S.C. Section 742I(b)) between the U.S. Fish and Wildlife Service, hereinafter "Service" or "Chief, Office of Law Enforcement," and the U.S. Marine Corps, hereinafter "USMC." This cooperative agreement shall serve as a master agreement for all USMC installations and U.S. Fish and Wildlife Service law enforcement offices.

Individual installation cooperative agreements may be negotiated and signed by the appropriate Service and USMC representatives. However, individual agreements are not mandatory. Individual agreements that have been signed and are presently in effect shall be updated to reflect the requirements of this Agreement. Individual agreements must comply with this MOA.

Whereas, the Congress of the United States has found that the protection and conservation of fish, wildlife, and other natural and cultural resources is in the best interest of the public and has enacted various laws to provide for protection and conservation of wildlife and native plants.

Whereas, the United States Congress has given the Secretary of the Interior the authority to enforce certain laws dealing with the protection and conservation of fish, wildlife, and other natural resources and this authority has been delegated to the Director of the Service and to certain qualified individuals.

Whereas, the Service and the USMC recognize that mutual benefits will accrue to the law enforcement efforts of each by entering into a Memorandum of Agreement to share law enforcement expertise, training, intelligence information, equipment, and other facilities, and to designate law enforcement officers to efficiently enforce all laws administered by the Service and USMC relating to fish, wildlife, and other natural and cultural resources.

Whereas, the Service has determined that it is necessary and appropriate to utilize certain persons, services, and facilities of the USMC to assist in providing effective enforcement of Federal conservation laws on the lands and waters under USMC jurisdiction.

CONSERVATION LAW ENFORCEMENT PROGRAM

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MARINE CORPS AND U.S. FISH AND WILDLIFE SERVICE MEMORANDUM OF
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Whereas, the USMC has determined that it is necessary and appropriate to utilize certain persons, services, and facilities of the Service to assist in providing effective enforcement of Federal conservation laws on the lands and waters under USMC jurisdiction.

Therefore, the parties agree that:

A. Re-Delegation of Federal Authority

(1) Under the authority provided by 16 U.S.C. § 742l(b), the Chief, Office of Law Enforcement, hereby delegates to the USMC and those certain persons designated in accordance with the terms specified herein ("USMC Conservation Law Enforcement Officers") the authority to enforce the following Federal laws dealing with the protection and conservation of fish, wildlife, and natural and cultural resources of the United States and regulations issued pursuant thereto within any limitations prescribed by regulations of the Department of Defense:

Lacey Act and Lacey Act Amendments of 1981 (18 U.S.C. 42, 16 U.S.C. 3371-3378)

Migratory Bird Treaty Act (16 U.S.C. 703-712)

Archeological Resources Protection Act of 1979 (16 U.S.C. 470aa-ll)

Endangered Species Act of 1973 (16 U.S.C.1531-1544)

Marine Mammal Protection Act (16 U.S.C. 1361-1384, 1401- 1407)

Migratory Bird Hunting and Conservation Stamp Act (16 U.S.C. 718-718k)

Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d)

Airborne Hunting Act (16 U.S.C. 742j-1)

National Wildlife Refuge System Improvement Act (16 U.S.C. 668dd-668ee)

This Agreement does not delegate authority to enforce the import and/or export provisions of the statutes above unless the designee is under the direct supervision of a Service special agent.

(2) The Chief, Office of Law Enforcement specifically delegates to the USMC and the USMC Conservation Law Enforcement Officers the same authority to search, seize, arrest, and exercise other law enforcement functions under the laws specified in paragraph A(1) of this Agreement, as if the USMC and the USMC Conservation Law Enforcement Officers were employed by the Department of the Interior and authorized by the Secretary of the Interior to enforce those laws.

CONSERVATION LAW ENFORCEMENT PROGRAM

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MARINE CORPS AND U.S. FISH AND WILDLIFE SERVICE MEMORANDUM OF
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(3) This Agreement between the Service and the USMC may not be used to re-delegate Federal law enforcement authority to any person convicted of a misdemeanor crime of domestic violence or otherwise prohibited from possessing firearms, within the meaning of 18 U.S.C. § 922(g).

B. Designation of Federal Authority by USMC of USMC Conservation Law Enforcement Officers

(1) The USMC, through the Installation Commanding General, may designate individuals to exercise the authority to enforce the conservation laws and regulations of the United States as specified above. This designation may only be to a person who meets criteria (a) or (b) and (c) and (d):

(a) Is presently employed and has been for at least one (1) year as a conservation law enforcement officer at a USMC installation and is trained, qualified, and authorized to carry a firearm and who is assigned conservation law enforcement duties at the installation; or

(b) Completed the Natural Resource Police Training Program, the former Land Management Police Training Program, or the Criminal Investigator Training Program, at the Federal Law Enforcement Training Center (FLETC), and completes a one (1) year probationary period; and who

(c) Is proficient in the use of firearms as demonstrated by meeting the firearms qualification and re-qualification standards required of the USMC installation, complies with the USMC Conservation Law Enforcement Program, and agrees to read, understand, and follow the Service Use of Force and Firearms policies when acting under this Agreement. These policies are attached and will be transmitted to all officers so delegated under this Agreement; and

(d) Has not been convicted of a misdemeanor crime of domestic violence or is not otherwise prohibited from possessing firearms, within the meaning of 18 U.S.C. § 922(g).

(2) The USMC shall notify the Service of the full name, address, date of birth, and social security number of each designee. This designation shall become effective upon the filing of such information with the Service's designated representative. The USMC shall issue an identification card to each designee, along with a copy of this Agreement and the Service Use of Force and Firearms policies.

If at any time, any person designated to exercise authority under this Agreement fails to meet any of the criteria set forth in paragraph B(1) above, terminates DOD employment, or is reassigned to non-law enforcement duties, the USMC shall terminate the designation

CONSERVATION LAW ENFORCEMENT PROGRAM

APPENDIX A

MARINE CORPS AND U.S. FISH AND WILDLIFE SERVICE MEMORANDUM OF
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when the USMC becomes aware of these circumstances. The USMC will collect that person's identification card and immediately notify the Service.

Information about the addition of designated officers should be provided to the Service within 30 days. The USMC will provide a complete up-to-date list of persons holding authority under this Agreement to the Service by January 15 of each year.

(3) Designated USMC Conservation Law Enforcement Officers may exercise authority to enforce the conservation laws and regulations specified in paragraph A(1) on USMC installations and lands or waters adjacent to installations under exigent circumstances, such as to arrest or detain individuals who are suspected of committing unlawful actions on the USMC installation and then flee. They may exercise this authority anywhere within the jurisdiction of the United States when under the direct supervision of a Service special agent.

(4) The Service may, by written notice to the USMC, terminate any designation made by the USMC.

(5) The USMC shall continue to provide, as appropriate, workmen's compensation in accordance with laws and regulations applicable to USMC civilian employees for work-related injuries incurred by USMC Conservation Law Enforcement Officers while performing duties under this Agreement. Designated individuals may also be considered eligible for compensation under subchapter III of chapter 81 of Title 5, United States Code when activities are initiated and approved by the Service.

(6) While performing duties under this Agreement, USMC Conservation Law Enforcement Officers shall:

(a) Be considered investigative or law enforcement officers of the Department of the Interior for the purposes of the tort claim provisions of Title 28, United States Code and 5 U.S.C. 8401(17); and

(b) Be considered officers or employees of the United States within the meaning of section 111 and 1114 of Title 18, United States Code.

C. Procedures for Investigating Federal Offenses

The following procedures shall govern investigations or prosecutions of Federal offenses made under this Agreement:

(1) The USMC installation will refer appropriate violations of Federal law or regulation to the Service's designated representative as expeditiously as possible.

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(2) The USMC installation shall submit in a timely manner, copies of all investigative reports to the Service's designee on law enforcement activities conducted under authority of this Agreement.

(3) All potential investigations that may result in a felony prosecution will be coordinated with the Service. All potential investigations against any person who may claim Native American treaty rights must be coordinated with the Service.

(4) Each USMC installation shall coordinate with the local Service law enforcement office to establish protocol and liaison with regard to all Federal prosecutions relating to violations of Federal laws and regulations specified in A(1), occurring on USMC installations.

D. Coordination

(1) The Service designee and the USMC representatives shall meet periodically and when necessary for the following purposes:

(a) Identifying enforcement problems in areas of concurrent jurisdiction that may require joint enforcement operations or investigations;

(b) Identifying enforcement problems that may require covert investigation;

(c) Identifying the need for specialized law enforcement equipment;

(d) Discussing new techniques and methods for the detection and apprehension of violators of conservation laws and the exchange of law enforcement information in general;

(e) Reviewing training programs and identifying the need for additional instruction in Federal laws, policies, interpretations, and other appropriate subjects; and

(f) Establishing procedures for the care, handling, identification, and storage of evidence and/or seized property.

E. Actions to be Taken by the Parties

(1) The Service will provide to the USMC, subject to available resources and manpower, copies of Federal laws and regulations and pertinent Service policy and interpretations and the assistance of special agents and equipment for specific enforcement operations.

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(2) The USMC will provide to the Service, subject to available resources and manpower, copies of regulations applicable to USMC installations and pertinent policy and interpretations and assistance by USMC Conservation Law Enforcement Officers and use of equipment for specific enforcement operations that occur on the USMC installations.


F. Terms, Amendment, Effective Date, and Termination

(1) This Agreement shall become effective upon the date last signed and executed by the duly authorized representatives of the parties and shall remain in full force and effect until terminated in writing by either party. Representatives of the USMC and Service will review the Agreement at least every ten (10) years. The Agreement may be terminated, without cause, by either party upon thirty (30) days written notice.

(2) The Agreement may be revised or amended by consent of the parties, but such revisions or amendments shall not be effective until produced in writing and signed by both parties. Local agreements made under this master agreement cannot eliminate a requirement set by this Agreement.

(3) Before delegating authority under this Agreement, the USMC will provide the Chief, Office of Law Enforcement a roster of Marine Corp Conservation Law Enforcement Officers and installations that will be authorized to enforce the laws specified in paragraph A(1) under this Agreement. The Chief, Office of Law Enforcement will forward this information to his/her designee.


R.S. COLEMAN
Brigadier General
U.S. Marine Corps
Assistant Deputy Commandant
Installations & Logistics


KEVIN R. ADAMS
Chief, Office of Law Enforcement
U.S. Fish and Wildlife Service

Date: 21 MAY 2003

Date: 6-5-03

Attachments

U.S. Fish and Wildlife Service Use of Force Policy
U.S. Fish and Wildlife Service Firearms Policy
U.S. Fish and Wildlife Service Regional Law Enforcement Office Contact Information

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1.1 Purpose. This chapter establishes Service policy concerning firearms issued, carried, and/or used by Service law enforcement officers in the performance of their official law enforcement duties.

1.2 Scope.

A. This chapter applies to all Service Law Enforcement Officers. The term law enforcement officer includes Special Agents, Refuge Officers including both full-time and collateral duty officers, and other Service employees that have been granted Service law enforcement authority and who have met the requirements of this chapter and other applicable Service requirements.

B. Nothing in this chapter shall preclude the use of, nor govern the use of firearms in the performance of non-law enforcement activities by Service employees. Non-law enforcement activities in which a firearm may be used include dispatching of injured animals, self-defense against wildlife, predator or stray animal control, covert hunting situations, or similar situations that do not involve the use of a firearm as a force option against a person or persons.

1.3 Policy and Authority.

A. Policy. All Service law enforcement officers shall be properly trained in the use of firearms and equipped with firearms appropriate for the law enforcement duties performed, and unless restricted by the authorities section of this part, shall carry firearms in the performance of their official duties.

B. Authority. Service law enforcement officers are authorized to carry and use firearms as follows:

(1) Service law enforcement officers are authorized to carry and use firearms in the performance of their official law enforcement duties by virtue of the power to arrest contained in the statutes enforced, and as expressly authorized under the Lacey Act Amendments of 1981 [16 USC 3375(b)].

(2) Wildlife inspectors are not authorized to carry firearms in the performance of their official duties unless specifically authorized. Such authorization must have the concurrence of the Chief, Division of Law Enforcement.

(3) Notwithstanding the authority granted by statute, only those law enforcement officers who meet the training standards established by the Service are authorized to carry or utilize firearms in the performance of their official duties.

1.4 Responsibilities.

A. Regional Directors will ensure compliance with all provisions of this chapter. The Regional Director is assisted by the Assistant Regional Director (ARD) for Law Enforcement who is also referred to as the Special Agent in Charge, and the ARD for Refuges and Wildlife. Responsibilities specific to the ARDs are identified throughout the chapter.

B. The Assistant Director - Refuges and Wildlife is responsible for development and maintenance of the Service policy and procedure governing the use of firearms. The Assistant Director is assisted by the Chief, Division of Law Enforcement and the Special Agent in Charge, Branch of Training and Inspection. The Assistant Director is also authorized to develop and issue a Firearms Instructor Handbook. See paragraph 1.10.

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1.5 Authorized Firearms and Ammunition. Only Service issued weapons may be utilized for law enforcement purposes. The carrying of personal weapons for official law enforcement purposes is prohibited. Firearms and related equipment issued to a Service law enforcement officer upon conferral of law enforcement authority shall remain with the law enforcement officer upon transfer or reassignment as long as he or she retains law enforcement authority. Upon separation from the Service or relinquishment of law enforcement authority, all firearms and related equipment will be returned to the Branch of Training and Inspection, Division of Law Enforcement.

A. Service Sidearms.

(1) The standard issue sidearm for all Service law enforcement officers shall be a stainless steel, six (6) shot, double action revolver with a barrel length of two and one half (2) to four (4) inches inclusive, in .357 magnum caliber; or a double action semi-automatic pistol in .45 ACP, .40 Smith and Wesson, .357 Sig, 9mm parabellum calibers, or other calibers that fire a .355 inch diameter or larger bullet and have been authorized by the Division of Law Enforcement. The action in the semi-automatic pistol may be in either of two configurations: (1) double action only in which all trigger pulls are in the double action mode, or (2) mixed double and single action in which the first shot is double action and subsequent shots are single action. The semi-automatic sidearm will have a magazine capacity of at least seven rounds, a magazine release mounted on the side of the frame, an external hammer with a hammer drop lever/decocking lever for the double/single action design, a firing pin safety lock which will allow it be carried safely with a round in the chamber, no external safety which would require manipulation prior to firing in the double action mode, and no magazine disconnect which would prevent the weapon from being fired with the magazine removed.

(2) Operation requirements, such as covert investigations and other special assignments or conditions, may necessitate carrying an alternate sidearm other than the standard issue pistol or revolver. Any double action, semi-automatic pistol or steel frame revolver of at least .38 Special or .380 (9mm KURZ) with a capacity of at least five cartridges owned by the Service may be issued and carried for special law enforcement purposes when authorized by the ARD for Law Enforcement/Special Agent in Charge or ARD for Refuges and Wildlife. When such authority is granted, the law enforcement officer is required to qualify or re-qualify with the alternate sidearm under the same standards applicable to the standard issue handgun.

(3) Service law enforcement officers are authorized to carry a second, concealed back-up sidearm for safety purposes. The back-up sidearm must meet the standards set in either paragraphs (1) and (2) above, and the law enforcement officer must successfully meet the qualification/re-qualification standards established by the Service for back-up sidearms.

B. Shotguns and Rifles.

(1) The standard issue shotgun shall be a 12 gauge pump or semi-automatic police type weapon with a barrel length of eighteen to twenty-one inches, and fitted with rifle sights or optical/electronic sights.

(2) The standard issue rifle for law enforcement purposes shall be a bolt action or semi-automatic in .223 (5.56) or .30 caliber. Approval from the ARD for Law Enforcement/Special Agent in Charge or Assistant Regional Director for Refuges and Wildlife shall be required if non-standard rifles are to be issued and used for law enforcement purposes.

C. Select Fire Weapons. The carrying and use of select fire (fully-automatic) weapons by Service law enforcement officers is not authorized.

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D. Ammunition.

(1) Except for training purposes, only factory manufactured new (as opposed to remanufactured) ammunition may be acquired and carried for use in sidearms used for law enforcement purposes. This ammunition shall be loaded with full metal jacketed or semi-jacketed controlled expansion bullets. Information on suitable, caliber specific, duty ammunition may be obtained from the Branch of Training and Inspection, Division of Law Enforcement.

(2) Target ammunition, reloads, or cartridges loaded with wadcutter bullets may be used for practice, but not when firing a qualification or re-qualification score for record, nor may they be carried for duty purposes. Law enforcement officers will qualify and re-qualify with the same or ballistically equivalent ammunition which normally carried on duty.

(3) Shotgun ammunition utilized for duty purposes shall be factory manufactured 12 gauge, number 00 buck or rifled slugs, or other suitable rounds as recommended by the Branch of Training and Inspection, Division of Law Enforcement.

(4) Only new, commercial factory, or military arsenal manufactured, center-fire rifle ammunition of full metal jacket or jacketed controlled expansion design will be carried or used for law enforcement purposes. For training purposes only, commercially manufactured reloads, of similar bullet design, may be substituted for duty ammunition. Specific recommendations on ammunition may be obtained from the Branch of Training and Inspection, Division of Law Enforcement.

(5) To ensure that all law enforcement officers remain proficient with their weapons, each officer shall be provided with an appropriate number of rounds to meet all re-qualification requirements and to practice with each weapon authorized to be carry. This ammunition shall be in addition to any ammunition provided to the officer for the annual 40 hour in-service training. It shall be the responsibility of the ARD for Law Enforcement/Special Agent in Charge or Assistant Director for Refuges and Wildlife to ensure that this ammunition is provided and fired on an annual basis.

1.6 Carrying and Transporting Firearms. Only Service law enforcement officers who qualify and re-qualify in accordance with this part are authorized to carry firearms for law enforcement purposes.

A. When To Carry. Special Agents and other full-time law enforcement officers are subject to call any time and, therefore, are authorized to carry firearms at all times. Other Service law enforcement officers shall carry firearms when engaged in law enforcement duties, reasonably expected to be engaged in law enforcement duties, or if specifically authorized under specific circumstances. Such specific authorization must be in writing, and signed by the officer's Project Leader or higher level management.

B. Foreign Countries. Service law enforcement officers are not authorized to possess firearms while engaged in law enforcement duties in foreign countries. However, certain conditions might arise that would necessitate that firearms be carried. If a Service law enforcement officer is cognizant of the fact that such a situation might arise, he or she must obtain written permission from the legal authority in the respective host country and from the U.S. State Department. Furthermore, the Chief, Division of Law Enforcement, must concur with this request.

C. Commercial Aircraft. Public Law 87-197, 49 USC 1472(1), provides criminal penalties for the carrying of a firearm aboard a commercial aircraft. The statute specifically states that this prohibition does not apply to agents of the Federal government who are authorized or required within their official capacities to carry firearms. Pursuant to this statute, the Department of Transportation has issued regulations regarding

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carrying firearms on commercial air carriers. These regulations (as contained in 14 CFR 108) require Federal agents meet the following conditions when it is necessary for the firearm to be carried while aboard any commercial aircraft:

- (1) The Service law enforcement officer shall notify the airline at least one hour prior to departure (or in the case of an emergency, as soon as practicable) that he or she is a Federal agent who has a need to travel armed. Among other things, this allows the carrier to comply with its regulatory requirements to notify crew members and other law enforcement personnel of the presence and location of each armed person aboard the aircraft.
- (2) Armed Service law enforcement officers must identify themselves by displaying their credentials to the appropriate airline and security personnel before carrying a firearm on a commercial aircraft.
- (3) The armed Service officer **shall not** consume alcoholic beverages while on board the aircraft, or eight hours before the flight.
- (4) In order not to cause undue alarm to any passenger or have the firearm become a target of opportunity for any person, the Service law enforcement officer will exercise the utmost discretion to ensure that the firearm is not observable while in flight status.
- (5) When traveling by air on official law enforcement business, Service law enforcement officers shall determine whether the immediate requirements of the particular mission make it necessary for a firearm to be carried on their person.
- (6) No firearm shall be carried aboard a commercial aircraft by a Service law enforcement officer when traveling on personal business. However, firearms may be placed in checked baggage in accordance with Paragraph (9) below.
- (7) Whenever a firearm is to be carried aboard an aircraft, the Service law enforcement officer shall adhere to all of the above procedures. It should be noted that despite the fact that the Service law enforcement officer feels that the scope of the enforcement mission requires that he/she carry a firearm on board an aircraft, airlines are not required to transport armed law enforcement officers and may deny boarding to the armed officer.
- (8) Except as required when checking baggage with the airlines, Service law enforcement officers will not surrender any firearm to airline personnel in order to obtain a boarding pass from the airline.
- (9) When in the judgement of the Service law enforcement officer the immediate requirements of a particular law enforcement mission do not warrant the carrying of a firearm aboard the aircraft, the firearm may be placed in checked baggage in accordance with the following requirements:
 - (a) The Service law enforcement officer must ensure that the firearm is **unloaded**, secured within hard-sided luggage, or placed in a hard-sided container within soft-sided luggage; and placed in luggage to which only the officer transporting the firearm retains the key or combination to the lock.
 - (b) The Service law enforcement officer must advise the airline that the above procedures have been followed, and if requested, allow airline personnel to inspect the weapon at the ticket counter when the luggage is checked.
 - (c) The Service law enforcement officer shall ensure that the "firearms" tag is placed inside the shipping

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container (luggage), and not affixed to the outside.

(10) Under no circumstances will a Service law enforcement officer carry OC-10, Cap-Stun, other pressurized Oleoresin capsicum agents, mace, tear gas, chemical agents, or other gaseous products in a pressurized container on board an aircraft, or place such items in their checked baggage or luggage.

1.7 Initial Firearms Training.

A. Service Sidearms.

(1) **Permanent Personnel.** Initial training in the use of an approved Service sidearm shall be accomplished by the law enforcement officer-trainee's successful completion of the Basic Criminal Investigators School (CI), or the Basic Law Enforcement Course for Land Management Agencies (LM) as administered by the Federal Law Enforcement Training Center (FLETC). All law enforcement officer-trainees must fire a minimum score of 80 percent or better on the course of fire utilized for qualification purposes during this basic training. In addition, when firearms training is incorporated into either the Special Agent Basic (SABS) or the Refuge Officer Basic (ROBS); all Service officer-trainees attending must successfully complete this training by firing a minimum score of 80 percent on all qualification courses fired for record. The inability of a Service law enforcement officer-trainee to qualify at the 80 percent or better level will result in his/her failure to successfully complete this required basic training.

(2) **Seasonal Personnel.** In order to meet basic training requirements for carrying Service sidearms, seasonal law enforcement officers must successfully complete 1) a law enforcement training course approved through the National Park Service Training Program for Seasonal Employees, or 2) a law enforcement training course approved by the Department of the Interior and the Service as a substitute to the Basic Law Enforcement Course for Land Management Agencies. Any waivers to 1) or 2) above must be approved by the Chief, Division of Law Enforcement. When recency of training exceeds three years, seasonal employees may retain law enforcement authority, and may continue to be authorized to carry Service firearms only if they have been actively involved in law enforcement since their initial training, and have re-qualified every six months or prior to resuming their seasonal duties.

(3) Sidearm Specific Training.

(a) The initial training referred to in paragraphs (1) and (2) above must be specific to the type of sidearm (i.e. revolver vs semi-automatic pistol) that the Service law enforcement officer will be issued upon conferral of authority. If a different type of sidearm was used during initial training, the Service law enforcement officer must successfully complete the appropriate transitional firearms program for the weapon he or she will be issued. The appropriate transitional firearms program shall be specified by the Branch of Training and Inspection.

(b) The appropriate transitional firearms training must be completed prior to the Service law enforcement officer being issued a Service approved sidearm of a different type than the one used during initial training. After receiving transitional training, the officer must be issued an appropriate weapon within ninety (90) days. If the sidearm cannot be issued within this ninety (90) day time frame, a refresher training course authorized by the Branch of Training and Inspection will have to be completed.

B. Service Shotguns. Initial training in the use of an approved Service shotgun shall be accomplished by the Service law enforcement officer-trainee's successful completion of the CI Program, or the LM Program as administered by FLETC. If this initial training has not been received by the law enforcement officer, the office must demonstrate proficiency with the shotgun by qualifying in accordance with paragraph D below

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prior to being issued this weapon.

C. Service Rifles. Service law enforcement officers are authorized to carry approved rifles for law enforcement purposes only when they have successfully completed the required rifle training specified by the Branch of Training and Inspection.

1.8. Firearms Qualification and Requalification

A. Qualification. Initial qualification by all Service law enforcement officer-trainees is accomplished by firing a minimum score of 80 percent or better during the CI Program, the LM Program, the appropriate seasonal program as described in paragraph A(2) above or the appropriate transitional program as described in 1.7A(3)(a) above.

B. Requalification. After initial qualification, all Service law enforcement officers shall receive a minimum of four (4) hours of firearms training annually. In addition, every law enforcement officer must requalify every six (6) months, with each Service weapon they wish to carry. Re-qualification shall be accomplished by firing for record the required score of at least 80 percent on an authorized course of fire for each Service weapon which will be carried for law enforcement purposes. Law enforcement officers will also receive refresher or additional training in weapon handling, tactics, and other firearms skills necessary to effectively use their issued weapons.

(2) All Service law enforcement officers must fire an authorized reduced-light course annually with their primary sidearm.

C. Scores. All scores fired for record during initial qualification and re-qualification must be fired under the supervision of a certified range officer or certified firearms instructor.

D. Records. All firearms records shall be maintained on Form 3-2085, Firearm Training Record, Exhibit 1 and forwarded to the ARD for Law Enforcement/Special Agent in Charge or designee and shall constitute the official record. For refuge law enforcement officers, the official record shall be forwarded to the Regional Refuge Law Enforcement Coordinator or designee. This official record shall only indicate that the Service law enforcement officer passed or failed the qualification or re-qualification standard. These records must be maintained for not less than five (5) years. The records shall indicate the date of firing, time of day, weather conditions, course of fire, number of rounds, ammunition type, weapon used and range location. In addition, the records shall identify the certified range officer or certified firearms instructor under whose supervision the firing occurred, and note any specialized instructions given to individual shooters.

E. Targets. All scores fired for record shall be fired on approved targets. Approved targets are specified for each course of fire. The firing of a score for record on any target not specified in each course of fire shall require the prior approval of Branch of Training and Inspection, and shall be noted on the Firearms Training Record.

F. Authorized Courses of Fire.

(1) Except as noted below, only the courses of fire approved and maintained by the Branch of Training and Inspection may be used by Service law enforcement officers for re-qualification purposes.

(2) Other Courses of Fire. If under unusual circumstances a law enforcement officer is unable to fire an approved course of fire specified in this chapter due to a remote duty station location, no appropriate firing

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range facilities, or other limiting factor; the officer may re-qualify on any approved practical police course used by any police agency in the surrounding area. Service law enforcement officers using an alternate course of fire, however, shall obtain prior approval from their ARD or designee. All the other requirements in this chapter shall remain the same.

1.9 Certified Firearms Instructors.

A. Within each region the ARD for Law Enforcement/Special Agent in Charge and ARD for Refuges and Wildlife shall designate employees within their respective programs to serve as Service Designated Firearms Instructors (SDFI). To serve as a SDFI an employee must have graduated from a basic Firearms Instructor Training Course at the Federal Law Enforcement Training Center or an equivalent course of instructor approved by the Branch of Training and Inspection. The employee must also have served as a primary or assistant instructor at one or more Service firearms training/re-qualification sessions within the past year. Designated Firearms Instructors assist the Lead Regional Firearms Instructor.

B. Within each region the ARD for Law Enforcement/Special Agent in Charge and the ARD for Refuges and Wildlife shall designate employees within their respective programs to serve as Lead Regional Firearms Instructors. The primary role of Lead Regional Firearms Instructors is to oversee firearms training, re-qualification, and weapon familiarization at the field level for those employees with law enforcement authority. Lead Regional Firearms Instructors are responsible for planning, organizing, implementing and evaluating the firearms training program within their respective programs.

C. Certification.

(1) The Branch of Training and Inspection will maintain a list of all individuals qualified to serve as Service Designated Firearms Instructor, and a list of those persons designated as the Lead Regional Firearms Instructors for each region. Such information shall be available to the ARD for Law Enforcement/Special Agent in Charge and the ARD for Refuges and Wildlife to be considered prior to designation of Firearms Instructors. The Special Agent in Charge, Branch of Training shall be notified in writing of all designations.

(2) Service Designated Firearms Instructor designations will remain in effect until such time as an instructor fails to conduct or assist in the presentation of one training/re-qualification session in two consecutive years or the designation is changed by the responsible ARD.

(3) Reinstatement as a Service Designated Firearms Instructor must be initiated by written request to the ARD for Law Enforcement/ Special Agent in Charge or Assistant Regional Director for Refuges and Wildlife. Reinstatement will be granted only after successful completion of a Service refresher or other approved refresher course as specified by the Branch of Training and Inspection, if the individual has not maintained qualifications as indicated in paragraph **(2)** above.

D. Non-Service Firearms Instructors. When special circumstances exist and a Service Designated Firearms Instructor is not available to conduct re-qualification this duty may be performed by a certified range officer or certified firearms instructor employed and designated by any bona fide Federal, State, County, or Municipal police agency. The reporting requirements as contained in this chapter must still be completed for any re-qualification conducted by non-Service firearms instructors.

E. In-Service Training for Firearms Instructors. Every three years, a 24 hour in-service training session will be conducted for Service firearms instructors. The Branch of Training and Inspection shall be responsible for the development and coordination of these training sessions. The ARD for Law Enforcement/Special Agent in Charge and ARD for Refuges and Wildlife shall nominate those firearms

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Instructors who will attend this training. However, attendance is mandatory for Designated Lead Regional Firearms Instructors.

1.10 Firearms Instructors Handbook. The Branch of Training and Inspection is responsible for the development, coordination, issuance and revision of the Firearms Instructor Handbook. The Handbook will contain applicable copies of the Department and Service firearms policies and guidelines; approved courses of fire; lesson plans; re-qualification reporting procedures and formats; and other information deemed necessary for proper administration of the Service's firearm programs.

1.11 Firearms Maintenance, Inspection, and Storage.

A. Maintenance. Each law enforcement officer is responsible for the care and routine cleaning of all assigned firearms. To ensure reliability, all ammunition carried in the firearm and ammunition carriers shall be replaced semi-annually. Law enforcement officers are not authorized to disassemble any Service firearm beyond the level specified during the training received for that firearm. Nor may they or anyone else modify in any way the internal/external parts of any firearm. The addition of after-market grips to a Service sidearm is authorized with the approval of a Service Armorer. The addition of accessories or other modifications to Service owned firearms used for law enforcement purposes may only be done by Service Armorer or by the factory, or other certified armorers with the approval of a Service Armorer.

B. Inspection and Repair. Service firearms shall be inspected at least annually by a certified armorer to ensure proper functioning. Certified armorers may disassemble Service firearms as necessary to inspect and analyze problems with the mechanical functioning of the weapons. If a firearm is found to have mechanical modifications that pose a safety hazard or if malfunctions or excessive wear are observed, the firearm is to be immediately removed from service until repaired or replaced. If immediate repairs are not possible, the law enforcement officer shall be issued a replacement firearm of the same type until such time as the officer's weapon is repaired. Firearms found to be unreliable, or in need of excessive repair, must be surveyed and, if appropriate, replaced. All repairs made to any Service firearm must be documented. Records of all annual firearm inspections and repairs shall be maintained by the ARD for Law Enforcement/Special Agent in Charge or designee. For refuge Law Enforcement officers, these records shall be maintained by the Regional Refuge Law Enforcement Coordinator or designee.

C. Storage.

(1) Service officers are responsible for the safe and secure storage of all firearms assigned to them. Service firearms that are not routinely carried shall be stored at Service facilities in a vault, gun locker, or other location which is secured in such a manner as to substantially reduce the possibility of theft or unauthorized removal. These firearms shall be unloaded, with the action open (out of battery).

(2) Service law enforcement officers may leave firearms that are routinely used for law enforcement operations in Service vehicles. Care should be exercised by law enforcement officers in removing and securing the firearms so as not to draw any undue attention which might result in the theft or unauthorized removal of the firearms.

(3) Service firearms carried in vehicles must be secured in locked boxes, trunks, or other locations which will reduce the risk of theft or unauthorized removal, unless their use is imminent. Firearms shall not be stored in vehicles that are not in routine use and which are left unattended for extended periods of time.

(4) If at all possible, firearms should be stored at the law enforcement officer's duty station. However, when it is impractical to do so, or operational requirements dictate otherwise, law enforcement officers are authorized to store them at their residence, provided appropriate safeguards are taken. Family members

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should be educated not to handle these firearms. Firearms stored at a residence must be stored under lock and key, unloaded, actions open (out of battery) with the ammunition stored separately.

D. Loss of Firearms. Service law enforcement officers shall verbally report the loss or theft of any Service firearm to his or her immediate supervisor, the local Federal Bureau of Investigation office, and the pertinent local police jurisdictions. This report should include weapon make, model number, serial number, and caliber. These oral reports must be followed by a written report from the law enforcement officer within seventy two (72) hours. The officer's immediate supervisor shall forward a copy of the report to the ARD for Law Enforcement/Special Agent in Charge or ARD for Refuges and Wildlife for compliance with report of survey requirements in accordance with 310 FW 7, Report of Survey.

1.12 Service Designated Armorer.

A. Within each region the ARD for Law Enforcement/Special Agent in Charge and the ARD for Refuges and Wildlife shall designate employees within their respective programs to receive training and serve as Service Designated Armorers (SDA). Service Designated Armorers will perform routine inspection, maintenance, and repair of Service firearms.

B. Service Designated Armorers must have graduated from a factory sponsored training course for the specific firearm(s) for which certification is required, and must successfully meet all factory re-certification requirements.

C. The Branch of Training and Inspection shall be advised of all Service Designated Armorer designations and shall maintain a list of all Service Designated Armorers. This list shall include the name, duty location, Division identification, and what weapon certification is held by each armorer.

/sgd/ Denise E. Sheehan, Assistant Director – Budget, Planning and Human Resources
for DIRECTOR

Date: November 22, 2005

11/22/05, FWM 472
Supersedes 445 FW 4, FWM 306, 12/31/96

LAW ENFORCEMENT

CONSERVATION LAW ENFORCEMENT PROGRAM

APPENDIX A

MARINE CORPS AND U.S. FISH AND WILDLIFE SERVICE MEMORANDUM OF
AGREEMENT

**FISH AND WILDLIFE SERVICE
LAW ENFORCEMENT**

Law Enforcement **Part 442 Firearms and Use of Force**
Chapter 2 Use of Force Policy **442 FW 2**

2.1 Purpose. This chapter establishes a uniform policy regarding the use of force by Service officers in the performance of their official law enforcement duties.

A. This policy is intended to provide Service officers with an understanding of the various force options available to them, and when the application of a particular option or level of force would be considered legally permissible and reasonably necessary to perform their duties, and to protect themselves and others.

B. For the purposes of this Part 442, the term Service law enforcement officer, Service officer, or officer means any Service employee authorized to carry and utilize firearms in the performance of their official law enforcement duties.

2.2 Policy. Service law enforcement officers will use only that force necessary and reasonable to overcome the resistance offered by a suspect or individual. The level of force used by a Service officer must not be excessive or unjustified.

2.3 Definitions. The following terms and definitions are to be used in the practical application of the use of force.

A. Force. Physical presence, action or exercise of strength to compel another to act or refrain from certain behavior. It may include physical touching of another, striking, kicking, the use of chemical agents and other intermediate force weapons, restraints, and/or firearms.

B. Non-lethal Force. Force used to control a suspect or prisoner, or other person when justified, which does not normally result in serious injury or death. This usually includes physical touching of a suspect, and may be in the form of control techniques, Oleoresin Capsicum, batons, or restraining devices.

C. Deadly Force. Force which is intended or likely to cause death or serious bodily harm. Most often, deadly force involves the use of a firearm aimed at a suspect. Deadly force actually encompasses any means or instrumentality which may inflict death or serious bodily injury.

D. Unjustified or Excessive Use of Force. Force without justification or excuse; or the application of force clearly beyond that called for given the suspect's level of resistance.

2.4 Application of Force.

A. Levels of Control/Force. The levels of control or force utilized by Service officers to overcome a suspect's/individual's resistance are categorized as follows.

- (1) Officer's Presence
- (2) Verbal Direction
- (3) Soft, empty hand control
- (4) Hard, empty hand control
- (5) Chemical Agents (Oleoresin capsicum)
- (6) Impact Weapons

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Law Enforcement Part 442 Firearms and Use of Force
Chapter 2 Use of Force Policy 442 FW 2

(7) Deadly Force

B. Use of Restraints. Service officers may routinely use handcuffs, flex-cuffs, legcuffs and body chains to justifiably control, restrain, and transport persons. Restraining devices will be applied properly and in accordance with the training received so as to minimize the risk of unnecessary injury.

C. Avoidance of Risk. Service officers should not take undue risks that could result in death or serious bodily harm. Whenever possible, officers should attempt to defuse and stabilize any dangerous situation(s) by using communication skills and/or waiting for backup assistance. Officers are never required to take UNREASONABLE risks and may opt to disengage or withdraw if such action can be safely accomplished without further endangering themselves, other officers or the public.

D. Degree of Force. Service officers will only use that degree of force that is legally permissible; reasonably necessary to perform their duties; and is required to protect themselves and others. The degree of force applied depends on the circumstances and facts of a particular incident, and is governed by the following conditions:

(1) The degree of resistance or force threatened or exhibited by the suspect(s), including the suspect's possession or non-possession of a deadly weapon; and

(2) The officer's perception of that resistance, including the jeopardy of death or serious bodily harm to the officer or others implied by the suspect.

E. Deadly Force Policy. The use of deadly force is the highest level of force that can be employed by a Service officer. It will normally involve the aimed discharge of a firearm at a person with the intended effect to be the immediate incapacitation of that person. The following deadly force policy will apply to all Service officers:

A SERVICE OFFICER MAY ONLY DISCHARGE HIS OR HER FIREARM DIRECTLY AT ANOTHER PERSON WHEN THE OFFICER REASONABLY BELIEVES THAT THE OFFICER OR ANOTHER INDIVIDUAL IS IN IMMINENT DANGER OF DEATH OR SERIOUS BODILY INJURY.

2.5 Chemical Agents.

A. Oleoresin capsicum (OC). The only approved chemical agent that may be used by Service officers is Oleoresin capsicum. The Service recognizes OC as a non-lethal force alternative which can be used to defend or against and control actively resistant or violent offender/individuals. Based on the Service officers reasonable perception that OC is necessary to avoid a physical confrontation, OC may be used immediately PRIOR to hard, empty hand control techniques, impact weapons, or deadly force.

B. Authorization. Only those Service officers who have successfully completed Service approved training in the use of OC are authorized to carry and use this agent. Only Service owned and issued OC is authorized.

2.6 Impact Weapons. Service officers who have successfully completed the required training are authorized to use a baton (either straight or collapsible). This weapon may only be used by Service officers when the offender is engaged in physically aggressive resistance which puts the officer at risk of bodily harm. Batons may only be used in accordance with the training received.

2.7 Firearms

A. Guidelines. The following guidelines will govern the use of firearms by Service officers.

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(1) A firearm will be fired directly at a person only with the intent of rendering the person incapable of continuing the action or activity that justified the use of deadly force. The use of deadly force will be justified based upon the circumstances known to the officer at that time, and where the immediate application of deadly force is the only reasonable means by which the person can be quickly and dependably incapacitated or stopped.

(2) Firing at a fleeing suspect is not justified unless the Service officer has reasonable cause to believe the fleeing person poses an immediate threat of serious bodily injury or death to the officer or others, has the means to carry out that threat, and manifests an intent to do so.

(3) Warning shots can pose a hazard to innocent persons, therefore their use by Service officers is not authorized.

(4) In the presence of the public, a sidearm should only be drawn when the Service officer has cause to believe it may be needed, and to leave it in the holster would place the officer at a distinct disadvantage.

(5) Shoulder weapons (shotguns and rifles) may be displayed only when appropriate and when their use may be required.

B. Authorization. Only those Service officers who have successfully completed Service approved training on the use of firearms and are currently qualified are authorized to carry and use firearms. Only Service owned and issued firearms are authorized.

/sgd/ Denise E. Sheehan, Assistant Director – Budget, Planning and Human Resources
for DIRECTOR

Date: November 22, 2005

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Law Enforcement Part 442 Firearms and Use of Force
Chapter 3 Reporting and Board of Review 442 FW 3

3.1 Purpose. This chapter establishes procedures for reporting the use of force or the discharge of firearms by Service officers and for convening a Board of Review (BOR) in such instances.

3.2 Scope.

A. This chapter applies to the use of force only where serious bodily injury has occurred, or the intentional or unintentional discharge of a firearm, by Service officers while performing law enforcement duties.

B. This chapter does not apply to the discharge of a firearm for training, qualifying, or non-law enforcement purposes.

3.3 Responsibilities.

A. Assistant Director-Refuges and Wildlife. The Assistant Director ensures the development of Service policy governing the use of force and that the policy remains current. The Assistant Director is assisted by the **Chief, Division of Law Enforcement**.

B. Regional Director. The Regional Director convenes and acts on the report of a Board of Review in accordance with this chapter and provides for logistical and clerical support as needed. The Regional Director also ensures that personnel involved in use of force incidents are offered psychological counseling.

C. Deputy Director - Staff. Within the Washington Office, responsibilities identified for the Regional Director are assumed by the Deputy Director - Staff.

D. Chairperson, Board of Review. The chairperson will ensure that the BOR fulfills its duties in accordance with this chapter and submits its final report to the Regional Director within the allotted time.

3.4 Reporting Requirements.

A. Service Officer.

(1) Whenever a Service officer has been involved in a use of force incident where serious bodily injury has occurred, or has discharged a firearm, except for training or non-law enforcement purposes, the involved officer shall as soon as possible verbally notify the immediate supervisor.

(2) The officer should notify local law enforcement authorities of use of force incidents, advise them of any arrests, and request that a crime scene investigation be initiated.

(3) Within seventy-two (72) hours, the involved officer shall prepare and submit a written report detailing the circumstances that resulted in the discharge of the firearm or use of force. This report shall be submitted to the officer's immediate supervisor. It is the official report of the incident and is not considered a statement covered by section 3.6

B. Supervisory Personnel.

(1) Upon receipt of the officer's verbal notification, the immediate supervisor shall as soon as possible notify

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LAW ENFORCEMENT**

Law Enforcement **Part 442 Firearms and Use of Force**
Chapter 3 Reporting and Board of Review **442 FW 3**

the appropriate Assistant Regional Director and the Chief, Division of Law Enforcement.

(2) The Chief, Division of Law Enforcement shall notify other Service/Department personnel as deemed appropriate, or as may be required by Department policy.

3.5 Other Actions Attendant to Incidents with Serious Bodily Injury or Death. Based on the initial facts known regarding the firearm discharge or other use of force, the following actions shall be taken.

A. Medical Aid. The officer should render or arrange for emergency medical aid for all injured persons when it is safe for the officer to do so.

B. On-Scene Presence. Upon receipt of the Service officer's notification, the immediate supervisor or other designated person shall:

(1) Report to the scene of the incident, or to where the involved officer is located. If the immediate supervisor is unable to report in a timely manner, the supervisor will arrange for another Service officer to immediately report to the scene or the officer's location.

(2) If the supervisor or designate deems it appropriate, take custody of all firearms that have been discharged by Service officers during the incident and retain them in the supervisor's custody until the conclusion of the BOR investigation; unless the weapons are being held by the local law enforcement agency. All such weapons shall be made available to the BOR for testing and other uses if the board deems it appropriate.

C. Administrative Leave. The officer will be placed on administrative leave with full pay pending the conclusion of the review by the BOR. The involved officer may be returned to restricted or non-restricted duties prior to the completion and submission of the BOR's final report when the Regional Director and Chief, Division of Law Enforcement concur that it is appropriate to do so.

3.6 Statements by Service Officers.

A. A Service officer should not give any oral or written statements to anyone, including the investigative agency at the scene until he/she has contacted his/her immediate supervisor. Depending on the seriousness of the incident, the involved officer may wish to wait 24 hours before making any statements regarding the incident.

B. With the exception of the official notifications and report of the incident required in section 3.4A, all statements, either oral or written, required to be made by Service officers to their supervisors or the BOR are for internal Service administrative purposes ONLY. Such statements will not be used in any criminal or civil proceeding that may result from the incident. Any officers involved in a use of force incident will be afforded up to forty-eight (48) hours to seek private legal counsel prior to making any statements. Should the officer retain private counsel, it will be at the officer's own expense. If retained, private counsel may be present during any questioning of the involved officer, and may provide assistance with the preparation of all oral and written statements.

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3.7 Psychological Counseling.

- A.** The Service shall make available to all Service officers and their immediate families, at no cost to them, professional psychological counseling whenever the officer has been involved in a use of force incident or other traumatic incident that may affect the officer or his/her family.
- B.** The use of this resource is entirely at the discretion of the officer or his/her family, except that the Regional Director may require such counseling when making a fitness for duty determination based on a recommendation by the BOR. The psychological counseling provided by the Service shall be of a reasonable duration and is intended to assist the officer and his/her family in dealing with the initial shock or psychological trauma that may result from the incident.
- C.** The offer of psychological counseling does not preclude the officer from obtaining counseling from anyone he/she desires, but at the officer's own expense.
- D.** Health care professionals involved in providing this service, absent a court order, will not divulge to any investigative body the contents of any discussions they have had with the officer or members of his/her family. The only exception to this will be the requirement to offer comments to the Service as to the officers fitness for duty.

3.8 Board of Review. Whenever a Service officer is involved in a use of force incident where serious bodily injury has occurred, or where the officer has discharged a firearm, either intentionally or unintentionally, excluding discharges during training and for non-law enforcement purposes; a Board of Review shall be convened to gather information and facts, conduct interviews, document, and make recommendations concerning any administrative actions that may be taken by the Service as a result of the incident.

A. Convening Authority. The Regional Director will convene the BOR as soon as practicable. Specifically, within 72 hours of being notified of an incident or discharge, the Regional Director will issue a document that impanels the members of the BOR, identifies the chair, states the purpose of the investigation, provides instructions by referencing this chapter, and specifies the date when the final report is due.

B. Composition.

- (1) The BOR will consist of a special agent from the Division of Law Enforcement's Branch of Training and Inspection; a management official knowledgeable and/or experienced in the field of operation in which the incident or discharge occurred; and a field officer knowledgeable and/or experienced in the field of operation in which the incident or discharge occurred, and selected by officer involved. In the event more than one officer is involved, two field officers shall be selected by the officers involved.
- (2) The BOR will be chaired by the special agent from the Branch of Training and Inspections.
- (3) The management official selected must have law enforcement authority and shall not be in the direct line of supervision of the officer or officers involved in the incident or discharge being reviewed.

C. Duties. The BOR shall review the instance to:

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(1) Determine whether the incident or discharge was appropriate. In arriving at such determination the BOR shall:

- (a) consider all property damage and personal injury or death to any persons involved;
- (b) consider whether officers involved complied with existing Service policy;
- (c) identify any weakness or defects in existing Service policy; and,
- (d) determine whether Service policy was effectively communicated.

(2) Recommend appropriate action to reduce likelihood of recurrence of the incident or discharge.

(a) Recommendations may address the need to review or revise existing procedures; provide additional training to parties involved both directly or indirectly; or take appropriate administrative action against parties involved, both directly and indirectly.

(b) The BOR will no recommendation concerning criminal or civil action.

(c) In the event that administrative action is recommended, the BOR will not recommend a specific administrative action to be taken.

(3) The BOR will clearly identify its "judgement calls" where they may differ from the judgements of others involved.

D. Report.

(1) The final report shall be concurred in by a majority of BOR members, and be signed by those concurring members. Any member that disagrees with the findings and recommendations of the Board, will submit a minority report. The final report(s) shall be submitted within thirty (30) days of impanelment to the convening authority (Regional Director.)

(2) The final report of the BOR is an internal document to be considered by management for the purpose of reviewing all use of force incidents and determining appropriate action. As such, the report does not constitute or contain an official position of the Service.

/sgd/ Denise E. Sheehan, Assistant Director – Budget, Planning and Human Resources
for DIRECTOR

Date: November 22, 2005

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**U.S. Fish and Wildlife Service Regional Law
Enforcement Office Contact Information**

JURISDICTION	SPECIAL AGENT IN CHARGE
REGION 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, and Guam,	SAC U.S. Fish and Wildlife Service/Law Enforcement 911 N.E. 11 th Avenue Portland, OR 97232-4181 Main: 503-231-6125 Fax: 503-231-6197
REGION 2: Arizona, New Mexico, Oklahoma, and Texas	SAC U.S. Fish and Wildlife Service/Law Enforcement 500 Gold Ave SW, RM 9021 Albuquerque, NM 87102 Main: 505-248-7889 Fax: 505-248-7899
REGION 3: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin	SAC U.S. Fish and Wildlife Service/Law Enforcement P.O. Box 45 Federal Building Fort Snelling, MN 55111-0045 Main: 612-713-5320 Fax: 612-713-5283
REGION 4: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, and the U.S. Virgin Islands	SAC U.S. Fish and Wildlife Service/Law Enforcement P.O. Box 49226 Atlanta, GA 30359 Main: 404-679-7057 Fax: 404-679-7065
REGION 5: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia	SAC U.S. Fish and Wildlife Service/Law Enforcement 300 Westgate Center Drive Hadley, MA 01035 Main: 413-253-8274 Fax: 413-253-8459
REGION 6: Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming	SAC U.S. Fish and Wildlife Service/Law Enforcement P.O. Box 25486 – DFC Denver, CO 80225 Main: 303-236-7540 Fax: 303-236-7901
REGION 7: Alaska	SAC U.S. Fish and Wildlife Service/Law Enforcement 1011 E. Tudor Road, Mail Stop 151 Anchorage, AK 99503-6199 Main: 907-786-3311 Fax: 907-786-3313
REGION 9: Headquarters Office	SAC U.S. Fish and Wildlife Service/Law Enforcement 4401 N. Fairfax Drive, Mail Stop LE3000 Arlington, VA 22203 Main: 703-358-1949 Fax: 703-358-2271

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APPENDIX C

The installation CLEP is currently using the following ammunition:

12 ga Federal 2 3/4 #6 shot

12 ga Federal 3 1/2 # 1 shot

12 ga Remington 2 3/4

12 ga Remington 2 3/4

12 ga Remington 3" #1 shot

12 ga Remington 3" #2 shot

12 ga Remington 3" BBB

12 ga Remington Nitro-steel 3" #1

12 GAUGE BIRDFRITE SCARE CARTRIDGES, aka Bangers

12 Gauge Nitro-Steel High Velocity Magnum Load Shotshell, 3" Shell, #1 Zinc-Plated Shot, 1-1/4 oz., 1390 fps, 25 Rounds Per Box

12 Gauge Remington Sportsman Hi-Speed Steel, 2-3/4", #6 Steel Shot, 1 oz., 1365 fps, 25 Rounds per box

12 GAUGE SHELL CRACKERS, aka Bangers

22 cal

Assorted for launcher

CCI 22 cal. Mini mag

CCI 22cal shot shell

CCI mini mag

CCI shot shell

Daisy

daisy .177 cal pellets

daisy .22 cal pellets

Federal 308 win

Federal 22 cal.

Federal 7mm

Federal premium 3 1/2"

Federal premium 3"

Federal rifle 308 win

Margo 12 ga scare

Margo supplies

Moog Feuerwerk jet firecracker

Moog jet fire cracker

PMC Pistol

PMC Pistol Cart.

PMC subsonic

PMC subsonic 22 cal

Quick silver

Reed Bird bangers

Reed Joseph bird banger

Reed Joseph screamer

Reed Screamer's

Remington 2 3/4"

Remington 22 subsonic

Remington 3"

Remington 3" # 1

Remington 3" BBB

Remington 9 pellet 00 bk

Remington Nitro-Steel Magnum

Remington subsonic

Starter 6mm caps

Winchester 12 ga 3" #2 shot

Winchester Supreme 3 1/2"

Zink Feuerwerk cracker

Zink Feuerwerk bird bomb

Zink Feuerwerk pyro- cracker

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Appendix I



Flora and Fauna Lists

- Enclosure 1 Flora of Naval Air Station Oceana Dam Neck Annex**
- Enclosure 2 Fauna of Naval Air Station Oceana Dam Neck Annex**
- Enclosure 3 Species of Greatest Conservation Need for the Mid-Atlantic Coastal Plain**

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Enclosure 1 Flora of Naval Air Station Oceana Dam Neck Annex

Flora of Naval Air Station Oceana Dam Neck Annex											
Scientific Name	Common name	Origin⁷	Forests	Dunes	Old Field Habitat	Freshwater Wetlands	Tidal Marshes	Developed Areas	Status	Rank	Date of Last Observation
Trees											
<i>Acer rubrum</i>	Red maple	N	X			X		X			
<i>Carpinus caroliniana</i>	American hornbeam	N	X								
<i>Crataegus marshallii</i>	Parsley hawthorn	N						X			
<i>Diospyros virginiana</i>	Persimmon	N	X								
<i>Ilex opaca</i>	American holly	N	X			X		X			
<i>Liquidambar styraciflua</i>	Sweet gum	N	X			X		X			
<i>Magnolia virginiana</i>	Sweet bay	N	X			X					
<i>Malus</i> sp.	Flowering crab apple	N			X			X			
<i>Nyssa sylvatica</i>	Black gum	N	X			X					
<i>Persea borbonia</i>	Red bay	N	X			X					
<i>Pinus palustris</i>	Long leaf pine	N						X			
<i>Pinus taeda</i>	Loblolly pine	N	X	X		X		X			
<i>Populus deltoides</i>	Eastern cottonwood	N						X			
<i>Prunus serotina</i>	Black cherry	N	X	X				X			
<i>Quercus alba</i>	White oak	N	X			X		X			
<i>Quercus falcata</i>	Southern red oak	N	X					X			
<i>Quercus incana</i> ¹	Bluejack oak	N	X	X							
<i>Quercus nigra</i>	Water oak	N	X			X		X			
<i>Quercus phellos</i>	Willow oak	N	X			X		X			
<i>Quercus rubra</i>	Northern red oak	N	X					X			
<i>Quercus velutina</i>	Black oak	N	X					X			
<i>Quercus virginiana</i>	Live oak	N	X	X				X			

Flora of Naval Air Station Oceana Dam Neck Annex											
Scientific Name	Common name	Origin ⁷	Forests	Dunes	Old Field Habitat	Freshwater Wetlands	Tidal Marshes	Developed Areas	Status	Rank	Date of Last Observation
<i>Salix nigra</i>	Black willow	N	X			X		X			
<i>Taxodium distichum</i>	Bald cypress	N				X	X				
Shrubs											
<i>Alnus serrulata</i>	Hazel alder	N				X					
<i>Baccharis halimifolia</i>	Groundsel-tree	N				X	X				
<i>Cephalanthus occidentalis</i>	Buttonbush	N				X					
<i>Hibiscus moscheutos</i>	Swamp rosemallow	N				X	X				
<i>Ilex coriacea</i>	Bay-gall holly	N				X					
<i>Iva frutescens</i>	Marsh elder	N	X			X	X	X			
<i>Iva imbricata</i> ²	Seashore elder	N		X		X	X				
<i>Myrica cerifera</i>	Southern wax myrtle	N	X			X	X	X			
<i>Populus heterophylla</i>	Swamp cottonwood	N	X			X					
<i>Rosa palustris</i>	Swamp rose	N				X					
<i>Salix alba</i>	White willow	I						X			
<i>Salix caroliniana</i>	Coastal-plain willow	N				X					
<i>Salix nigra</i>	Black willow	N				X					
<i>Sambucus canadensis</i>	Common elderberry	N	X			X					
<i>Vaccinium arboreum</i>	Sparkleberry	N	X			X					
<i>Vaccinium corymbosum</i>	Highbush blueberry	N	X			X					
<i>Yucca aloifolia</i>	Spanish bayonet	N			X			X			
Forbs/Herbs											
<i>Agalinis purpurea</i>	False fox-glove	N				X					

Flora of Naval Air Station Oceana Dam Neck Annex											
Scientific Name	Common name	Origin ⁷	Forests	Dunes	Old Field Habitat	Freshwater Wetlands	Tidal Marshes	Developed Areas	Status	Rank	Date of Last Observation
<i>Ammophila breviligulata</i>	American beachgrass	N		X							
<i>Andropogon virginicus</i>	Broomsedge	N	X					X			
<i>Apios americana</i>	Groundnut	N	X		X						
<i>Atriplex paula</i>	Orach	N		X							
<i>Arundinaria gigantea</i>	Switchcane	N	X			X					
<i>Asclepias incarnata</i>	Swamp milkweed	N				X					
<i>Bacopa monnieri</i>	Coastal water-hyssop	N					X				
<i>Bidens frondosa</i>	Devil's beggars-tick	N									
<i>Boehmeria cylindrica</i>	False nettle	N				X					
<i>Borrhchia frutescens</i>	Sea ox-eye	N		X			X				
<i>Briza minor</i>	Quaking grass	I			X	X					
<i>Cakile edentula</i>	American searocket	N		X							
<i>Calapogon puchellus</i>	Grass-pink	N				X					
<i>Carex comosa</i>	Longhair sedge	N				X					
<i>Carex lupulina</i>	Hop sedge	N				X					
<i>Carex lurida</i>	Shallow sedge	N				X					
<i>Carex stipata</i>	Sedge	N				X					
<i>Cenchrus longispinus</i>	Sandbur	N		X							
<i>Cenchrus tribuloides</i>	Sand dune sandspur	N		X							
<i>Centella asiatica</i>	Spadeleaf	I				X					
<i>Chasmanthium laxum</i>	Slender spinegrass	N	X			X					
<i>Chasmanthium sessiliflorum</i>	Longleaf spike grass	N		X							

Flora of Naval Air Station Oceana Dam Neck Annex											
Scientific Name	Common name	Origin ⁷	Forests	Dunes	Old Field Habitat	Freshwater Wetlands	Tidal Marshes	Developed Areas	Status	Rank	Date of Last Observation
<i>Cladium jamaicense</i>	Jamaica swamp sawgrass	N					X				
<i>Cladium mariscoides</i>	Smooth sawgrass	N				X					
<i>Cuscuta</i> spp.	Dodder	N		X	X	X					
<i>Cyperus erythrorhizos</i>	Red-root flatsedge	N				X					
<i>Cyperus pseudovegetus</i>	Marsh flatsedge	N				X					
<i>Cyperus strigosus</i>	Straw-color flatsedge	N			X						
<i>Decodon verticillatus</i>	Swamp loosestrife	N				X					
<i>Desmodium strictum</i>	Pineland tick-trefoil	N			X			X			
<i>Diodia virginiana</i>	Button weed	N			X			X			
<i>Distichlis spicata</i>	Salt grass	N					X				
<i>Drosera intermedia</i> ³	Spoon-leaved sundew	N			X	X					
<i>Echinochloa walteri</i>	Coast cockspur	N				X					
<i>Eclipta alba</i>	False daisy	N				X					
<i>Elymus virginicus</i>	Wild rye	N		X							
<i>Eleocharis fallax</i>	Creeping spikerush	N				X					
<i>Eleocharis melanocarpa</i> ¹	Black-fruited spikerush	N				X					
<i>Eleocharis obtusa</i>	Blunt spikerush	N				X					
<i>Eleocharis quadrangulata</i>	Square-stemmed spikerush	N				X					
<i>Saccharum giganteum</i>	Sugarcane plumegrass	N				X					
<i>Erigeron vernus</i> ¹	Early whitetop fleabane	N		X		X					

Flora of Naval Air Station Oceana Dam Neck Annex											
Scientific Name	Common name	Origin ⁷	Forests	Dunes	Old Field Habitat	Freshwater Wetlands	Tidal Marshes	Developed Areas	Status	Rank	Date of Last Observation
<i>Eupatorium perfoliatum</i>	Common boneset	N	X			X					
<i>Euthamia galeatorum</i>	Narrow-leaf fragrant goldenrod	N									
<i>Fimbristylis caroliniana</i>	Carolina fimbry	N		X		X					
<i>Fuirena breviseta</i> ⁴	Umbrella sedge	N		X		X					
<i>Fuirena pumila</i>	Dwarf umbrella-sedge	N				X					
<i>Galium obtusum</i>	Bedstraw	N	X		X						
<i>Galium tinctorium</i>	Stiff marsh bedstraw	N				X					
<i>Gratiola aurea</i>	Golden hedgehyssop	N				X					
<i>Hibiscus moscheutos</i>	Swamp rosemallow	N				X					
<i>Hydrocotyle verticillata</i>	Whorled pennywort	N				X					
<i>Hydrolea quadrivalvis</i>	Water pod	N				X					
<i>Hypericum mutilum</i>	Dwarf St. Johnswort	N	X			X					
<i>Hypoxis sessilis</i> ⁴	Glossy-seeded yellow star-grass	N									
<i>Juncus biflorus</i>	Bog rush	N				X					
<i>Juncus canadensis</i>	Canada juncus	N				X					
<i>Juncus diffusissimus</i>	Slim pod rush	N				X					
<i>Juncus effusus</i>	Soft rush	N				X					
<i>Juncus elliotii</i> ²	Elliott's rush	N									
<i>Juncus repens</i>	Creeping rush	N				X					
<i>Juncus roemerianus</i>	Black needlerush	N					X				

Flora of Naval Air Station Oceana Dam Neck Annex											
Scientific Name	Common name	Origin ⁷	Forests	Dunes	Old Field Habitat	Freshwater Wetlands	Tidal Marshes	Developed Areas	Status	Rank	Date of Last Observation
<i>Juncus scirpoides</i>	Needlepod rush	N				X					
<i>Juncus validus</i> var. <i>validus</i> ⁵	Round-headed rush	N									
<i>Lechea maritima</i> var. <i>virginica</i> ³	Virginia pinweed	N		X							
<i>Leersia hexandra</i>	Club-head cutgrass	N				X					
<i>Leersia oryzoides</i>	Rice cutgrass	N				X					
<i>Limnobium spongia</i>	American spongeplant	N		X		X					
<i>Lipocarpa maculata</i> ⁶	American halfchaff sedge	N				X					
<i>Lobelia cardinalis</i>	Cardinal flower	N				X					
<i>Ludwigia alternifolia</i>	Bushy seedbox	N				X	X				
<i>Ludwigia brevipes</i> ¹	Long beach primrose-willow	N				X					
<i>Ludwigia palustris</i>	Water primrose	N				X					
<i>Ludwigia repens</i>	Creeping primrose-willow	N									
<i>Ludwigia sphaerocarpa</i>	Globe fruit seedbox	N				X					
<i>Luncus acuminatus</i>	Knot-leaved rush	N				X					
<i>Lycopus virginicus</i>	Virginia bugleweed	N				X					
<i>Mikania scandens</i>	Climbing hempweed	N	X		X			X			
<i>Nelumbo lutea</i>	American lotus	N				X					
<i>Nymphaea odorata</i>	Fragrant water lily	N				X					
<i>Osmunda cinnamomea</i>	Cinnamon fern	N	X								
<i>Osmunda regalis</i>	Royal fern	N	X			X					

Flora of Naval Air Station Oceana Dam Neck Annex											
Scientific Name	Common name	Origin ⁷	Forests	Dunes	Old Field Habitat	Freshwater Wetlands	Tidal Marshes	Developed Areas	Status	Rank	Date of Last Observation
<i>Panicum dichotomiflorum</i>	Fall panic grass	N	X		X						
<i>Panicum scoparium</i>	Panicgrass	N			X			X			
<i>Peltandra virginica</i>	Arrow arum	N				X					
<i>Phragmites australis</i>	Common reed	N				X	X	X			
<i>Phyla lanceolata</i>	Lance-leaf frog-fruit	N				X					
<i>Pluchea camphorata</i>	Camphor pluchea	N				X	X				
<i>Polygonum arifolium</i>	Tearthumb	N				X					
<i>Polygonum densiflorum</i>	Denseflower smartweed	N			X	X					
<i>Polygonum pennsylvanicum</i>	A smartweed	N			X	X					
<i>Polygonum punctatum</i>	Dotted smartweed	N				X					
<i>Pontederia cordata</i>	Pickerelweed	N				X					
<i>Proserpinaca palustris</i>	Marsh mermaid-weed	N				X					
<i>Rhexia mariana</i>	Maryland meadow-beauty	N				X					
<i>Rhynchospora fascicularis</i> var. <i>fascicularis</i> ⁶	Fasciculate beakrush	N		X		X					
<i>Rhynchospora glomerata</i>	Clustered beaksedge	N				X					
<i>Rhynchospora macrostachya</i> var. <i>macrostachya</i> ³	Tall horned beaksedge	N				X					
<i>Rhynchospora rariflora</i>	Few-flower beakrush	N				X					

Flora of Naval Air Station Oceana Dam Neck Annex											
Scientific Name	Common name	Origin ⁷	Forests	Dunes	Old Field Habitat	Freshwater Wetlands	Tidal Marshes	Developed Areas	Status	Rank	Date of Last Observation
<i>Rosa palustris</i>	Swamp rose	N				X					
<i>Rubis hispidus</i>	Bristly blackberry	N			X	X					
<i>Rubus cuneifolius</i>	Sand blackberry	N		X							
<i>Rumex crispus</i>	Curly dock	I						X			
<i>Sacciolepis striata</i>	American cupscale	N				X					
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	N				X					
<i>Saururus cernuus</i>	Lizard's tail	N				X					
<i>Schoenoplectus tabernaemontani</i>	Softstem bulrush	N				X					
<i>Scirpus americanus</i>	Chair-maker's rush	N				X					
<i>Scirpus cyperinus</i>	Wool grass	N				X					
<i>Setaria magna</i>	Giant foxtail grass	N			X	X					
<i>Solidago sempervirens</i>	Seaside goldenrod	N		X							
<i>Solidago</i> spp.	Goldenrod	N	X	X	X	X		X			
<i>Spartina alterniflora</i>	Smooth cordgrass	N					X				
<i>Spartina patens</i>	Saltmeadow cordgrass	N					X				
<i>Triadenum walteri</i>	Marsh St. Johnswort	N				X					
<i>Typha latifolia</i>	Broadleaf cattail	N				X					
<i>Unioila paniculata</i>	Seaoats	N		X							
<i>Utricularia subulata</i>	Zigzag bladderwort	N				X					
<i>Woodwardia areolata</i>	Netted chainfern	N	X			X					
<i>Woodwardia virginica</i>	Virginia chainfern	N				X					
Vines											
<i>Campsis radicans</i>	Trumpet creeper	N	X	X				X			

Flora of Naval Air Station Oceana Dam Neck Annex											
Scientific Name	Common name	Origin ⁷	Forests	Dunes	Old Field Habitat	Freshwater Wetlands	Tidal Marshes	Developed Areas	Status	Rank	Date of Last Observation
<i>Gelsemium sempervirens</i>	Yellow jessamine	N	X	X				X			
<i>Ipomoea pandurata</i>	Man-root	N			X						
<i>Lonicera japonica</i>	Japanese honeysuckle	I	X	X				X			
<i>Lonicera sempervirens</i>	Trumpet honeysuckle	N		X							
<i>Parthenocissus quinquefolia</i>	Virginia creeper	N	X	X				X			
<i>Smilax bona-nox</i>	Saw greenbrier	N	X								
<i>Smilax rotundifolia</i>	Roundleaf greenbrier	N	X	X		X		X			
<i>Toxicodendron radicans</i>	Poison ivy	N	X	X		X		X			
<i>Vitis riparia</i>	Riverbank grape	N				X					
<i>Vitis rotundifolia</i>	Muscadine grape	N	X	X				X			

Notes:

State rankings are assigned by a consensus of the network of natural heritage programs, scientific experts, and The Nature Conservancy to designate a rarity rank based on the range-wide status of a species or variety within Virginia (Townsend 2012).

¹ S2 Ranking = Imperiled (at high risk of extirpation from the state)

² S1S2 Ranking = Between Critically Imperiled and Imperiled

³ S3 Ranking = Vulnerable (at moderate risk of extirpation from the state)

⁴ SH Ranking = Possibly Extirpated (known only from historical occurrences but still some hope of rediscovery)

⁵ SNA Ranking = Not Applicable (species is not a suitable target for conservation action)

⁶ S1 Ranking = Critically Imperiled (At very high risk of extirpation from the state)

⁷ N = Native to the region, I = Introduced to the region

Sources: VDCR–DNH 1990, Buhlmann et al. 1992, Navy 1997, Navy 1998b, Navy 2006b, and Townsend 2012

Enclosure 2 Fauna of Naval Air Station Oceana Dam Neck Annex


Mammals Known to Occur at NASO DNA						
Scientific Name	Common Name	Origin	Habitat	Status¹	Rank	Date of Last Observation²
Order Marsupilia	Marsupials					
<i>Didelphis virginianus</i>	Virginia opossum			–		1990-1991
Order Insectivora	Insectivores					
<i>Blarina carolinensis</i>	Short-tailed shrew			–		1990-1991
<i>Cryptotis parva</i>	Least shrew			–		1990-1991
<i>Scalopus aquaticus</i>	Eastern mole			–		2008-2009
<i>Sorex longirostris longirostris</i>	Southeastern shrew			–		1990-1991
Order Rodentia	Rodents					
<i>Microtus pennsylvanicus</i>	Meadow vole			–		1990-1991
<i>Microtus pinetorum</i>	Pine vole			–		1990-1991
<i>Mus musculus</i>	House mouse			–		1989
<i>Myocaster coypus</i>	Nutria			–		1990-1991
<i>Ondatra zibethica</i>	Muskrat			–		1990-1991
<i>Oryzomys palustris</i>	Marsh rice rat			–		1990-1991
<i>Peromyscus leucopus</i>	White-footed mouse			III		1990-1991
<i>Peromyscus leucopus easti</i>	Pungo mouse			III		1989-1991
<i>Rattus norvegicus</i>	Norway rat			–		1989
<i>Reithrodontomys humulus</i>	Harvest mouse			–		1990-1991
<i>Sciurus carolinensis</i>	Eastern gray squirrel			–		1990-1991
Order Lagomorpha	Lagomorphs					
<i>Sylvilagus floridana</i>	Eastern cottontail rabbit			–		2008-2009
<i>Sylvilagus paulustris</i>	Marsh rabbit			–		2008-2009
Order Carnivora	Carnivores					
<i>Halichoerus grypus</i>	Gray seal			–		2012
<i>Phoca vitulina</i>	Harbor seal			–		2012
<i>Procyon lotor</i>	Raccoon			–		2008-2009

Mammals Known to Occur at NASO DNA						
Scientific Name	Common Name	Origin	Habitat	Status¹	Rank	Date of Last Observation²
<i>Urocyon cinereoargenteus</i>	Gray fox					2008-2009
Order Artiodactyla	Ungulates					
<i>Odocoileus virginianus</i>	White-tailed deer			–		2012
Order Cetacea	Whales, Dolphins and Porpoises					
<i>Orcinus orca</i>	Killer whale			–		
<i>Phocoena phocoena</i>	Harbor porpoise			–		
<i>Tursiops truncatus</i>	Bottlenose dolphin			–		

¹ SWAP Levels of Conservation Concern: III = Tier III (High) (VDGIF 2005)

² Ranges were provided for some of the Date of Last Observation listings as surveys were conducted over multiple years and the exact date of last observation was not provided.

Sources: VDCR–DNH 1990, Buhlman et al. 1992, VDGIF 2005, and Evans and Belden 2010

Birds Known to Occur at NASO DNA 						
Scientific Name	Common Name	Origin	Habitat	Status ¹	Rank	Date of Last Observation ²
Order Pelecaniformes						
<i>Gavia immer</i>	Common loon			–		1990-1991
<i>Gavia stellata</i>	Red-throated loon			BCC (nb)		
<i>Morus bassanus</i>	Northern gannet			–		
<i>Pelecanus occidentalis</i>	Brown pelican			SC		2008-2009
<i>Phalacrocorax auritus</i>	Double-crested cormorant					2008-2009
Order Podicipediformes						
<i>Podiceps auritus</i>	Horned grebe			BCC (nb), IV		1989
<i>Podilymbus podiceps</i>	Pied-billed grebe			BCC		1989
Order Ciconiiformes						
<i>Ardea alba</i>	Great egret			SC		2008-2009
<i>Ardea herodias</i>	Great blue heron			–		2008-2009
<i>Butorides virescens</i>	Green heron			IV		2000
<i>Egretta thula</i>	Snowy egret			BCC		1990-1991
<i>Eudocimus albus</i>	White ibis			–		
<i>Florida caerulea</i>	Little blue heron			II		
<i>Nyctanassa violacea</i>	Yellow-crowned night heron			SC, II		
<i>Plegadis falcinellus</i>	Glossy ibis			SC, IV		
Order Anseriformes						
<i>Aix sponsa</i>	Wood duck			–		1990-1991
<i>Anas crecca</i>	Green-winged teal			–		1989
<i>Anas discors</i>	Blue-winged teal					1989
<i>Anas platyrhynchos</i>	Mallard			–		2008-2009
<i>Anas rubripes</i>	American black duck			II		
<i>Anas strepera</i>	Gadwall			–		
<i>Aythya affinis</i>	Lesser scaup			–		
<i>Aythya collaris</i>	Ring-necked duck			–		
<i>Branta bernicla</i>	Brant			III		

Birds Known to Occur at NASO DNA						
Scientific Name	Common Name	Origin	Habitat	Status¹	Rank	Date of Last Observation²
<i>Branta canadensis</i>	Canada goose			–		2008-2009
<i>Bucephala albeola</i>	Bufflehead			–		
<i>Chen caerulescens</i>	Snow goose			–		
<i>Cygnus columbianus</i>	Tundra swan			–		
<i>Lophodytes cucullatus</i>	Hooded merganser			–		1989
<i>Melanitta perspicillata</i>	Surf scoter			–		
<i>Mergus serrator</i>	Red-breasted merganser			–		
Order Charadriiformes						
<i>Actitis macularia</i>	Spotted sandpiper			–		1990-1991
<i>Arenaria interpres</i>	Ruddy turnstone			–		2008-2009
<i>Calidris alba</i>	Sanderling			–		1990-1991
<i>Calidris alpina</i>	Dunlin			IV		
<i>Calidris canutus</i>	Red knot			FC, BCC (nb), IV		1990-1991
<i>Calidris mauri</i>	Western sandpiper			–		
<i>Calidris minutilla</i>	Least sandpiper			–		
<i>Calidris pusilla</i>	Semipalmated sandpiper			–		1990-1991
<i>Catoptrophorus semipalmatus</i>	Willet			–		
<i>Charadrius melodus</i>	Piping plover			FT, ST, I		2013
<i>Charadrius semipalmatus</i>	Semipalmated plover			–		1990-1991
<i>Charadrius vociferous</i>	Killdeer			–		1990-1991
<i>Charadrius wilsonia</i>	Wilson's plover			SE, BCC		
<i>Chidonias niger</i>	Black tern			–		
<i>Larus argentatus</i>	Herring gull			–		2000
<i>Larus atricilla</i>	Laughing gull			–		2008-2009
<i>Larus delawarensis</i>	Ring-billed gull			–		2000
<i>Larus marinus</i>	Greater black-backed gull			–		2000
<i>Larus philadelphia</i>	Bonaparte's gull			–		1989
<i>Limnodromus griseus</i>	Short-billed dowitcher			BCC (nb), IV		

Birds Known to Occur at NASO DNA						
Scientific Name	Common Name	Origin	Habitat	Status¹	Rank	Date of Last Observation²
<i>Limosa fedoa</i>	Marbled godwit			BCC, IV		
<i>Numenius phaeopus</i>	Whimbrel			BCC (nb), IV		
<i>Pluvialis dominica</i>	American golden plover			–		
<i>Pluvialis squatarola</i>	Black-bellied plover			IV		1990-1991
<i>Rallus elegans</i>	King rail			II		1990-1991
<i>Rynchops niger</i>	Black skimmer			II		1990-1991
<i>Sterna antillarum</i>	Least tern			SC, BCC (c), II		1990-1991
<i>Sterna caspia</i>	Caspian tern			SC		
<i>Sterna forsteri</i>	Forster's tern			SC		2008-2009
<i>Sterna hirundo</i>	Common tern			III		2008-2009
<i>Sterna maxima</i>	Royal tern			II		1990-1991
<i>Sterna nilotica</i>	Gull-billed tern			ST, I		1990-1991
<i>Sterna sandvicensis</i>	Sandwich tern			SC		1990-1991
<i>Tringa melanoleuca</i>	Greater yellowlegs			–		1990-1991
Order Coraciiformes						
<i>Ceryle alcyon</i>	Belted kingfisher			–		2008-2009
Order Falconiformes						
<i>Accipiter striatus</i>	Sharp-shinned hawk			–		1989
<i>Buteo jamaicensis</i>	Red-tailed hawk			–		2008-2009
<i>Buteo lineatus</i>	Red-shouldered hawk			–		1989
<i>Cathartes aura</i>	Turkey vulture			–		2008-2009
<i>Circus cyaneus</i>	Northern harrier			III		
<i>Falco columbarius</i>	Merlin			–		1989
<i>Falco peregrinus</i>	Peregrine falcon			ST, BCC, I		
<i>Falco sparverius</i>	American kestrel			–		2000
<i>Haliaeetus leucocephalus</i>	Bald eagle			BCC, II		2013
<i>Pandion haliaetus</i>	Osprey			–		2008-2009

Birds Known to Occur at NASO DNA						
Scientific Name	Common Name	Origin	Habitat	Status¹	Rank	Date of Last Observation²
Order Galliformes						
<i>Colinus virginianus</i>	Northern bobwhite			IV		2008-2009
Order Columbiformes						
<i>Columba livia</i>	Rock pigeon			–		
<i>Zenaida macroura</i>	Mourning dove			–		1990-1991
Order Caprimulgiformes						
<i>Caprimulgus vociferus</i>	Whip-poor-will			BCC, IV		
<i>Chordeiles minor</i>	Common nighthawk			–		2008-2009
Order Cuculiformes						
<i>Coccyzus americanus</i>	Yellow-billed cuckoo			IV		2008-2009
Order Strigiformes						
<i>Bubo virginianus</i>	Great horned owl			–		1989
<i>Otus asio</i>	Eastern screech owl			–		1989
Order Apodiformes						
<i>Archilochus colubris</i>	Ruby-throated hummingbird			–		
<i>Chaetura pelagica</i>	Chimney swift			IV		1990-1991
Order Piciformes						
<i>Colaptes auratus</i>	Northern flicker			–		2008-2009
<i>Dryocopus pileatus</i>	Pileated woodpecker			–		2008-2009
<i>Melanerpes carolinus</i>	Red-bellied woodpecker			–		2000
<i>Picoides pubescens</i>	Downy woodpecker			–		2008-2009
<i>Picoides villosus</i>	Hairy woodpecker			–		
Order Passeriformes						
<i>Agelaius phoeniceus</i>	Red-winged blackbird			–		1990-1991
<i>Bombycilla cedrorum</i>	Cedar waxwing					2000
<i>Cardinalis cardinalis</i>	Northern cardinal			–		2008-2009
<i>Carduelis tristis</i>	American goldfinch			–		2008-2009
<i>Carpodacus mexicanus</i>	House finch			–		2000
<i>Catharus bicknelli</i>	Bicknell's thrush			–		

Birds Known to Occur at NASO DNA						
Scientific Name	Common Name	Origin	Habitat	Status¹	Rank	Date of Last Observation²
<i>Catharus fuscescens</i>	Veery			–		
<i>Catharus minimus</i>	Gray-cheeked thrush			–		
<i>Catharus ustulatus</i>	Swainson's thrush			–		
<i>Certhia americana</i>	Brown creeper			SC, IV		
<i>Cistothorus palustris</i>	Marsh wren			IV		
<i>Contopus virens</i>	Eastern wood-pewee			IV		2008-2009
<i>Corvus brachyrhynchos</i>	American crow			–		2008-2009
<i>Corvus ossifragus</i>	Fish crow			–		2008-2009
<i>Cyanocitta cristata</i>	Blue jay			–		2008-2009
<i>Dumetella carolinensis</i>	Gray catbird			IV		2008-2009
<i>Empidonax virescens</i>	Acadian flycatcher			–		
<i>Euphagus carolinus</i>	Rusty blackbird			BCC, IV		
<i>Geothlypis trichas</i>	Common yellowthroat			–		1990-1991
<i>Guiraca caerulea</i>	Blue grosbeak			–		2008-2009
<i>Helmitheros vermivorum</i>	Worm-eating warbler			BCC, IV		
<i>Hirundo rustica</i>	Barn swallow			–		2008-2009
<i>Hylocichla mustelina</i>	Wood thrush			BCC, IV		
<i>Icteria virens</i>	Yellow-breasted chat			IV		1990-1991
<i>Icterus spurius</i>	Orchard oriole			–		1990-1991
<i>Junco hyemalis</i>	Dark-eyed junco			–		
<i>Melospiza georgiana</i>	Swamp sparrow			–		
<i>Melospiza melodia</i>	Song sparrow			–		2000
<i>Mimus polyglottos</i>	Northern mockingbird			–		2008-2009
<i>Mniotilta varia</i>	Black-and-white warbler			IV		
<i>Molothrus ater</i>	Brown-headed cowbird			–		1990-1991
<i>Myiarchus crinitus</i>	Great crested flycatcher			–		2000
<i>Parula americana</i>	Northern parula			IV		2008-2009
<i>Parus bicolor</i>	Tufted titmouse			–		2008-2009

Birds Known to Occur at NASO DNA						
Scientific Name	Common Name	Origin	Habitat	Status¹	Rank	Date of Last Observation²
<i>Passerina ciris</i>	Painted bunting					
<i>Passer domesticus</i>	House sparrow			–		1990-1991
<i>Passerella iliaca</i>	Fox sparrow			–		1989
<i>Passerina cyanea</i>	Indigo bunting			–		2008-2009
<i>Pipilo erythrophthalmus</i>	Eastern towhee			IV		2000
<i>Poecile carolinensis</i>	Carolina chickadee			–		2008-2009
<i>Polioptila caerulea</i>	Blue–gray gnatcatcher			–		2000
<i>Pooecetes gramineus</i>	Vesper sparrow			–		
<i>Progne subis</i>	Purple martin			–		1990-1991
<i>Protonotaria citrea</i>	Prothonotary warbler			IV		1990-1991
<i>Quiscalus major</i>	Boat–tailed grackle			–		1990-1991
<i>Quiscalus quiscula</i>	Common grackle			–		2000
<i>Regulus satrapa</i>	Golden–crowned kinglet			SC		1989
<i>Seiurus aurocapillus</i>	Ovenbird			IV		1990-1991
<i>Seiurus motacilla</i>	Louisiana waterthrush			IV		
<i>Seiurus noveboracensis</i>	Northern waterthrush			–		
<i>Setophaga caeruleascens</i>	Black–throated blue warbler			–		
<i>Setophaga coronata</i>	Yellow–rumped warbler			–		2000
<i>Setophaga dominica</i>	Yellow–throated warbler			–		
<i>Setophaga discolor</i>	Prairie warbler			BCC, IV		1990-1991
<i>Setophaga magnolia</i>	Magnolia warbler			SC		
<i>Setophaga palmarum</i>	Palm warbler			–		
<i>Setophaga pensylvanica</i>	Chestnut–sided warbler			–		
<i>Setophaga petechia</i>	Yellow warbler			IV		1990-1991
<i>Setophaga pinus</i>	Pine warbler			–		11990-1991
<i>Setophaga ruticilla</i>	American redstart			–		
<i>Setophaga striata</i>	Blackpoll warbler			–		1990-1991
<i>Setophaga virens</i>	Black–throated green warbler			I		

Birds Known to Occur at NASO DNA						
Scientific Name	Common Name	Origin	Habitat	Status¹	Rank	Date of Last Observation²
<i>Sialis sialis</i>	Eastern bluebird			–		
<i>Sitta canadensis</i>	Red-breasted nuthatch			SC		
<i>Sitta carolinensis</i>	White-breasted nuthatch			–		1990-1991
<i>Sitta pusilla</i>	Brown-headed nuthatch			BCC, IV		1989
<i>Spizella passerina</i>	Chipping sparrow			–		2000
<i>Spizella pusilla</i>	Field sparrow			IV		1990-1991
<i>Stelgidopteryx serripennis</i>	Northern rough-winged swallow			IV		
<i>Sturnella magna</i>	Eastern meadowlark			IV		1990-1991
<i>Sturnus vulgaris</i>	European starling			–		1990-1991
<i>Tachycineta bicolor</i>	Tree swallow			–		1989
<i>Thryothorus ludovicianus</i>	Carolina wren			–		2008-2009
<i>Toxostoma rufum</i>	Brown thrasher			IV		2008-2009
<i>Troglodytes aedon</i>	House wren			–		
<i>Turdus migratorius</i>	American robin			–		2000
<i>Tyrannus tyrannus</i>	Eastern kingbird			IV		1990-1991
<i>Vireo griseus</i>	White-eyed vireo			–		2000
<i>Vireo olivaceus</i>	Red-eyed vireo			–		2008-2009
<i>Zonotrichia albicollis</i>	White-throated sparrow			–		2000

¹ BCC = Bird of Conservation Concern listed by the USFWS (2008); (c) = BCC non-listed subspecies or population of threatened or endangered species; FC = federal candidate species for listing; FT = federally threatened; (nb) = BCC non-breeding population; SC = state species of concern; SE = state listed endangered; and ST = state listed threatened. SWAP Levels of Conservation Concern: I = Tier I (Critical), II = Tier II (Very High), III = Tier III (High), IV = Tier IV (Moderate) (VDGIF 2005)

² Ranges were provided for some of the Date of Last Observation listings as surveys were conducted over multiple years and the exact date of last observation was not provided.

Sources: VDCR–DNH 1990, Buhlman et al. 1992, Navy 1998a, Beatty 2003, USFWS 2008, Roble 2010, and Institute for Bird Populations 2012

Herpetofauna Known to Occur at NASO DNA						
Scientific Name	Common Name	Origin	Habitat	Status ¹	Rank	Date of Last Observation ²
AMPHIBIANS						
Salamanders						
<i>Amphiuma means</i>	Two-toed amphiuma					1990-1991
<i>Plethodon chlorobryonis</i>	Atlantic coastal slimy salamander			–		1990-1991
<i>Plethodon cinereus</i>	Red-backed salamander			–		1990-1991
<i>Siren lacertina</i>	Greater siren			–		1990-1991
Frogs and Toads			IV			
<i>Anaxyrus terrestris</i>	Southern toad					1990-1991
<i>Anaxyrus woodhousii</i>	Fowler's toad			–		2000
<i>Gastrophryne carolinensis</i>	Eastern narrow-mouthed toad			–		2008-2009
<i>Hyla chrysoscelis</i>	Cope's gray treefrog			–		1990-1991
<i>Hyla cinerea</i>	Green treefrog			–		2000
<i>Hyla femoralis</i>	Pine woods treefrog			–		1990-1991
<i>Hyla squirella</i>	Squirrel treefrog			–		1990-1991
<i>Lithobates catesbeiana</i>	American bullfrog			–		2008-2009
<i>Lithobates clamitans melanota</i>	Northern green frog			–		2008-2009
<i>Lithobates palustris</i>	Pickerel frog			–		2000
<i>Lithobates sphenoccephalus</i>	Southern leopard frog			–		2008-2009
<i>Pseudacris crucifer</i>	Spring peeper			–		2000
REPTILES						
Turtles						
<i>Caretta caretta</i>	Loggerhead sea turtle			FT, ST		2013
<i>Chelonia mydas</i>	Green sea turtle			FT, ST		
<i>Chelydra serpentina serpentina</i>	Common snapping turtle			–		1990-1991
<i>Chrysemys picta picta</i>	Eastern painted turtle			–		2000
<i>Clemmys guttata</i>	Spotted turtle			III		1990-1991
<i>Dermochelys coriacea</i>	Leatherback sea turtle			FE, SE		

Herpetofauna Known to Occur at NASO DNA						
Scientific Name	Common Name	Origin	Habitat	Status¹	Rank	Date of Last Observation²
<i>Eretmochelys imbricata</i>	Atlantic hawksbill sea turtle			FE, SE		
<i>Kinosternon subrubrum subrubrum</i>	Eastern mud turtle			–		2008-2009
<i>Lepidochelys kempii</i>	Kemp's ridley sea turtle			FE, SE		2012
<i>Pseudemys rubriventris</i>	Northern red-bellied cooter			–		1990-1991
<i>Sternotherus odoratus</i>	Eastern musk turtle (stinkpot)			–		1990-1991
<i>Terrapene carolina carolina</i>	Eastern box turtle			III		2008-2009
<i>Trachemys scripta elegans</i>	Red-eared slider			–		
<i>Trachemys scripta scripta</i>	Yellow-bellied slider			III		1990-1991
Snakes						
<i>Agkistrodon piscivorous piscivorous</i>	Eastern cottonmouth			–		1990-1991
<i>Carphophis amoenus amoenus</i>	Eastern worm snake			–		2008-2009
<i>Coluber constrictor constrictor</i>	Northern black racer			–		1990-1991
<i>Diadophis punctatus punctatus</i>	Southern ring-necked snake			–		2008-2009
<i>Elaphe obsoleta</i>	Eastern rat snake			–		2008-2009
<i>Heterodon platirhinos</i>	Eastern hog-nosed snake			IV		1990-1991
<i>Nerodia sipedon sipedon</i>	Northern water snake			–		1990-1991
<i>Nerodia taxispilota</i>	Brown water snake			–		1990-1991
<i>Opheodrys aestivus aestivus</i>	Northern rough green snake			–		2008
<i>Thamnophis sauritus sauritus</i>	Eastern ribbon snake			IV		1990-1991
<i>Virginia valeriae valeriae</i>	Eastern smooth earth snake			II		1989
Lizards						
<i>Cnemidophorus sexlineatus</i>	Six-lined racerunner			–		2000
<i>Eumeces fasciatus</i>	Common five-lined skink			–		2008-2009
<i>Eumeces inexpectatus</i>	Southern five-lined skink			–		
<i>Sceloporus undulatus hyacinthinus</i>	Eastern fence lizard			–		1990-1991
<i>Scincella lateralis</i>	Little brown skink			–		1990-1991

¹ FE = Federally endangered, FT = Federally threatened, SE = State endangered, ST = State threatened. SWAP Levels of Conservation Concern: II = Tier II (Very High), III = Tier III (High), IV = Tier IV (Moderate) (VDGIF 2005)

Herpetofauna Known to Occur at NASO DNA						
Scientific Name	Common Name	Origin	Habitat	Status¹	Rank	Date of Last Observation²

² Ranges were provided for some of the Date of Last Observation listings as surveys were conducted over multiple years and the exact date of last observation was not provided.

Sources: VDCR–DNH 1990, Buhlman et al. 1992, VDGIF 2005, and NAVFAC Mid-Atlantic 2013

Freshwater Fishes Known to Occur at NASO DNA						
Scientific Name	Common Name	Origin¹	Habitat	Status²	Rank	Date of Last Observation
<i>Ameiurus nebulosus</i>	Brown bullhead	N/I		–		2000
<i>Amia calva</i>	Bowfin	N/I		–		2000
<i>Anguilla rostrata</i>	American eel			UR		
<i>Centrarchus macropterus</i>	Flier	N		–		1989
<i>Cyprinus carpio</i>	Common carp	N		–		2000
<i>Dorosoma cepedianum</i>	Gizzard shad	N		–		2000
<i>Enneacanthus gloriosus</i>	Blue-spotted sunfish	N		–		2000
<i>Enneacanthus obesus</i>	Banded sunfish	N		IV		2000
<i>Gambusia affinis</i>	Mosquitofish	N/I		–		2000
<i>Lepisosteus osseus</i>	Longnose gar	N		–		
<i>Lepomis gibbosus</i>	Pumpkinseed	I		–		2000
<i>Lepomis gulosus</i>	Warmouth	N/I		–		
<i>Lepomis macrochirus</i>	Bluegill	N/I		–		2000
<i>Lepomis microlophus</i>	Red-ear sunfish	I		–		
<i>Micropterus salmoides</i>	Largemouth bass	I		–		2000
<i>Morone americana</i>	White perch	N/I		–		
<i>Notemigonus crysoleucas</i>	Golden shiner	N/I		–		
<i>Pomoxis nigromaculatus</i>	Black crappie	N/I		–		2000
<i>Umbra pygmaea</i>	Eastern mudminnow	N		–		2000

¹ N = Native to Virginia, I = Introduced to Virginia,

² UR = Under Review. SWAP Levels of Conservation Concern: IV = Tier IV (Moderate) (VDGIF 2005)

Sources: VDCR–DNH 1990, Buhlman et al. 1992, Fuller et al. 1999, Galvez and Swihart 2000, VDGIF 2005, and Evans and Belden 2010

Fish Species with Designated Essential Fish Habitat in the Nearshore Region off NASO DNA	
Scientific Name	Common Name
INVERTEBRATE SPECIES	
<i>Chaceon fenneri</i>	Golden crab
<i>Loligo pealeii</i>	Longfin inshore squid
<i>Spisula solidissima</i>	Atlantic surfclams
TIDAL AND SALTWATER FISHES	
Class Actinopterygii	Ray-Finned Fishes
<i>Scomberomorus cavalla</i>	King mackerel
<i>Scomberomorus maculatus</i>	Atlantic Spanish mackerel
<i>Rachycentron candum</i>	Cobia
Class Chondrichthyes	Cartilaginous Fishes
<i>Carcharhinus plumbeus</i>	Sandbar shark
<i>Carcharhinus obscurus</i>	Dusky shark
<i>Galeocerdo cuvier</i>	Tiger shark
<i>Leucoraja erinacea</i>	Little skate
<i>Leucoraja ocellata</i>	Winter skate
<i>Odontaspis taurus</i>	Sand tiger shark
<i>Raja eglanteria</i>	Clearnose skate
<i>Rhizoprionodon teraeonovae</i>	Atlantic sharpnose shark
<i>Sphyrna zygaena</i>	Scalloped hammerhead shark
<i>Squalus acanthias</i>	Spiny dogfish
Class Osteichthyes	Bony Fishes
<i>Centropristis striata</i>	Black sea bass
<i>Clupea harengus</i>	Atlantic herring
<i>Glyptocephalus cynoglossus</i>	Witch flounder
<i>Paralyichthys dentatus</i>	Summer flounder
<i>Pomatomus saltatrix</i>	Bluefish
<i>Sciaenops ocellatus</i>	Red drum
<i>Scopthalmus aquosus</i>	Windowpane flounder

Fish Species with Designated Essential Fish Habitat in the Nearshore Region off NASO DNA	
Scientific Name	Common Name
<i>Stenotomus chrysops</i>	Scup
<i>Urophycis chuss</i>	Red hake

Source: Navy 2003

Enclosure 3 Species of Greatest Conservation Need for the Mid-Atlantic Coastal Plain

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4.3. The Species of Greatest Conservation Need: Coastal Plain

Of the 235 species of greatest conservation need that occur in the Coastal Plain, 23 (10%) are in Tier I, 35 (15%) are in Tier II, 39 (17%) are in Tier III, and 138 (59%) are in Tier IV (Table 4.2).

Table 4.23. The species of greatest conservation need in Virginia's Coastal Plain.

Common Name	Scientific Name
Tier I	
Fishes	
Shortnose sturgeon	<i>Acipenser brevirostrum</i>
Blackbanded sunfish	<i>Enneacanthus chaetodon</i>
Bridle shiner	<i>Notropis bifrenatus</i>
Roanoke logperch	<i>Percina rex</i>
Amphibians	
None	
Reptiles	
Loggerhead turtle ¹	<i>Caretta caretta</i>
Wood turtle	<i>Glyptemys insculpta</i>
Chicken turtle	<i>Deirochelys reticularia</i>
Birds	
Bachman's sparrow	<i>Aimophila aestivalis</i>
Henslow's sparrow	<i>Ammodramus henslowii</i>
Piping plover	<i>Charadrius melodus</i>
Wilson's plover	<i>Charadrius wilsonia</i>
Wayne's black-throated green warbler	<i>Dendroica virens waynei</i>
Peregrine falcon	<i>Falco peregrinus</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Black rail	<i>Laterallus jamaicensis</i>
Red-cockaded woodpecker	<i>Picoides borealis</i>
Gull-billed tern	<i>Sterna nilotica</i>
Mammals	
Eastern big-eared bat	<i>Corynorhinus rafinesquii macrotis</i>
Terrestrial Insects	
Arogos skipper	<i>Atrytone arogos arogos</i>
American burying beetle	<i>Nicrophorus americanus</i>
Other Terrestrial Invertebrates	
None	
Aquatic Mollusks	
None	
Crustaceans	

Common Name	Scientific Name
Phreatic isopod	<i>Caecidotea phreatica</i>
Lancaster County amphipod	<i>Crangonyx baculispina</i>
Northern Virginia well amphipod	<i>Stygobromus phreaticus</i>
Aquatic Insects	
None	
Other Aquatic Invertebrates	
None	
Tier II	
Fishes	
Atlantic sturgeon	<i>Acipenser oxyrhynchus</i>
Roanoke bass	<i>Ambloplites cavifrons</i>
Amphibians	
Mabee's salamander	<i>Ambystoma mabeei</i>
Tiger salamander	<i>Ambystoma tigrinum</i>
Oak toad	<i>Bufo quercicus</i>
Barking treefrog	<i>Hyla gratiosa</i>
Reptiles	
Canebrake rattlesnake	<i>Crotalus horridus</i>
Northern diamond-backed terrapin	<i>Malaclemys terrapin</i>
Eastern glass lizard	<i>Ophisaurus ventralis</i>
Birds	
Saltmarsh sharp-tailed sparrow	<i>Ammodramus caudacutus</i>
American black duck	<i>Anas rubripes</i>
American bittern	<i>Botaurus lentiginosus</i>
Cerulean warbler	<i>Dendroica cerulea</i>
Little blue heron	<i>Egretta caerulea</i>
American oystercatcher	<i>Haematopus palliatus</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Swainson's warbler	<i>Limnithlypis swainsonii</i>
Yellow-crowned night-heron	<i>Nyctanassa violacea</i>
King rail	<i>Rallus elegans</i>
Black skimmer	<i>Rynchops niger</i>
Least tern	<i>Sterna antillarum</i>
Royal tern	<i>Sterna maxima</i>
Mammals	
Delmarva fox squirrel	<i>Sciurus niger cinereus</i>
Terrestrial Insects	
Precious underwing	<i>Catocala pretiosa pretiosa</i>
Northeastern beach tiger beetle	<i>Cicindela dorsalis dorsalis</i>

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
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Common Name	Scientific Name
Rare skipper	<i>Problema bulenta</i>
Other Terrestrial Invertebrates	
Snowhill ambersnail	<i>Catinella hubrichti</i>
Hanging Rock threetooth	<i>Triodopsis pendula</i>
Aquatic Mollusks	
Dwarf wedgemussel	<i>Alasmidonta heterodon</i>
Green floater	<i>Lasmigona subviridis</i>
Crustaceans	
Dismal Swamp isopod	<i>Caecidotea attenuatus</i>
Rock Creek groundwater amphipod	<i>Stygobromus kenki</i>
Aquatic Insects	
Spieth's great speckled olive mayfly	<i>Siphloplecton costalense</i>
Other Aquatic Invertebrates	
Holsinger's groundwater planarian	<i>Sphalloplana holsingeri</i>
Bigger's groundwater planarian	<i>Sphalloplana subtilis</i>
Tier III	
Fishes	
Steelcolor shiner	<i>Cyprinella whipplei</i>
Amphibians	
Dwarf waterdog	<i>Necturus punctatus</i>
Carpenter frog	<i>Rana virgatipes</i>
Lesser siren	<i>Siren intermedia</i>
Reptiles	
Spotted turtle	<i>Clemmys guttata</i>
Glossy crayfish snake	<i>Regina rigida rigida</i>
Eastern box turtle	<i>Terrapene carolina</i>
Birds	
Nelson's sharp-tailed sparrow (winter)	<i>Ammodramus nelsoni</i>
Redhead (winter)	<i>Aythya americana</i>
Brant (winter)	<i>Branta bernicla</i>
Northern harrier	<i>Circus cyaneus</i>
Sedge wren (winter)	<i>Cistothorus platensis</i>
Tricolored heron	<i>Egretta tricolor</i>
Least bittern	<i>Ixobrychus exilis</i>
Black-crowned night-heron	<i>Nycticorax nycticorax</i>
Glossy ibis	<i>Plegadis falcinellus</i>
Common tern	<i>Sterna hirundo</i>
Barn owl	<i>Tyto alba pratincola</i>

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
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Common Name	Scientific Name
Mammals	
Pungo white-footed mouse	<i>Peromyscus leucopus easti</i>
Southeastern fox squirrel	<i>Sciurus niger niger</i>
Terrestrial Insects	
Dusky roadside-skipper	<i>Amblyscirtes alternata</i>
Little metalmark	<i>Calephelis virginiensis</i>
Hessel's hairstreak	<i>Callophrys hesseli</i>
Dismal Swamp green stink bug	<i>Chlorochroa dismalia</i>
Dukes' skipper	<i>Euphyes dukesi</i>
Palatka skipper	<i>Euphyes pilatka</i>
Brimley's assassin bug	<i>Pnirontis brimleyi</i>
Sandpit alydid bug	<i>Stachyocnemus apicalis</i>
Other Terrestrial Invertebrates	
A millipede	<i>Pseudopolydesmus paludicolous</i>
Aquatic Mollusks	
Yellow lance	<i>Elliptio lanceolata</i>
Yellow lampmussel	<i>Lampsilis cariosa</i>
Chesapeake ambersnail	<i>Oxyloma subeffusum</i>
Crustaceans	
Chowanoke crayfish	<i>Orconectes virginiensis</i>
Tidewater interstitial amphipod	<i>Stygobromus araeus</i>
Tidewater amphipod	<i>Stygobromus indentatus</i>
Aquatic Insects	
Swamp forestfly	<i>Prostoia hallasi</i>
Coppery emerald	<i>Somatochlora georgiana</i>
Other Aquatic Invertebrates	
None	
Tier IV	
Fishes	
Mud sunfish	<i>Acantharcus pomotis</i>
Alewife	<i>Alosa pseudoharengus</i>
American shad	<i>Alosa sapidissima</i>
American eel	<i>Anguilla rostrata</i>
Swampfish	<i>Chologaster cornuta</i>
Banded sunfish	<i>Enneacanthus obesus</i>
Lake chubsucker	<i>Erimyzon sucetta</i>
Lined topminnow	<i>Fundulus lineolatus</i>
Least brook lamprey	<i>Lampetra aepyptera</i>
American brook lamprey	<i>Lampetra appendix</i>

Common Name	Scientific Name
Ironcolor shiner	<i>Notropis chalybaeus</i>
Logperch	<i>Percina caprodes</i>
Trout-perch	<i>Percopsis omiscomaycus</i>
Amphibians	
New Jersey chorus frog	<i>Pseudacris feriarum kalmi</i>
Striped southern chorus frog	<i>Pseudacris nigrita nigrita</i>
Little grass frog	<i>Pseudacris ocularis</i>
Eastern mud salamander	<i>Pseudotriton montanus</i>
Eastern spadefoot	<i>Scaphiopus holbrookii</i>
Greater siren	<i>Siren lacertina</i>
Many-lined salamander	<i>Stereochilus marginatus</i>
Reptiles	
Scarletsnake	<i>Cemophora coccinea</i>
Mudsnake	<i>Farancia abacura</i>
Rainbow snake	<i>Farancia erythrogramma</i>
Eastern hog-nosed snake	<i>Heterodon platirhinus</i>
Eastern slender glass lizard	<i>Ophisaurus attenuatus</i>
Queen snake	<i>Regina septemvittata</i>
Southeastern crowned snake	<i>Tantilla coronata</i>
Common ribbonsnake	<i>Thamnophis sauritus</i>
Yellowbellied slider	<i>Trachemys scripta scripta</i>
Birds	
Seaside sparrow	<i>Ammodramus maritimus</i>
Grasshopper sparrow	<i>Ammodramus savannarum</i>
Greater scaup (winter)	<i>Aythya marila</i>
Green heron	<i>Butorides striatus</i>
Dunlin (winter)	<i>Calidris alpina</i>
Red knot (winter)	<i>Calidris canutus</i>
Purple sandpiper (winter)	<i>Calidris maritima</i>
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>
Whip-poor-will	<i>Caprimulgus vociferus</i>
Bicknell's thrush (migrant)	<i>Catharus bicknelli</i>
Chimney swift	<i>Chaetura pelagica</i>
Marsh wren	<i>Cistothorus palustris</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Northern bobwhite	<i>Colinus virginianus</i>
Eastern wood-pewee	<i>Contopus virens</i>
Yellow rail (migrant)	<i>Coturnicops noveboracensis</i>
Prairie warbler	<i>Dendroica discolor</i>
Yellow warbler	<i>Dendroica petechia</i>
Gray catbird	<i>Dumetella carolinensis</i>
Willow flycatcher	<i>Empidonax traillii</i>
Rusty blackbird (winter)	<i>Euphagus carolinus</i>
Worm-eating warbler	<i>Helmitheros vermivorus</i>

Common Name	Scientific Name
Wood thrush	<i>Hylocichla mustelina</i>
Yellow-breasted chat	<i>Icteria virens</i>
Short-billed dowitcher (migrant)	<i>Limnodromus griseus</i>
Marbled godwit (migrant)	<i>Limosa fedoa</i>
Hudsonian godwit (migrant)	<i>Limosa haemastica</i>
Black-and-white warbler	<i>Mniotilta varia</i>
Whimbrel (migrant)	<i>Numenius phaeopus</i>
Kentucky warbler	<i>Oporornis formosus</i>
Northern parula	<i>Parula americana</i>
Rose-breasted grosbeak	<i>Pheuctitus ludovicianus</i>
Eastern towhee	<i>Pipilo erythrophthalmus</i>
Scarlet tanager	<i>Piranga olivacea</i>
Black-bellied plover (winter)	<i>Pluvialis squatarola</i>
Horned grebe (winter)	<i>Podiceps auritus</i>
Prothonotary warbler	<i>Protonotaria citrea</i>
Virginia rail	<i>Rallus limicola</i>
Clapper rail	<i>Rallus longirostris</i>
American woodcock	<i>Scolopax minor</i>
Ovenbird	<i>Seiurus aurocapillus</i>
Louisiana waterthrush	<i>Seiurus motacilla</i>
Brown-headed nuthatch	<i>Sitta pusilla</i>
Field sparrow	<i>Spizella pusilla</i>
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>
Roseate tern (migrant)	<i>Sterna dougallii</i>
Forster's tern	<i>Sterna forsteri</i>
Eastern meadowlark	<i>Sturnella magna</i>
Brown thrasher	<i>Toxostoma rufum</i>
Eastern kingbird	<i>Tyrannus tyrannus</i>
Yellow-throated vireo	<i>Vireo flavifrons</i>
Mammals	
Least weasel	<i>Mustela nivalis</i>
Southeastern myotis	<i>Myotis austroriparius</i>
Cotton mouse	<i>Peromyscus gossypinus</i>
Dismal Swamp southeastern shrew	<i>Sorex longirostris fisheri</i>
Appalachian cottontail	<i>Sylvilagus obscurus</i>
Marsh rabbit	<i>Sylvilagus palustris</i>
Southern bog lemming	<i>Synaptomys cooperi</i>
Terrestrial Insects	
Barrens dagger moth	<i>Acronicta albarufa</i>
A cane moth	<i>Argillophora furcilla</i>
Frosted elfin	<i>Callophrys irus</i>
Orange-bellied tiger beetle	<i>Cicindela abdominalis</i>
Spectral tiger beetle	<i>Cicindela lepida</i>
A tiger beetle	<i>Cicindela limbalis</i>
Pink-streak moth	<i>Faronta rubripennis</i>

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Chapter 4 — The Mid-Atlantic Coastal Plain

Common Name	Scientific Name
A cane moth	<i>Franclimontia interrogans</i>
A shield bug	<i>Galgupha denudata</i>
Buchholz's gray moth	<i>Hypomecis buchholzaria</i>
Lemmer's pinion moth	<i>Lithophane lemmeri</i>
Bronze copper	<i>Lycaena hyllus</i>
Yucca giant-skipper	<i>Megathymus yuccae</i>
A noctuid moth	<i>Meropleon titan</i>
A turtle bug	<i>Oncozygia clavicornis</i>
Long dash	<i>Polites mystic</i>
Southern Ptichodis moth	<i>Ptichodis bistrigata</i>
Yellow-edged Pygarctia moth	<i>Pygarctia abdominalis</i>
Other Terrestrial Invertebrates	
Slim snaggletooth	<i>Gastrocopta pellucida</i>
Fine-ribbed striate	<i>Striatura milium</i>
Pinhole threetooth	<i>Triodopsis messana</i>
Palmetto vertigo	<i>Vertigo oralis</i>
Swamp vertigo	<i>Vertigo teskeyae</i>
Aquatic Mollusks	
Triangle floater	<i>Alasmidonta undulata</i>
Alewife floater	<i>Anodonta implicata</i>
Carolina lance mussel	<i>Elliptio angustata</i>
Carolina slabshell mussel	<i>Elliptio congaraea</i>
Northern lance mussel	<i>Elliptio fisheriana</i>
Oblong ancylid	<i>Ferrissia parallelus</i>
Tidewater mucket	<i>Leptodea ochracea</i>
Eastern pondmussel	<i>Ligumia nasuta</i>
Ridged lioplax	<i>Lioplax subcarinata</i>
Sharp sprite	<i>Promenetus exacuuous</i>
Creeper	<i>Strophitus undulatus</i>
Florida pondhorn	<i>Uniomerus caroliniana</i>
Crustaceans	
Ohio River shrimp	<i>Macrobrachium ohione</i>
Aquatic Insects	
Blackwater bluet	<i>Enallagma weewa</i>
Robust baskettail	<i>Epitheca spinosa</i>
Drake's water scorpion	<i>Ranatra drakei</i>
Treetop emerald	<i>Somatochlora provocans</i>
Laura's clubtail	<i>Stylurus laurae</i>
Other Aquatic Invertebrates	
None	

¹ Loggerhead turtle *Caretta caretta* is included in Section 4.4, since its habitat within Virginia is terrestrial (nesting beaches).

Appendix J

Wildlife Management

- Enclosure 1** Commander, Navy Region Mid-Atlantic Instruction (COMNAVREG MIDLANT INST) 11015.1 (Fishing)
- Enclosure 2** Hunting Regulations and Information
- Enclosure 3** Commander, Navy Region Mid-Atlantic Instruction (COMNAVREG MIDLANT INST) 11015.3 (Natural Resources Management for Fish and Wildlife, Feral Animals, Invasive Species, and Certain Pests)
- Enclosure 4** Chief of Naval Operations (CNO) Policy Letter on Feral Cats and Dogs
- Enclosure 5** Naval Air Station Oceana, Naval Auxiliary Landing Field Fentress, and Naval Air Station Oceana Dam Neck Annex Prescribed Burn and Smoke Management Plan (2010)
- Enclosure 6** Pollinator Management

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**Enclosure 1. Commander, Navy Region Mid-Atlantic Instruction (COMNAVREG
MIDLANT INST) 11015.1 (Fishing)**



DEPARTMENT OF THE NAVY

COMMANDER
NAVY REGION, MID-ATLANTIC
1510 GILBERT ST.
NORFOLK, VA 23511-2737

IN REPLY REFER TO:
COMNAVREGMIDLANTINST 11015.1
N45

29 JUL 2005

COMNAVREG MIDLANT INSTRUCTION 11015.1

From: Commander, Navy Region, Mid-Atlantic

Subj: FISHING

Ref: (a) 32 C.F.R. Section 190
(b) DODINST 4715.3
(c) OPNAVINST 5090.1B
(d) P.L. 105-85 (Sikes Act Improvement Amendments of 1997)
(e) NAVFAC P-73, Vol. II
(f) E.O. 12962
(g) Virginia Freshwater and Saltwater Fishing (Current) Regulations
(h) COMNAVREGMIDLANT/SOPA(ADMIN) HRINST 5400.1

Encl: (1) Station Permit Suspension/Revocation
(2) COMNAVREG MIDLANT Fresh Water Fishing Areas

1. Purpose. To establish procedures for fishing on board COMNAVREG MIDLANT installations including: Naval Weapons Station (WPNSTA), Yorktown, including Cheatham Annex; Naval Amphibious Base (NAVPHIBASE), Little Creek; Naval Air Station (NAS), Oceana, including Dam Neck Annex; and Naval Support Activity (NAVSUPACT), Norfolk, Northwest Annex. No freshwater fishing is permitted on Pennsylvania installations. References (a) through (h) pertain.

2. Cancellation. COMNAVBASENORVAINST 11015.1; CAXINST 11015.20; NAVPHIBASELCREEKINST 10570.1I; DAMNECKBASEINST 11015.1G; WPNSTAYORKTOWNINST 1710.3; and NASOCEANAINST 11015.3B. Due to numerous changes, instruction should be read in its entirety.

3. Policy

a. References (b) through (e) allow for recreational fisheries management on military installations, consistent with mission requirements.

b. Violations of reference (g) and this instruction may result in suspension or revocation of fishing privileges. See enclosure (1).

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c. The Regional Comptroller Office will prescribe operating and accounting procedures for handling funds. Permit fees will be expended solely for management, protection, and harvesting of fish and wildlife resources per reference (a).

4. Definitions

a. Tidal Waters (Saltwater). Tidal waters include the shorelines of the Atlantic Ocean and the York and James Rivers and their tributaries.

b. Non-tidal Waters (Freshwater). Non-tidal waters include all freshwater ponds and lakes open to fishing, as noted in this instruction. This does not include closed bodies of water located on certain golf courses or within sensitive or restricted areas.

c. Fishing. Fishing refers to the harvest or attempted harvest of finfish species for sport or self-consumption.

5. Responsibilities

a. Environmental Program Director. The Regional Environmental Program Director is responsible for managing the fishing program at the installations to which this instruction applies. This authority may be delegated to a properly trained Regional Natural Resources Program Manager.

(1) Natural Resources Managers. Natural Resources Managers, under the direction of the Regional Natural Resources Program Manager, manage fishing and freshwater fish resources at NAS Oceana, NAVPHIBASE Little Creek, and WPNSTA Yorktown. Natural Resources Managers enforce fish and wildlife laws and regulations, and this instruction.

(2) Conservation Officers. Under the direction of the Regional Natural Resources Program Manager, Conservation Officers enforce fish and wildlife laws and regulations and this instruction. Conservation Officers are authorized to conduct creel inspections.

b. Installation Security Officers. Security Officers also enforce fish and wildlife laws, regulations, and this instruction, and review and make recommendations to Installation Commanders on proposals to conduct fishing tournaments and other special events. Security Officers are an after-hours emergency contact point for Natural Resources Managers and Conservation Officers.

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c. Fishermen. Fishermen shall comply with this instruction and applicable fish and wildlife laws and regulations.

6. Authorized Patrons

a. Authorized Patrons. The following persons are authorized to fish at the installations to which this instruction applies:

(1) Active duty military personnel and their dependents are given priority access to all fishing programs, activities, and events.

(2) Retired military personnel and their dependents.

(3) Federal civilian employees of COMNAVREG MIDLANT installations and their dependents.

(4) Reservists and their dependents.

(5) If allowable under existing Force Protection Condition (FPCON) constraints, authorized patrons may be accompanied by two guests. All guests must adhere to applicable fish and wildlife laws and regulations, and this instruction. Sponsors are responsible for their guests and must accompany them at all times.

7. Licenses/Permits

a. Fishing Licenses. Authorized patrons and guests between the ages 16 and 65 must obtain, if they do not already possess, Virginia (state or county) freshwater fishing licenses and station fishing permits. Reference (g) exempts persons who are legally blind. Virginia Saltwater fishing licenses are required for anyone attempting saltwater fishing except when fishing from MWR piers that maintain pier licenses (see enclosure (2)).

(1) Dependents and guests under the age of 12 must be directly supervised by an adult, 18 years of age or older, who holds valid fishing licenses and station permits.

b. Station Permits. Station fishing permits are valid at all installations to which this instruction applies. Annual permits are valid concurrent with the Virginia fishing licenses (1 January - 31 December). A full season permit costs \$8; a one-week permit costs \$4. Saltwater fishing does not require a station permit.

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(1) WPNSTA Yorktown and Cheatham Annex. Fishing permits are available at the Morale, Welfare and Recreation (MWR), Building 2006 and Cheatham Annex MWR, Building 284.

(2) NAVPHIBASE Little Creek. Fishing permits are available at the Environmental Compliance Department, Building 3165.

(3) NAS Oceana and Dam Neck Annex. Freshwater fishing permits are available at the NAS Oceana Natural Resources Center, Building 78.

(4) Station permits are issued upon assumption of risk, and authorized patrons and guests shall be required to sign a statement acknowledging risk. The statement shall also release the United States of liability, in case of accident or injury, to the extent allowed by law.

(5) Possession of a station fishing permit does not authorize access to an installation, grant permission to use other MWR facilities, or convey or bestow any other rights or privileges.

8. Regulations

a. General

(1) Unless approved under reference (h) consumption of alcoholic beverages is prohibited during any fishing activity or event to which this instruction applies.

(2) Fish may be taken only within the limits, seasons, and times, and by the methods prescribed by Federal and State regulation.

(3) No more than two treble hooks are permitted on any fishing lure. In catch-and-release waters, barbed hooks are discouraged and treble hooks are prohibited.

(4) Fishing shall be conducted only by angling with a hook and line or rod and reel, held in hand. A hand-held landing net may also be used to remove legally hooked fish.

(5) Use of live bait fish (minnows, eels, etc.) is discussed in enclosure (2). Use of crickets, grubs, worms, and other non-fish baits is permitted as noted.

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(6) Unless otherwise specified, fishing hours are sunrise to sunset.

(7) Use of trotlines, fish traps, or chemicals in ponds are prohibited except under direction of the Natural Resources Manager.

(8) Boats and canoes are permitted on certain freshwater ponds and lakes as discussed in specific regulations. To prevent introduction or spread of invasive aquatic species, the following precautions should be taken:

(a) Drain water from live wells, bilges, and other containers before leaving the launch area;

(b) Remove plant parts and animals from the boat, trailer, and accessory equipment. Dispose of the removed materials in the garbage at the launch area or at home;

(c) Do not release live bait or aquarium pets into any waters; and

(d) Wash boat and trailer thoroughly at home. Flush water through the motor's cooling system, live wells, and other areas that hold water or dry your boat and equipment for five days in a sunny location before transferring it to a new body of water.

(9) If boat use is permitted at an approved fishing location, boats and canoes may not be stored on ponds or surrounding banks. A life jacket is required for each person fishing from boats. Additionally, persons under the age of 10 years shall wear life jackets while on boats.

(10) Littering on station is prohibited. All refuse shall be placed in designated trash containers. This includes all refuse generated from fishing activities (i.e., monofilament line, hooks, etc.).

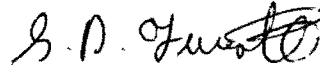
(12) Natural Resources Managers or Security Officers may close specific fishing areas at any time. Such announcements will be posted at the respective Security Command Building or Natural Resources Office. Personnel may not use freshwater areas not listed in enclosure (2) of this instruction without specific authorization by the appropriate Natural Resources Manager.

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(13) The Installation Natural Resources Manager, the Installation Security Officer and the Installation Commander must approve fishing tournaments and other special events.

9. Enforcement. Fish and wildlife laws and regulations, and this instruction, are enforced at the installations to which this instruction applies by Conservation Officers and Installation Security Officers by authority of Installation Commanders. Fully-trained, properly-qualified, and duly-certified Conservation Officers have power to apprehend and arrest violators for violations occurring at places over which the Navy may exercise law enforcement jurisdiction. Military and civilian personnel who observe or acquire credible information concerning violations of fish and wildlife laws and regulations, and this instruction, shall report same to Natural Resources Managers, Conservation Officers, or Installation Security Officers at the installation where the violation allegedly occurred.

10. Review Authority. The Regional Natural Resources Program Manager is responsible for review and update of this instruction.



S. A. TURCOTTE

Distribution: www.cnrma.navy.mil

29 JUL 2005

STATION PERMIT SUSPENSION/REVOICATION

1. Policy. Access to, and fishing at, the installations to which this instruction applies is a privilege granted by the Installation Commander.

2. Authority. The authority of Installation Security Officers, Natural Resources Managers, and Conservation Officers to enforce this instruction includes the power to summarily suspend or revoke fishing privileges, for good cause.

3. Violations. The following is a list, for illustrative purposes only, of common violations and administrative actions that may be taken, independently or in connection with other administrative or judicial remedies, against persons who violate fish and wildlife laws and regulations, and this instruction. Repeat offenders are likely to suffer permanent revocation of fishing privileges.

<u>SUSPENSION</u>	<u>VIOLATION</u>
30 Days	Violation of any state statute.
30 Days	Patron does not hold a station fishing permit.
30 Days	Operation of gasoline motor or boat in unauthorized area.
30 Days	Digging for bait in the vicinity of ponds.
60 Days	Fishing with live bait fish in unauthorized area.
30 Days	Unauthorized vehicle parking.
1 Year	Fishing with trotlines, fish traps or chemicals.
60 Days	Violation of station limit, but not state limit.
Reinstatement of Fishing Privileges at discretion of Installation Commanding Officer.	Defacing or destroying government property and littering.
Reinstatement of fishing privileges at discretion of Installation Commanding Officer.	Alcoholic Beverages

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COMNAVREG MIDLANT FISHING AREAS

1. NAS Oceana/Dam Neck Annex

a. Oceana Pond:

(1) Size/Location. Approximately 9 acres. Located on NAS Oceana, approximately one-half mile southeast of the intersection of Oceana Boulevard and Bells Road. Access restricted to a maintained gravel road bisecting an agricultural field.

(2) Parking. Parking permitted in designated cul-de-sac area between inner and outer gates.

(3) Facilities. Picnic facilities available. No open fires without permission of Natural Resources Manager. A boat launch is available. An interpretive nature trail loops the lake.

(4) License/Permit. In addition to the Virginia license and station permit, a parking permit will be issued with the station fishing permit and must be displayed on the vehicle dashboard in plain view.

(5) Size/Possession Limits. Catch and release encouraged.

(a) Largemouth Bass. Possession authorized from 16 June to 28 February only. Between 9 to 11 inches total length: two per day per person during season. Greater than 15 inches total length: one per day per person during season. For all other sizes, possession is prohibited.

(b) Catfish. Daily limit of three per person with a 10-inch minimum size.

(c) Panfish and Other Species. Virginia limits apply.

(6) Boats. Hand-propelled or electric motor boats and canoes are permitted. Gasoline motors are prohibited.

(7) Bait. No live bait fish.

(8) Special Regulations. Daytime use only unless approved by Natural Resources Manager. No other restrictions unless previously stated.

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b. Lake Tecumseh:

(1) Size/Location. Located on Dam Neck Annex, south of Dam Neck Road and west of Regulus Avenue.

(2) Parking. Limited parking is available off Dove Street.

(3) Facilities. Bank-fishing only. A fishing pier is located at the end of Dove Street.

(4) License/Permit. In addition to the Virginia license and station permit, a parking permit will be issued with the station fishing permit and must be displayed on the vehicle dashboard in plain view.

(5) Size/Possession Limits. Virginia limits apply for all species.

(6) Boats. None permitted.

(7) Bait. Must adhere to state regulations.

(8) Special Regulations. The Navy does not own Lake Tecumseh, only portions of the land around it. Therefore, the Navy does not authorize fishing from boats launched from Navy property. Anglers encouraged to catch and remove all carp, shad, and other rough fish.

c. Saltwater Fishing - Dam Neck Fishing Beach:

(1) Location. Located on Atlantic Ocean across the dune from Seamist RV Park off Regulus Avenue.

(2) Parking. Limited parking is available after hours and on weekends in the Naval Marine Intelligence Center parking lot.

(3) Facilities. None. Trash cans are located at the walkovers.

(4) License/Permit. Virginia Saltwater fishing license.

(5) Size/Possession Limits. Virginia or Federal regulations apply.

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(6) Boats. Boats are not permitted to be launched or retrieved on any recreational beaches.

(7) Bait. Virginia or Federal regulations apply.

(8) Special Regulations. Fishing may occur on the beach 24 hours a day. During dusk and evening hours, fishermen are required to have a light or lantern at their fishing location.

2. NAVPHIBASE Little Creek

a. Lake Bradford and Chubb Lake:

(1) Size/Location. Approximately 134 acres. Located on NAVPHIBASE Little Creek, off D Street.

(2) Parking. Seal Park, off D Street.

(3) Facilities. Boat ramp and picnic facilities are available.

(4) License/Permit. Virginia license and station permit.

(5) Size/Possession Limits. Catch and release encouraged.

(a) Largemouth Bass. Possession authorized from 16 June to 28 February only. Between 9 to 11 inches total length: two per day, per person, during season. Greater than 15 inches total length: one per day, per person, during season. For all other sizes, possession is prohibited.

(b) Walleye. Daily limit of two per person.

(c) Pan fish and other Species. Virginia limits apply.

(6) Boats. Boats with gasoline engines (10-hp limit) or electric motors are allowed. "No wake" limitations are in effect over the entire lake.

(7) Bait. Must adhere to Virginia regulations.

(8) Special Regulations. The eastern shoreline of Lake Bradford is privately owned. Anglers encouraged to catch and remove all carp, shad, and other rough fish.

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b. Lake Varian and Bigelow Hall Lake:

(1) Size/Location. Located on NAVPHIBASE Little Creek. Small ponds located at end of D Street near Rifle Range and at the intersection of 10th and 11th Streets, respectively.

(2) Parking. For Lake Varian, use parking area for Lake Bradford. For Bigelow Hall Lake use barracks parking.

(3) Facilities. None.

(4) License/Permit. Virginia license and station permit.

(5) Size/Possession Limits. Catch and release encouraged.

(a) Largemouth Bass. Possession authorized from 16 June to 28 February only. Between 9 to 11 inches total length: two per day per person during season. Greater than 15 inches total length: one per day per person during season. For all other sizes, possession is prohibited.

(b) Catfish. Daily limit of three per person with a 10-inch minimum size limit.

(c) Panfish and other Species. Virginia limits apply.

(6) Boats. None permitted.

(7) Bait. No live bait fish.

(8) Special regulations. None.

c. Saltwater Fishing Areas:

(1) Location. Fishing is only allowed on the beaches of the all hands beach.

(2) Parking. Parking available at end of Hewitt Drive.

(3) Facilities. Bathhouse available on site.

(4) License/Permit. Virginia Saltwater Fishing License.

(5) Size/Possession Limits. Virginia or Federal regulations apply.

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(6) Boats. Boats are not allowed to be launched or retrieved at any time from the beach.

(7) Bait. Virginia or Federal regulations apply.

(8) Special Regulations. Fishing is permitted from after Labor Day until Memorial Day from sunrise to sunset.

3. WPNSTA Yorktown/Cheatham Annex

a. Jones Pond:

(1) Size/Location. 63 acres on WPNSTA Yorktown, Cheatham Annex.

(2) Parking. Designated parking lot only.

(3) Facilities. Floating pier and picnic area.

(4) License/Permit. Virginia license and station permit.

(5) Size/Possession Limits. Catch and release encouraged.

(a) Striped Bass. One fish per day, minimum 20 inches.

(b) All Other Species. Virginia limits apply.

(6) Boats. To prevent introduction of invasive or exotic species, all boats used on this lake must be rented from MWR.

(7) Bait. To prevent introduction of invasive or exotic species, any live bait fish must be purchased from MWR.

(8) Special Regulations. No bank fishing permitted.

b. Cheatham Pond:

(1) Size/Location. 108 acres on WPNSTA Yorktown, Cheatham Annex.

(2) Parking. Designated parking at boat landing area.

(3) Facilities. Boat pier.

(4) License/Permit. Virginia license and station permit.

(5) Size/Possession Limits. Catch and release encouraged.

(a) Striped Bass. One fish per day, minimum 20 inches.

(b) All Other Species. Virginia limits apply.

(6) Boats. To prevent introduction of invasive or exotic species, all boats used on this lake must be rented from MWR.

(7) Bait. To prevent introduction of invasive or exotic species, any live bait fish must be purchased from MWR.

(8) Special Regulations. No bank fishing permitted.

c. Penniman Lake:

(1) Size/Location. 48 acres on WPNSTA Yorktown, Cheatham Annex.

(2) Parking. Designated parking lot at boat landing, behind Galley.

(3) Facilities. Picnic facilities located on lake.

(4) License/Permit. Virginia license and station permit.

(5) Size/Possession Limits. Catch and release only.

(6) Boats. To prevent introduction of invasive or exotic species, all boats used on this lake must be rented from MWR.

(7) Bait. To prevent introduction of invasive or exotic species, any live bait fish must be purchased from MWR.

(8) Special Regulations. Bank fishing permitted from two designated areas.

d. Feurer Youth Pond:

(1) Size/Location. 2 acres on WPNSTA Yorktown, Cheatham Annex.

(2) Parking. Designated parking lot only.

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(3) Facilities. Fishing pier, restrooms, and picnic area available.

(4) License/Permit. None required.

(5) Size/Possession Limits. Catch and release only.

(6) Boats. None permitted.

(7) Bait. To prevent introduction of invasive or exotic species, any live bait fish must be purchased from MWR.

(8) Special Regulations. Youth only, 15 years of age and younger. Bank and pier fishing only.

e. Roosevelt Pond:

(1) Size/Location. 21 acres on WPNSTA Yorktown.

(2) Parking. Designated parking area at boat landing.

(3) Facilities. Pier and shoreline boardwalk.

(4) License/Permit. Virginia license and station permit.

(5) Size/Possession Limits. Virginia limits apply for all species.

(6) Boats. To prevent introduction of invasive or exotic species, all boats used on this lake must be rented from MWR.

(7) Bait. No live bait fish.

(8) Special Regulations. Bank fishing permitted from two locations. Pond closed to fishing during explosive loading operations at ordnance pier.

f. WPNSTA Yorktown Ponds 10, 11, and 12:

(1) Size/Location. Pond 10 (4.5 acres), Pond 11 (23 acres), and Pond 12 (15 acres) on WPNSTA Yorktown.

(2) Parking. Designated parking adjacent to boat pier.

(3) Facilities. Floating pier.

(4) License/Permit. Virginia license and station permit.

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(5) Size/Possession Limits. Virginia limits apply for all species.

(6) Boats. To prevent introduction of invasive or exotic species, all boats used on this lake must be rented from MWR.

(7) Bait. No live bait fish.

(8) Special Regulations. Must possess a valid WPNSTA Yorktown Restricted Area ID. Must check in at MWR Outdoor Recreation/Rental Equipment office and receive a daily fishing pass before entering Restricted Area. The fishing pass shall be prominently displayed in the front window of vehicle. Ponds 11 and 12 may at times be closed due to Explosive Ordnance Detachment (EOD) operations.

g. Saltwater Fishing: Only authorized saltwater fishing is from the Cheatham Annex Pier.

(1) Location. Cheatham Annex Pier at the end of Sanda Avenue.

(2) Parking. Limited parking available at the pier.

(3) Facilities. None.

(4) Licenses/Permits. A current Virginia Saltwater License is required. A pier pass is required and available for purchase from MWR, Building 284. Military fee is \$10 per year, civilian fee is \$20 per year.

(5) Size/Possession Limits. Virginia and Federal regulations apply.

(6) Boats. None authorized.

(7) Bait. Virginia and Federal regulations apply.

(8) Special Regulations. Times: 1600-0600 Monday - Friday; 24 hours a day Saturdays, Sundays, and Holidays.

4. NAVSTA Norfolk

a. Naval Station Fishing Pier:

(1) Location. Located next to Salt Marsh Park, next to the Q Area ballfields off Admiral Massey Hughes Drive.

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- (2) Parking. Adequate parking is available at pier.
- (3) Facilities. Port-a-toilet available.
- (4) License/Permit. None required.
- (5) Size/Possession Limits. Virginia and Federal regulations apply.
- (6) Boats. Boats may not be launched or retrieved at this location.
- (7) Bait. Virginia and Federal regulations apply.
- (8) Special Regulations. Times: 24 hours a day; 7 days a week.

b. Other areas:

(1) Size/Location. Fishing is authorized from the following locations:

(a) The bulkhead extending eastward from the Deperming Station tower along the waters edge parallel to Admiral Massey Hughes Drive to the first picnic gazebo at Salt Marsh Park.

(b) From the westward end of Salt Marsh park to Iowa Point just west of the Sailing Center.

(c) Along the sea wall from the eastern side of the Bousch Creek culvert to the Mason Creek bridge.

(d) From the Mason Creek outfall on the sea wall (Building SP-263) along the sea wall not further than 10th Avenue.

(e) In the waters of Mason Creek.

(f) For Willoughby Bay Housing residents only: along the sand beach to the fence at the dredge spoil deposit site.

- (2) Parking. Limited at all areas.
- (3) Facilities. None.
- (4) License/Permit. Virginia Saltwater Fishing License.

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(5) Size/Possession Limits. Virginia and Federal regulations apply.

(6) Boats. None allowed.

(7) Bait. Virginia and Federal regulations apply.

(8) Special Regulations. None.

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Enclosure 2. Hunting Regulations and Information

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DEPARTMENT OF THE NAVY

COMMANDER
NAVY REGION, MID-ATLANTIC
6506 HAMPTON BLVD.
NORFOLK, VA 23508-1273

IN REPLY REFER TO:

COMNAVREG MIDLANT
INST 11015.2A
REG ENG Code 90
12 NOV 2002

COMNAVREG MIDLANT INSTRUCTION 11015.2A

Subj: HUNTING AND TRAPPING PROGRAM

Ref: (a) 16 U.S. Code § 670 *et seq.*
(b) 10 U.S. Code § 2671
(c) 32 C.F.R. Part 190
(d) 29.1 VA Code Chapters 3 and 5; 4 VA Admin. Code, Agency 15 (Dept. of Game and Inland Fisheries)
(e) NC General Statutes, CH. 113, Subchapters 3 and 4
(f) 50 C.F.R. Chapter 1, Subchapter B
(g) OPNAVINST 5090.1B, Chapter 22
(h) NAVSEA OP-5, Vol. 1, § 2-1.6
(i) JAGMAN

Encl: (1) Station Permit Suspension/Revocation
(2) Hunter Application Form
(3) Qualification Proficiency Standards
(4) Deer Hunting on NAS Oceana or Dam Neck Annex
(5) Deer Hunting on NALF Fentress
(6) Deer Hunting on WPNSTA Yorktown
(7) Deer Hunting on Cheatham Annex
(8) Deer Hunting on NAVSUPPACT Norfolk, Northwest Annex
(9) Waterfowl Hunting on Dam Neck Annex
(10) Spring Turkey (Gobbler) WPNSTA Yorktown
(11) Spring Turkey (Gobbler) Hunting on Cheatham Annex
(12) Small Game Hunting on NAS Oceana
(13) Small Game Hunting on NALF Fentress
(14) Small Game Hunting on NAVSUPPACT Norfolk, Northwest Annex
(15) Small Game Hunting on WPNSTA Yorktown
(16) Dove Hunting on NAS Oceana, NALF Fentress, and NAVSUPPACT Norfolk, Northwest Annex
(17) Trapping at NAS Oceana, NALF Fentress, Dam Neck Annex, and NAVSUPPACT Norfolk, Northwest Annex

1. Purpose. To regulate hunting and trapping on board Naval Weapons Station (WPNSTA), Yorktown, including Cheatham Annex; Naval Air Station (NAS), Oceana, including Dam Neck Annex and Naval Auxiliary Landing Field (NALF), Fentress; and Naval Support Activity (NAVSUPPACT), Norfolk, Northwest Annex.

2. Cancellation. NSGANWINST 11015.2D; COMNAVREGMIDLANTINST 11015.2.

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3. Policy

a. Reference (a) requires sustainable, multi-purpose use of natural resources on naval installations, consistent with combat readiness. These uses can include hunting and trapping and must conform to safety and security requirements and provide for public access.

b. Reference (b) requires compliance with Federal and State hunting laws, prescribes that State hunting licenses must be obtained if State law authorizes licenses for non-resident active duty personnel on the same terms as residents, and grants access to Naval installations by State wildlife management officials.

c. Reference (c) implements reference (a), providing, among other things, for public access to naval installations, unless a specific determination is made that safety or security reasons prohibit, or carrying capacity of wildlife resources precludes such access. Reference (c) also provides that hunting and trapping fees collected pursuant to reference (a) shall be used only to defray the costs of wildlife management programs at the installation collecting the fees. Collection, handling, and disbursement of funds shall comply with requirements prescribed by Commander, Naval Facilities Engineering Command (COMNAVFACENGCOM) and the Regional Comptroller Office.

d. Hunting and trapping on board WPNSTA Yorktown and Cheatham Annex; NAS Oceana, Dam Neck Annex, and NALF Fentress; and NAVSUPACT Norfolk, Northwest Annex shall comply with references (d) or (e), Virginia and/or North Carolina hunting and trapping laws and regulations per reference (f). The U.S. Fish and Wildlife Service regulations pertain to endangered and threatened species and migratory birds per reference (g), the Navy's Natural Resources Program instruction. Reference (h) places special limits on hunting and trapping in the vicinity of explosives handling and storage areas.

e. Hunting and trapping safety, to include the security of personnel, operations, and facilities, are matters within the authority and responsibility of Installation Commanders (ICs). Suspected violations of Federal and State statutes and regulations shall be reported to the cognizant Natural Resources Manager or to Naval law enforcement personnel. These violations will be investigated with a view to referral to the United States Attorney or, depending on the nature of the suspected violation, to Virginia civil authorities. Other suspected violations of this Instruction, not amounting to a violation of Federal or State law, shall be investigated and forwarded to the cognizant IC for disposition. As required by reference (c), investigation and enforcement may be conducted only by properly trained Federal

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and State personnel under the direction of, or in coordination with, Natural Resources Managers. Enclosure (1) pertains.

f. Hunting and trapping related incidents involving personal injury or property damage, especially those with potential to result in claims for or against the Government, shall be investigated and adjudicated as per reference (i). ALL HANDS ARE REMINDED TO REPORT SUCH INCIDENTS PROMPTLY. Initial reports of the occurrence of personal injury or property damage may be made by the most expeditious means available to Natural Resources Managers, Hunt Captains, security, medical emergency, or law enforcement personnel, Command Duty Officers (CDOs), and others in the IC chain of command.

g. Acceptance of a permit to hunt or trap on board any Commander, Navy Region, Mid-Atlantic (COMNAVREG MIDLANT) installation constitutes consent to inspection at any time by Navy, Federal, and State authorized personnel for purposes of safety, security, and/or compliance with the statutes and regulations referenced in this instruction. Enclosure (2) will so specify.

4. Responsibilities

a. Regional Engineer (PWC Norfolk)

(1) Natural Resources Manager. The Natural Resources Managers are responsible for managing fish and wildlife resources to include control of game harvesting and the designation of hunting/trapping areas. The Natural Resources Managers and Conservation Officers resolve disputes involving ownership of harvested game and enforce all Federal, State, and local game laws and regulations.

Subject to 10 U.S. Code § 1588, Natural Resources Managers are authorized to accept voluntary services in support of hunting and trapping-related natural resources programs, functions, and activities. This includes, without limitation, Hunt Captains at WPNSTA Yorktown, operating and maintaining the archery range at NAS Oceana (Building 78), conducting hunter qualification programs, and investigating alleged violations of hunting and trapping laws and regulations.

(2) Designated Conservation Officers. Conservation Officers are trained personnel assigned to the Regional Engineer's storefront compliance departments who, acting under the Natural Resources Managers, are responsible for enforcing Federal, State, and local wildlife laws and regulations. Conservation Officers are authorized to conduct game and hunter

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inspections to determine compliance with all applicable laws, regulations, and policies.

b. Regional Public Safety Program Manager. Security Officers at NAS Oceana; NAVSUPPACT Norfolk, Northwest Annex; and WPNSTA Yorktown will provide hunter check-in and check-out assistance and support Natural Resources Managers and Conservation Officers with law enforcement issues upon request.

c. Hunters and Trappers. Acceptance of a permit to hunt or trap on board a COMNAVREG MIDLANT installation constitutes consent to abide by Federal and State statutes and regulations incorporated herein by reference, and directives of Natural Resources Managers, Hunt Captains, and Conservation Officers. Enclosure (2) will so specify.

5. General

a. Authorized Personnel. For reasons of safety, security, and resource carrying capacity, only the following persons are authorized to hunt and trap on WPNSTA Yorktown, Cheatham Annex; NAS Oceana, NALF Fentress, and Dam Neck Annex; and NAVSUPPACT Norfolk, Northwest Annex:

- (1) Active duty military personnel and their dependents.
- (2) Retired military personnel and their dependents.
- (3) Federal civilian employees at COMNAVREG MIDLANT installations and their dependents.
- (4) Reservists and their dependents.
- (5) Retired Federal civilian employees at the installation from which they retired.
- (6) The above-listed authorized personnel may sponsor one guest while hunting white-tailed deer or turkey, or two guests while hunting small game. Additional security measures may be required for guests to hunt. Contact appropriate Natural Resources staff for details: WPNSTA Yorktown (757) 887-7605, NAS Oceana/NALF Fentress/Dam Neck Annex (757) 433-2151, and NAVSUPPACT Norfolk, Northwest Annex (757) 421-8043.
- (7) In instances where demand for a hunting activity exceeds availability, active duty personnel will be assigned to available slots prior to other applicants.

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b. Hunting Equipment

(1) General. Shotguns, bows and arrows may be brought onto a station only by those given permission to hunt and then only the day of an authorized hunt. At WPNSTA Yorktown and Cheatham Annex, off-station residents must have permission in advance from the Security Officer to bring weapons on board for practicing, qualifying, etc. on days other than hunting days. Off-station residents will remove weapons from the station immediately upon securing from hunting or checking out from the Hunt Station.

(2) Firearms

(a) The use of centerfire and rimfire rifles or handguns for hunting is prohibited on all installations covered under this instruction.

(b) Shotguns may be used for deer hunting at designated areas on WPNSTA Yorktown; Cheatham Annex; NALF Fentress; Dam Neck Annex; and NAVSUPPACT Norfolk, Northwest Annex and for small game hunting at all installations covered under this instruction. With the exception of waterfowl, there is no small game hunting on Dam Neck Annex. There is no squirrel hunting on NAVSUPPACT Norfolk, Northwest Annex.

(c) Shotguns must be 10-gauge or less, the magazines of which have been cut off or plugged so the gun will hold no more than three shells - chamber and magazine combined. A minimum 20-gauge is required for deer hunting.

(d) Muzzleload firearms for the special NAS Oceana, NALF Fentress and Dam Neck Annex, and NAVSUPPACT Norfolk, Northwest Annex hunts shall comply with current Virginia or North Carolina regulations.

(e) It is prohibited to transport a loaded firearm in a vehicle or to carry a loaded firearm on a hard surface road.

(3) Ammunition

(a) Shot size #7½ or less must be used for doves and upland birds. Waterfowl hunters must use steel or other federally-approved non-toxic alternatives to lead shot. Recommended shot size for waterfowl is BB through #6.

(b) Shot size #6 or less is authorized for rabbits, squirrels, and small game other than doves or upland birds.

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(c) Buckshot (#1, 0, 00, and 000) is permitted for deer only on WPNSTA Yorktown, Cheatham Annex, NALF Fentress, and Dam Neck Annex. Shotgun slugs are permitted only on NAVSUPACT Norfolk, Northwest Annex pending hunter qualification with this ammunition.

(d) Turkey hunters are restricted to shot size between #2 and #6.

(4) Archery. Equipment for deer hunting at all locations must be hand-held and hand-drawn (release aids are permitted). Archery equipment shall conform to all applicable regulations in references (d) or (e).

c. Safety/Security Requirements

(1) Hunter Safety

(a) All firearm hunters must have attended a hunter safety course approved by the Virginia Game Division. Proof of successful completion must be presented upon purchase of installation hunting permits.

(b) All bowhunters at NAS Oceana, NALF Fentress, and Dam Neck Annex must produce a certificate of completion from an International Bowhunter Education Program (IBEP) safety course at the time of station permit purchase or during proficiency qualifications. IBEP is strongly recommended for bowhunters at WPNSTA Yorktown and Cheatham Annex.

(2) Blaze Orange

(a) All deer hunters are required to wear blaze orange while walking to and from their stand and while pursuing wounded game. In addition, bowhunters and muzzleload hunters must adhere to all applicable blaze orange requirements specified in references (d) or (e) during the regular firearms season. Outside the regular firearms season, and while on stand, bowhunters and muzzleload hunters must display solid blaze orange material (at least 100 square inches) at shoulder level within arms reach and visible from 360 degrees.

(b) Small game hunters are required to wear applicable blaze orange in accordance with references (d) or (e). Blaze orange is not required while dove or waterfowl hunting, or during the spring turkey season.

(c) During deer and small game season, trappers are required to follow blaze orange requirements as specified above.

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(3) Vehicles/Parking

(a) WPNSTA Yorktown and Cheatham Annex. During shotgun deer season at WPNSTA Yorktown, designated Hunt Captains will transport hunters to their hunting area. Each Hunt Captain is responsible for the conduct and safety of his or her group and shall make sure the members of the group follow Federal and State regulations and this instruction. During other seasons, two personal operating vehicles (POVs) will be allowed per hunting area. The Natural Resources staff will register the vehicles and provide a dashboard pass the morning of the hunt authorizing POV entry into the restricted area. During all hunting seasons at Cheatham Annex, designated vehicle parking areas will be described during the indoctrination brief, and vehicle parking passes will be distributed. Hunting while parked in other than designated areas, or failure to display a parking pass while hunting, is prohibited. All parking passes must be returned to Natural Resources when checking out at the conclusion of the hunt.

(b) NAS Oceana, NALF Fentress, Dam Neck Annex and NAVSUPACT Norfolk, Northwest Annex. Designated vehicle parking areas will be described during the required indoctrination. Vehicle parking passes will be distributed at hunter check-in. Parking in other areas, or without a displayed parking pass, is prohibited.

(4) General

(a) Drive-hunting deer, using hunters as drivers, without permission is prohibited. The Natural Resources Manager may organize and execute man-drives in situations where he deems population management is necessary.

(b) It is prohibited to hunt, carry a loaded weapon, or discharge a weapon within 150 yards of an occupied structure or horse trail, or within 200 yards of exposed working personnel, recreation areas, buffer zones, or roads. Hunting over horse trails is authorized at WPNSTA Yorktown, as trail-riding is not permitted on hunt days.

(c) Hunting or trapping while in possession or under the influence of alcohol, as defined by State law, or of any substance prohibited by Federal or State law, is likewise prohibited. Appropriate action will be taken to address personal accountability for all instances of alcohol and substance abuse. Similarly, smoking is prohibited in all hunting areas and in all Government buildings.

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d. Dog Use and Training

(1) Training. As noted in reference (d), the training of dogs-on-live-wild-animals is considered hunting and is unlawful during the closed season.

(2) NAS Oceana, NALF Fentress, Dam Neck Annex and NAVSUPACT Norfolk, Northwest Annex. Dogs shall not be used to hunt white-tailed deer. Dogs are permitted for use by small game hunters on NAS Oceana, NALF Fentress and NAVSUPACT Norfolk, Northwest Annex and must be in control of the handler at all times.

(3) WPNSTA Yorktown and Cheatham Annex. Dogs may be used to hunt deer and small game only if approved in advance by the Natural Resources Manager.

(4) Waterfowl. Use of retrieving dogs is permitted and encouraged for waterfowl hunters on Dam Neck Annex although they will not be allowed to roam freely outside hunting locations.

(5) Vaccinations/Ownership. All hunting dogs must have current vaccinations and owner identification on the animal's collar.

e. Tree-Stands. Permanent tree-stands, or those affixed to trees by screws or nails, may be provided at WPNSTA Yorktown, Cheatham Annex, or NAVSUPACT Norfolk, Northwest Annex. In addition, disabled veterans may contact the Natural Resources Staff at WPNSTA Yorktown regarding the availability of a wheelchair accessible tree stand. Use of this stand is reserved for disabled veterans, but the application process is the same for hunting in general. Permanent stands are prohibited on other COMNAVREG MIDLANT installations. Pruning of small limbs (less than two inches in diameter) is permitted around temporary tree-stands for safe bow limb clearance. Removal of large limbs or trees for creation of shooting lanes is prohibited. All temporary tree-stands, which must be clearly marked with the owner's name and permit number, are to be removed no later than 30 days from the completion of the hunting season.

f. Protected Wildlife. Protected wildlife, as defined by reference (f), such as songbirds, hawks, owls, eagles, gulls, herons, egrets, and vultures shall not be hunted or trapped at any time. Killing, capturing, or harassing other non-game species is prohibited. There shall be no open season on any wildlife except as specified by references (d) or (e) and this instruction.

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g. Wildlife Harassment. Unless specifically needed to maintain flightline safety, wildlife harassment is prohibited at all installations.

h. Spotlighting. It is unlawful for any person to cast the rays of an artificial light as a hunting or trapping aid on any station field or woodland area at any time except for routine census checks conducted by the Natural Resources Manager.

i. Injured Wildlife. Injured wildlife shall be immediately reported to the Natural Resources Manager for determination of disposition. Hunters are required to make every possible effort to retrieve wounded deer. On NAS Oceana and NAVSUPACT Norfolk, Northwest Annex, if a wounded deer is lost, hunters shall notify security. The Natural Resources Manager, Conservation Officers, Hunt Captains, and hunting and trapping program volunteers may offer assistance in tracking, if required.

6. Procedures

a. Hunting Licenses. Each hunter must possess a valid Virginia or North Carolina hunting license as appropriate. A big game license is required for deer and turkey hunting, and a migratory bird stamp and a Virginia Harvest Information Program (HIP) number is required for hunting waterfowl and other migratory birds.

b. Station Permits. In addition to a valid hunting license, a current station hunting permit is required of all persons who hunt or trap on board installations covered under this instruction. Each station permit will cover all authorized small and big game hunting allowed on the installation during the current hunting season. Annual permits are valid concurrent with the hunting licenses from 1 July through 30 June. Additional information on permits and hunting dates is available on the Navy Public Works Center (PWC) Norfolk website, www.norfolk.navy.mil/pwc.

(1) WPNSTA Yorktown and Cheatham Annex. All hunters on WPNSTA Yorktown or Cheatham Annex must possess a WPNSTA Yorktown Hunting Permit. Permits may be obtained for \$10 from WPNSTA Yorktown Morale, Welfare and Recreation (MWR), Building 705, and Cheatham Annex MWR, Building 130. This permit covers all small and big game hunting on either unit.

(2) NAS Oceana, NALF Fentress, Dam Neck Annex, and NAVSUPACT Norfolk, Northwest Annex. All hunters on NAS Oceana, NALF Fentress, Dam Neck Annex, or NAVSUPACT Norfolk, Northwest Annex must obtain a NAS Oceana Hunting Permit. Hunting and

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trapping permits are obtainable only from the Regional Engineer, Oceana Compliance Department staff located at the Natural Resources Center (NRC), Building 78, or Building 404 at NAVSUPACT Norfolk, Northwest Annex. Permits are available for sale at all scheduled proficiency qualifications and indoctrinations. The cost for a hunting, trapping, or range-only permit is \$20 per season. Purchase of a season permit allows use of the Archery Range at the NRC and covers all small game, big game, and waterfowl hunting on these installations.

(3) Upon submitting an application to hunt, individuals shall be required to sign a general release statement that relieves the Federal Government of liability in case of accident or injury. Individuals are responsible for having read and understood all applicable Federal, State, local and installation hunting regulations.

(4) All guests must adhere to application procedures specified in enclosure (2), obtain a valid installation hunting permit, and comply with all applicable qualifications as outlined below. Guests are the responsibility of their sponsor while hunting.

(5) For individuals under 18 years of age, a parent or legal guardian must sign the hunting application. Minors are the responsibility of their adult sponsor who holds a valid hunting permit. Dependents under the age of 12 must be in the same stand or in direct contact with the parent or legal guardian at all times while hunting.

c. Qualifications. Persons wishing to hunt deer with archery equipment, or muzzleloading rifles, or use shotgun slugs at NAVSUPACT Norfolk, Northwest Annex, must complete an annual proficiency qualification. There is no qualification required of shotgun hunters not utilizing slugs. Qualification dates and times will be announced during the first weeks of August and September in installation plans of the week (POW) and will also be posted at the NAS Oceana NRC, Building 78; WPNSTA Yorktown Hunt Station, Building 53; and Cheatham Annex MWR, Building 130. Standards are provided in enclosure (3).

d. Site-specific Hunting Procedures. Enclosures (4) through (17) detail specific procedures for hunting various types of game at COMNAVREG MIDLANT installations.

7. Enforcement. On bases covered herein, Navy regulations, and Federal, State, and local game laws are enforced by Natural Resources Management personnel acting as Station Conservation Officers by authority of the IC. They have the power to

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apprehend and arrest all violators of Federal, State, and station game laws and regulations. In addition, they have the authority to dismiss any hunter in violation of this instruction or whomever they consider unsafe for any reason. All violations of this instruction or other applicable laws and regulations shall be reported to the Installation Natural Resources Manager or Security Officer.

8. Review Authority. The Regional Engineer's Natural Resources Program Manager is responsible for the reviewing and updating of this instruction.


G. E. EICHERT
Chief of Staff

Distribution: www.cnrma.navy.mil

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STATION PERMIT SUSPENSION/REVOCATION

A-1 POLICY. The privilege of hunting on COMNAVREG MIDLANT installations is governed by the IC of the appropriate installation.

A-2 AUTHORITY. The Natural Resources Manager and Conservation Officer(s) shall enforce regulations and have the authority to suspend or revoke hunting privileges as appropriate.

A-3 VIOLATIONS. The following is a list of common violations and administrative actions that may be taken against personnel who violate applicable State and Federal hunting and trapping laws and regulations, and this instruction. Permit suspensions may be in addition to criminal prosecution and/or prosecution through the Uniform Code of Military Justice. Suspensions are measured in "hunting days from date of violation." Penalties for the second offense are indefinite revocation of hunting privileges. ICs have unlimited authority to control access to their installations and provide for the safety and security thereof. Penalties for the first offense are listed below:

<u>VIOLATION</u>	<u>ACTION</u>
Violation of parking requirements, or parking in an unauthorized area	10 Days
Guest not accompanied by sponsor	30 Days
Violation of blaze orange requirements	30 Days
Littering	30 Days
First violation of any station regulation, not a violation of State regulations	30 Days
Violation of station permit procedures	60 Days
Unauthorized stocking or release of domesticated or wild animals	60 Days
Violation of check-in or check-out procedures	TERMINATION FOR SEASON
Hunting on unauthorized days	TERMINATION FOR SEASON
Hunting in unauthorized areas or unauthorized movement into other hunting areas or stands	TERMINATION FOR SEASON
Second violation of any station regulation, not a violation of State regulations	1 Year
Violation of any State or Federal Wildlife Statute	PERMANENT HUNTING BAN
Use of unauthorized weapons or ammunition	PERMANENT HUNTING BAN

Enclosure (1)

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HUNTING APPLICATION

1. SEASON - CHECK ONLY ONE BOX PER APPLICATION:

(Applications with more than one box check will be discarded.)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPRING TURKEY (Cheatham)	SPRING TURKEY (Yorktown)	GUN DEER (Cheatham)	BOW DEER (Cheatham)	GUN DEER (Yorktown)

Deadline: 15 MAR 15 MAR 1 NOV 15 SEP 1 NOV

2. PREFERRED HUNTING DATE (List choices in priority order.):

Date(s): _____
(Go to www.norfolk.navy.mil/pwc or call 887-7605 for available dates.)

3. APPLICANT INFORMATION:

NAME: _____

MIL OR CIV HUNTER SAFETY CARD NO. _____
(Check only one.) (Attach photocopy with application.)

COMMAND: _____

HOME MAILING ADDRESS: _____

PHONE NUMBER: _____ (DAY) _____ (EVENING)

WPNSTA Yorktown PERMIT NUMBER: _____
(If obtained by date of application.)

4. NAME OF GUEST (IF ANY) YOU WISH CONSIDERED ON THIS APPLICATION:

NAME: _____ HUNTER SAFETY #: _____

5. AGREEMENT: By signing this application, I certify I have read, understand and will abide by COMNAVREGMIDLANTINST 11015.2 (Series) and all applicable State and Federal hunting laws. I consent to inspection at any time by duly authorized personnel (Navy, Federal, and State), for purposes of safety, security, or compliance with said instruction. Subject to penalties provided by law, I attest that I am not prohibited by Chapter 44 of title 18, U.S. Code, from possessing firearms or ammunition; and that the possession of firearms or ammunition will not violate a statute of the Commonwealth of Virginia or an ordinance applicable to the locality in which I reside. I attest that I have full knowledge of the risks and dangers involved in hunting and trapping, and hereby relieve the Federal Government of all liability for loss, damage, personal injury, or death sustained therein on board COMNAVREG MIDLANT installations. I agree that this release not only binds me, but also my family, heirs, assigns, administrators, and executors.

SIGNATURE: _____ DATE: _____

SIGNATURE: _____ DATE: _____ (Guest)

Enclosure (2)

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HUNTING APPLICATION INSTRUCTIONS

1. General. Print or type all required information except for signature. All information must be included. Applications must be mailed (or FAXED) and received at the following address by dates specified on the application. Late applications will not be considered unless available slots remain unfilled. **A photocopy of applicable military or Department of Defense (DOD) civilian identification, and hunter safety or IBEP card must be submitted with the application.**

For WPNSTA Yorktown or Cheatham Annex hunts:

Navy Public Works Center/Regional Engineer (Code 950)
9742 Maryland Avenue
Norfolk, VA 23511-3095

FAX: (757) 887-4478

2. Season. Check only one box per application. **If you wish to submit an application for more than one type of hunting, separate applications must be submitted.** Applications with more than one box checked in this section will be discarded.

3. Preferred Hunting Date. List preferred hunting dates. Available hunting dates may change for each calendar year based on State regulations and installation requirements. Go to www.norfolk.navy.mil/pwc for available dates or contact the Natural Resources Manager at WPNSTA Yorktown, (757) 887-7605.

4. Applicant Information. Print all information, including address and zip code. Ensure a block designating military or civilian is checked. List current station hunting permit number, if obtained.

5. Name of Guest. Eligible personnel may sponsor one guest while hunting deer or turkey. Guests must adhere to all application procedures, obtain an installation hunting permit and comply with all applicable qualifications. If an applicant is approved, the sponsored guest is also selected to hunt on that day. Include photocopy of guests hunter safety card.

6. Signature (Required). By signing page one of enclosure (2), applicants acknowledge they have read and understood this instruction and all applicable State and Federal hunting laws.

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QUALIFICATION PROFICIENCY STANDARDS1. BOWHUNTING

a. Archers shall be permitted up to three qualifying attempts per year. All attempts can be made on the same day if so desired.

b. Archers shall shoot two arrows each at three designated targets. Six arrows are required for any qualifying attempt. Qualification distances shall not exceed 25 yards.

c. On each target, one of two arrows must land inside a marked kill-zone. The shaft of an arrow breaking the line is a valid shot.

d. Arrows must be tipped with hunting broadheads, and equipment must be that to be used during the hunting season. All broadheads and shafts must match and be numbered with the last four digits of the archer's Social Security Number. Archers using mechanical broadheads can qualify with field points provided mechanical broadheads are presented at the qualification and used during the hunting season.

e. The bow hunting range shall be closed 30 minutes prior to all qualifications. No practice shots are allowed prior to the qualification period.

2. MUZZLELOADER/SHOTGUN SLUG

a. Participants shall be permitted one qualifying attempt per day. If more than one qualification shoot is scheduled for the year, shooters may attempt an additional qualification on the second day, within allotted range time, after all first time qualifiers have been given an initial attempt.

b. Participants may shoot up to three shots at the target from a bench rest distance of 50 yards. A 9" diameter target will have an internal 3½" diameter inner ring. Any shot inside the inner ring will be scored as 75 points and any in the outer ring will be scored as 50 points. Qualification consists of a minimum 125 point score. A shot breaking the edge of either ring is a valid shot.

c. Equipment used in qualifying shall be the same as that used for hunting.

d. No practice rounds permitted.

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DEER HUNTING ON NAS OCEANA OR DAM NECK ANNEX

1. Season Dates/Hunting Hours. Unless specifically restricted by Natural Resources staff, seasons and hours will conform to those in reference (d). There shall be no hunting at NAS Oceana during, and two days prior to, the annual air show.
2. Area Closures. The Natural Resources Manager and/or the Security Officer may close specific areas at any time. Such announcements will be posted at NAS Oceana Security, Building 320 and at the Naval Resources Center (NRC), Building 78.
3. Indoctrination Brief. All persons wishing to hunt deer are required to attend an indoctrination brief given by the Natural Resources staff. This brief will help hunters familiarize themselves with hunting areas, base regulations, and all procedures not covered herein. These procedures are enforceable as indicated by enclosure (1). Dates for indoctrination will be posted at the NRC, Building 78, and in the NAS Oceana POW beginning in August.
4. Check-in Procedures
 - a. Each hunter shall sign-out at NAS Oceana Security, Building 320, for a specific area immediately before going into the field for hunting or scouting. Hunters may sign-out for an area as early as 1½ hours prior to sunrise. Hunters must report to the check station within 1½ hours after sunset of that hunting day or forfeit hunting privileges for the season. A hunter may not proceed to another hunting area without signing back-in and then back-out for the new area. Log forms must be completed at the end of each day's hunt. This includes information on hours hunted, game seen and harvested, and hunter identification.
 - b. Only one hunter shall be allowed in each hunting area for deer hunting unless a hunter is sponsoring a guest or hunters have prearranged with each other to hunt in the area. Hunters who plan to hunt in the same area must all be present at the time of check-in for an area.
 - c. Hunters shall be issued parking passes upon check-in for hunting areas. The parking pass must be displayed on the vehicle dashboard.
5. Permits/Application Process. No application other than purchase of the required State license and installation hunting permit is required.
6. Scouting
 - a. Scouting is permitted at any time during the year for individuals with a valid hunting permit. Scouting shall be

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closed two weeks prior to the opening day of the regularly scheduled deer season, and may be closed at other times by the Natural Resources Manager or NAS Oceana Security Officer.

b. Individuals wishing to scout must report to NAS Oceana Security, Building 320, and check-out under the same procedures for hunting outlined above.

7. Handling of Harvested Game. Hunters may field-dress deer off station or in wooded areas where animals were harvested. No field-dressing is permitted within 200 yards of occupied buildings, roads, horse trails, agricultural areas, or within Airfield Clear Zone Boundaries.

8. Game Check-In. Per reference (d), a hunter harvesting a deer shall immediately attach the appropriate big game tag from their license or Deer Management Assistance Program (DMAP) tag to the animal before moving it from the place of kill. Successful hunters must contact the Natural Resource Manager (433-3461 or 433-2151 until 1600) to be issued a Virginia Department of Game and Inland Fisheries (VDGIF) Check Card and for collection of biological data from the animal. After 1600, the Natural Resources Manager may be contacted through NAS Oceana Security (433-3103). All check-in of deer will occur at the NAS Oceana NRC, Building 78.

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DEER HUNTING ON NALF FENTRESS

1. Season Dates/Hunting Hours. Hunting at NALF Fentress is during the general Chesapeake firearms season unless otherwise designated by the Natural Resources Manager. Unless specifically restricted by Natural Resources staff, seasons and hours will conform to reference (d).
2. Area Closures. The Natural Resources Manager and/or Security Officer may close specific areas at any time. Such announcements will be posted at the Crash Captain's Watch Desk, Building 100, and the NAS Oceana NRC, Building 78.
3. Indoctrination Brief. All persons wishing to hunt deer are required to attend an indoctrination brief given by the Natural Resources staff. This brief will help hunters familiarize themselves with hunting areas, base regulations, and all procedures not covered herein. Dates for indoctrination will be posted at the NAS Oceana NRC, Building 78, NALF Fentress, Building 100, and in the NAS Oceana POW beginning in August.
4. Check-In Procedures. Hunters shall sign-out for a specific area as early as 1½ hours prior to sunrise at the Crash Captain's Watch Desk, NALF Fentress, Building 100, immediately before going into the field for hunting or scouting. Hunters must report to Building 100 within 1½ hours after sunset of that hunting day and complete a log form or forfeit hunting privileges for the season. A hunter may not proceed to another hunting area without signing back-in and then back-out for the new area.
5. Permits/Application Process. No application other than purchase of the required State license and installation hunting permit is required.
6. Scouting. Individuals wishing to scout must report to the Crash Captain, Building 100, and check-out for an area under the same procedures for hunting outlined above.
7. Handling of Harvested Game. Hunters may field-dress deer off station or in wooded areas where animals were harvested. No field-dressing is permitted within 200 yards of occupied buildings, roads, agricultural areas, or within Airfield Clear Zone Boundaries.
8. Game Check-In. Per reference (d), a hunter harvesting a deer shall immediately attach the appropriate big game tag from their license or DMAP tag to the animal before moving it from the place of kill. Successful hunter must contact the Natural Resource Manager (433-3461 or 433-2151 until 1600) to be issued a VDGIF Check Card and for collection of biological data from the animal. After 1600, the Natural Resources Manager may be contacted through NAS Oceana Security (433-3103). All check-in of deer will occur at the NAS Oceana NRC, Building 78.

Enclosure (5)

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DEER HUNTING ON WPNSTA YORKTOWN

1. Season Dates/Hunting Hours. Hunting is permitted only on Saturdays or specified Holidays that fall within the established Virginia hunting seasons, or on other dates within the established seasons as authorized by the Commanding Officer. The hunting day will be in accordance with reference (d), or as otherwise directed by the Natural Resources staff. A list of hunting days will be announced annually during the first week of August and September in the WPNSTA Yorktown POW and will also be posted at the WPNSTA Yorktown Hunt Station, Building 53, and Cheatham Annex MWR, Building 130.
2. Area Closures. The Natural Resources Manager and/or the Security Officer may close specific stands or areas at any time. Such announcements will be made during the Indoctrination Brief.
3. Indoctrination Brief. On the morning of the hunt, all hunters must first check-in by 0500 with the Natural Resources personnel at the WPNSTA Yorktown Hunt Station, Building 53, before proceeding to their assigned hunt area. Hunters will be given an indoctrination brief, assigned a marked stand, and taken to their assigned hunting stand by a designated Hunt Captain.
4. Check-In Procedures. Hunters shall remain within their assigned area. No hunter will be permitted to leave the stand unless the Hunt Captain is with them, except to return to the drop-off point, and/or collect and field-dress harvested game. No hunter shall solicit or accept a ride back to the Hunt Station by any individual other than their Hunt Captain. During the early archery season, all bowhunters will assemble at the WPNSTA Yorktown Hunt Station where they are scheduled to hunt at a time directed by the Natural Resources staff.
5. Permits/Application Process. In addition to the State license and installation permit, anyone wishing to hunt at WPNSTA Yorktown shall fill-out enclosure (2) and submit by stated application deadlines and according to directions. A drawing to select participants for each hunt will be held and successful applicants notified. In the event that all hunting spaces are not filled, the Natural Resources Manager may accept late applications.
6. Scouting. There is no scouting permitted on WPNSTA Yorktown.
7. Handling of Harvested Game. Hunters may retrieve and field-dress any deer taken within direct line-of-sight of their assigned stand. If a wounded animal leaves direct line-of-sight, the hunter should wait for arrival of a designated Hunt Captain before pursuing.
8. Game Check-In. Upon return from the hunting area, all hunters shall check-in at the Hunt Station, Building 53. Successful hunters will then report kills and exchange their license tab for an official VDGIF Check Card.

1 2 NOV 2002

DEER HUNTING ON CHEATHAM ANNEX

1. Season Dates/Hunting Hours. Hunting is permitted on Wednesday beginning at 1200 and on Saturdays, or specified Holidays that fall within the established Virginia hunting seasons, or on other dates within the established seasons as authorized by Commanding Officer, WPNSTA Yorktown. The hunting hours will be in accordance with reference (d), or as otherwise directed by the Natural Resources staff. A list of hunting days will be announced annually during the first week of August and September in the WPNSTA Yorktown POW and will also be posted at the WPNSTA Yorktown Hunt Station, Building 53, and Cheatham Annex MWR, Building 130.

2. Area Closures. The Natural Resources Manager and/or the Security Officer may close specific stands or areas at any time. Adjustments to hunting days/hours may be made by the Natural Resources Manager as required. Such announcements will be made during the indoctrination brief.

3. Indoctrination Brief. Selected hunters shall assemble at a location specified by the Natural Resources Staff by 1130 Wednesdays or by 0430 on Saturdays on their scheduled hunt day. Hunters will be given an indoctrination brief, and be assigned a hunting area. Hunters will be issued a parking pass and map of their assigned hunt area showing the boundaries and the designated parking area, and at that point, may proceed to the field.

4. Check-In Procedures

a. Hunters shall remain within their assigned area. Hunters must check out in person at the conclusion of their hunt, no later than 1½ hours after sunset of that hunting day or as otherwise directed by the Natural Resources staff, or forfeit hunting privileges for the season. A hunter may not proceed to another hunting area without clearance from the Natural Resources staff. Temporary tree stands shall be removed from the woods at the conclusion of each hunt day.

b. Only one hunter will be allowed in each hunting area, except that individuals under 16 years of age may occupy the same area as their sponsor, but only one bow or gun will be allowed in each area.

5. Permits/Application Process. In addition to the State license and installation permit, anyone wishing to hunt at Cheatham Annex shall fill out enclosure (2) and submit by deadline dates, according to directions. A drawing to select participants for each hunt will be held and successful applicants notified. In the event not all hunting spaces are filled, the Natural Resources Manager may accept late applications.

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6. Scouting. Scouting will be permitted in advance of the early archery season by contacting the WPNSTA Yorktown, Security Officer.

7. Handling of Harvested Game. All deer shall be field-dressed in the wooded area where the animal was harvested. Hunters may not pursue wounded animals beyond the boundaries of their assigned hunt area without permission from the Natural Resources staff.

8. Game Check-In. Per reference (d), a hunter harvesting a deer shall immediately attach the appropriate big game tag from his or her license or DMAP tag to the animal before moving it from the place of kill. All deer harvested must be checked in, at which time hunters will exchange their license tab for an official VDGIF Check Card.

DEER HUNTING ON NAVSUPPACT NORFOLK, NORTHWEST ANNEX

1. Season Dates/Hunting Hours. Hunting at NAVSUPPACT Norfolk, Northwest Annex is on Tuesdays, Thursdays, and Saturdays during the general Chesapeake or Currituck County firearms season unless otherwise designated by the Natural Resources Manager. Unless specifically restricted by Natural Resources staff, seasons and hours will conform to those listed in references (d) and (e).
2. Area Closures. The Natural Resources Manager and/or the Security Officer may close specific stands or areas at any time. Such announcements will be made during the indoctrination brief. MWR is responsible for notifying Natural Resources personnel and the Security Officer one week prior to scheduling use of campground areas.
3. Indoctrination Brief. All persons wishing to hunt deer are required to attend an indoctrination brief given by the Natural Resources staff. This brief will help hunters familiarize themselves with hunting areas, base regulations, and all procedures not covered in this instruction. Dates for indoctrination will be posted at the NAS Oceana NRC, Building 78, Northwest Annex, Building 404, and in the Northwest Annex POW beginning in August.
4. Check-In Procedures. Hunters shall sign-out for a specific area as early as 1½ hours prior to sunrise at Building 145, Northwest Annex, Security immediately before going into the field for hunting or scouting. Hunters must report to Building 145 within 1½ hours after sunset of that hunting day and complete a log form, or forfeit hunting privileges for the season. A hunter may not proceed to another hunting area without signing back-in and then back-out for the new area.
5. Permits/Application Process. No application other than purchase of the required State license and installation hunting permit is required.
6. Scouting. Individuals wishing to scout must report to Building 145, Security Office, and check-out for an area under the same procedures for hunting outlined above.
7. Handling of Harvested Game. Hunters may field-dress deer off station or in wooded areas where animals were harvested.
8. Game Check-In. Per references (d) and (e), a hunter harvesting a deer shall immediately attach the appropriate big game tag from their license or DMAP tag to the animal before moving it from the place of kill. Successful hunters must contact the Natural Resource Manager (421-8043 until 1600) to be issued a VDGIF Check Card and for collection of biological data from the animal. After 1600, the Natural Resources Manager may be contacted through Northwest Annex, Security (421-8000). All check-in of deer will occur at the game check station, Building 295.

WATERFOWL HUNTING ON DAM NECK ANNEX

1. Season Dates/Hunting Hours. Waterfowl seasons will be in accordance with all State and/or Federal seasons. All Federal bag limits and other migratory waterfowl regulations apply.
2. Blinds/Area Closures. Waterfowl hunters will be allowed to hunt only from duck blind locations maintained by the Natural Resources Manager. Blind locations will be posted at NAS Oceana, Security, Building 320, and the NRC, Building 78. Hunters may not hunt from shore, boats, or any area other than authorized blind locations. The Natural Resources Manager and/or the Security Officer may close specific blinds at any time. Such announcements will be posted at the Security Office, Building 320.
3. Check-in Procedures. Blinds will be drawn on a first-come basis on the opening day of each split season and the following Wednesdays and Saturdays during the season. Blind reservations shall not be accepted. Waterfowl hunters must check-out blinds at NAS Oceana, Security, Building 320, on the day they are hunting no earlier than 1½ hours before sunrise. Hunters must check-in with Security no later than one hour after sunset.
4. Permits/Application Process. All waterfowl hunters must have a Federal migratory duck stamp and Harvest Information Program (HIP) number in addition to their State hunting license and station permit.
5. Game Check-In. Upon return from the hunting area, all hunters shall check-in at the Security Office to turn in parking passes and report harvest information.
6. Restrictions. Boats used for waterfowling may be propelled by gasoline engines in Redwing Lake only; however, "no wake" limitations will be strictly enforced. Boats are not permitted on Lake Tecumseh unless written permission is obtained from the private landowner. For boating and personal safety, no more than four hunters are permitted to hunt from a duck blind.

12 NOV 2004

SPRING TURKEY (GOBLER) SEASON ON WPNSTA YORKTOWN

1. Season Dates/Hunting hours. Hunting is permitted on WPNSTA Yorktown on Saturdays during the established Virginia Spring Hunting Season for bearded birds only. All Virginia bag limits and regulations apply. The hunting day will be from 30 minutes before sunrise until 1200.
2. Indoctrination Brief. Selected hunters are to assemble at the Hunt Station, Building 53, on their scheduled hunt day at a time directed by the Natural Resources Manager. Hunters will be briefed and assigned a hunting area prior to going into the field.
3. Permits/Application Process. Due to security concerns, turkey hunting at WPNSTA Yorktown is restricted to Yorktown personnel only. There are a limited number of spaces available on each hunting day. Yorktown personnel wishing to hunt turkey at WPNSTA Yorktown shall fill-out enclosure (2) and submit according to directions. A drawing to select participants for each hunt will be held and successful applicants notified. A State license and installation permit is also required.
4. Game Check-In. Upon return from the hunting area, all hunters shall check-in at the Hunt Station, Building 53. Successful hunters will then report kills and exchange their license tab for an official VDGIF Check Card.
5. Restrictions. Electric callers are prohibited, as are dogs and organized drives.

1 2 NOV 2002

SPRING TURKEY (GOBLER) SEASON ON CHEATHAM ANNEX

1. Season Dates/Hunting hours. Hunting is permitted on Cheatham Annex on Wednesdays and Saturdays during the established Virginia Spring Hunting Season for bearded birds only. All Virginia bag limits and regulations apply. The hunting day will be from 30 minutes before sunrise until 1200.
2. Indoctrination Brief. Selected hunters shall assemble at the WPNSTA Yorktown Hunt Station, Building 53, on their scheduled hunt day at a time directed by the Natural Resources staff. Hunters will be given an indoctrination brief, and be assigned a hunt area. Hunters will be issued a parking pass and map of their assigned hunt area showing the boundaries, and at that point, may proceed to Cheatham Annex.
3. Permits/Application Process. There are a limited number of spaces available on each hunting day. Anyone wishing to hunt turkey at Cheatham Annex shall fill out and submit enclosure (2). Drawings to select participants for each hunt will be held and successful applicants notified. A State license and installation permit is also required.
4. Game Check-In. Hunters must remain within their assigned area. Hunters must check-out in person at the conclusion of their hunt, no later than 1230 or as directed by the Natural Resources staff, or forfeit hunting privileges for the season. A hunter may not proceed to another hunting area without clearance from the Natural Resources staff.
5. Restrictions. Electric callers are prohibited, as are dogs and organized drives.
6. Scouting. Scouting will be permitted in advance of the spring gobbler season by contacting the Cheatham Annex, Security Department.

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SMALL GAME HUNTING ON NAS OCEANA

1. Season Dates/Hunting Hours. The small game season includes squirrel, rabbit, quail, dove, woodcock, and other species as authorized by Virginia game regulations. Virginia regulations regarding bag limits, seasons, and hours will be followed.
2. Area Closures. Except for dove hunting, small game areas will be open on Saturdays only during the regular small game season. While open to small game hunting, all deer hunting areas within the small game area will be closed. Open small game hunting areas will be posted at NAS Oceana, Security, Building 320, and the NRC, Building 78. The Natural Resources Manager and/or Security Officer may close specific areas at any time. Such announcements will be posted at NAS Oceana, Security, Building 320, and outside the NRC, Building 78.
3. Indoctrination Brief. Although an indoctrination brief is not required for small game hunters, all hunters should be familiar with hunting area boundaries and parking areas prior to hunting.
4. Check-In Procedures. Each hunter shall sign-out at Security, Building 320, for a specific area immediately before going into the field for hunting. Hunters may sign-out for an area as early as sunrise. Only one hunting party, consisting of up to four hunters, shall be allowed in a small game hunting area at any one time. To reduce pressure on game species, only two hunting parties shall be allowed in any small game area per day. Reservation of hunting areas shall not be accepted. Hunters shall be issued parking maps and parking passes upon check-in for hunting areas. The parking pass must be displayed on the vehicle dashboard. Upon return from the hunting area, all hunters shall check-in at the Security Office by sunset of that hunting day, complete the log form, and turn in parking passes.
5. Permits/Application Process. No application other than purchase of the required State license and installation hunting permit.

SMALL GAME HUNTING ON NALF FENTRESS

1. Season Dates/Hunting Hours. The small game season includes squirrel, rabbit, quail, dove, woodcock, and other species as authorized by Virginia game regulations. Virginia regulations regarding bag limits and seasons will be followed.
2. Area Closures. Small game areas will be open only after the general Chesapeake firearm season for deer is over. Except for dove hunting, hunting is permitted on Saturdays only during the regular small game season. The Natural Resources Manager and/or Security Officer may close specific areas at any time. Such announcements will be posted at the Crash Captain's Watch Desk, Building 320. These announcements will also be posted outside the NRC, Building 78.
3. Indoctrination Brief. An indoctrination brief is not required for small game hunters although all hunters should be familiar with hunting area boundaries and parking areas.
4. Check-In Procedures. Each hunter shall sign-out at the Crash Captain's Watch Desk, Building 100, for a specific area immediately before going into the field for hunting. Hunters may sign-out for an area as early as sunrise. To reduce pressure on game species, only one hunting party, consisting of up to four hunters, shall be allowed in a small game hunting area per day. Reservation of hunting areas shall not be accepted. Hunters shall be issued parking maps and parking passes upon check-out of a hunting area. The parking pass must be displayed on the vehicle dashboard. Hunters may only hunt in the area in which they have signed-out. Prior to hunting in another area, hunters are required to report back to the Crash Captain, Building 100, and turn-in hunting and parking passes. Hunters must report to Building 100 by sunset of that hunting day or forfeit hunting privileges for the season. Log forms must be completed at the end of each day's hunt. This includes information on hours hunted, game seen and harvested, and hunter identification.
5. Application Process. No application other than purchase of the required State license and installation hunting permit.

SMALL GAME HUNTING ON NAVSUPPACT NORFOLK, NORTHWEST ANNEX

1. Season Dates/Hunting Hours. The small game season includes rabbit, quail, dove, woodcock, and other species as authorized by Virginia or North Carolina game regulations. Virginia and/or North Carolina regulations regarding bag limits and seasons will be followed.
2. Area Closures. Small game areas will be open only on Saturdays after the general Chesapeake and Currituck firearm seasons for deer are over. Except for dove hunting, hunting is permitted on Saturdays only during the regular small game season. The Natural Resources Manager and/or Security Officer may close specific areas at any time. Such announcements will be posted at Building 145, Security, and outside the NAVSUPPACT Norfolk, Northwest Annex, Environmental Office, Building 404.
3. Indoctrination Brief. An indoctrination brief is not required for small game hunters although all hunters should be familiar with hunting area boundaries and parking areas.
4. Check-In Procedures. Each hunter shall sign-out at Building 145, Security, for a specific area immediately before going into the field for hunting. Hunters may sign-out for an area as early as sunrise. To reduce pressure on game species, only one hunting party, consisting of up to four hunters, shall be allowed in a small game hunting area per day. Reservation of hunting areas shall not be accepted. Hunters shall be issued parking maps and parking passes upon check-out of a hunting area. The parking pass must be displayed on the vehicle dashboard. Hunters may only hunt in the area in which they have signed-out. Prior to hunting in another area, hunters are required to report back to Building 145, Security, and turn in hunting and parking passes. Hunters must report to Building 145 by sunset of that hunting day or forfeit hunting privileges for the season. Log forms must be completed at the end of each day's hunt. This includes information on hours hunted, game seen and harvested, and hunter identification.
5. Application Process. No application other than purchase of the required State license and installation hunting permit.

SMALL GAME HUNTING ON WPNSTA YORKTOWN

1. Season Dates/Hunting Hours. Hunting is permitted only on Saturdays or specified Holidays prior to and immediately after the general firearms season for deer, which fall within the established Virginia hunting seasons, or on other dates within the established seasons as authorized by the Commanding Officer.

The hunting day will be in accordance with reference (d), or as otherwise directed by the Natural Resources staff. The small game season includes squirrel, rabbit, quail, dove, woodcock, and other species as authorized by Virginia game regulations. Virginia regulations regarding bag limits and seasons will be followed. While dove hunting is permitted on scheduled small game hunt days on WPNSTA Yorktown during the regular dove season, organized hunts are not planned.

2. Area Closures. The Natural Resources Manager will determine open areas.

3. Indoctrination Brief. Small game hunters are to assemble at the Hunt Station, Building 53, of the WPNSTA Yorktown unit on scheduled hunting days at a time directed by the Natural Resources Manager. Hunters will be briefed and assigned a hunting area prior to going into the field.

4. Check-in Procedures. Hunters are to assemble at the Hunt Station at the WPNSTA Yorktown unit where they will be briefed and assigned an area in which to hunt.

5. Application Process. No application, other than purchase of the required State license and installation hunting permit, is required. All hunters planning to hunt doves or woodcock must have a HIP number in addition to their State hunting license and station permit.

6. Game Check-In. All hunters will check back in at the Hunt Station before leaving for the day.

DOVE HUNTING ON NAS OCEANA, NALF FENTRESS, AND
NAVSUPPACT NORFOLK, NORTHWEST ANNEX

1. Season Dates/Hunting Hours. Dove may be hunted on NAS Oceana, NALF Fentress, and NAVSUPPACT Norfolk, Northwest Annex on Tuesdays, Thursdays, Saturdays, and designated Holidays during the open seasons. Bag limits, seasons, and times are subject to annual change.
2. Area Closures. Availability of open fields is dependent on various factors including weather, crop type, and maturity. The Natural Resources Manager will be responsible for determining field availability and rotation schedule. Dove field locations change from year to year. For NAS Oceana, locations shall be posted at Security, Building 320, and the NRC, Building 78. For NALF Fentress, locations shall be posted at the Crash Captain's Watch Desk, Building 100. For NAVSUPPACT Norfolk, Northwest Annex, locations will be posted at Buildings 145 and 404. Hunter quotas may be assigned to each area for dove hunting. These quotas shall be posted, if applicable, at the Hunter Check Station.
3. Indoctrination Brief. An indoctrination brief is not required for small game hunters although all hunters should be familiar with hunting area boundaries and parking areas.
4. Check-in Procedures. Due to high response for opening day of the season, all NAS Oceana check-in for that day will be conducted at the NRC, Building 78. Hunter quotas and areas will be assigned at this time. Hunting check-in after that day will be at Building 320. NALF Fentress hunters will check-in at Building 100, and NAVSUPPACT Norfolk, Northwest Annex hunters will check-in at Building 145. Upon return from the hunting area, all hunters shall check-in at the Security Office or the Crash Captain's Watch Desk, NALF Fentress to turn in parking passes and report harvest.
5. Permit/Application Process. All dove hunters must have a HIP number in addition to their State hunting license and station permit.

TRAPPING AT NAS OCEANA, NALF FENTRESS, DAM NECK, OR
NAVSUPPACT NORFOLK, NORTHWEST ANNEX

1. Season Dates/Hunting Hours. Trappers must abide by State laws, this instruction, and any other special regulation announced by the Natural Resources Manager.
2. Area Closures. The Natural Resources Manager will designate trapping areas and, in coordination with the Security Officer, may restrict access to these areas.
3. Check-In Procedures. Prior to checking traps, trappers must check-in at the Security Watch Desk, Building 320, NAS Oceana, Building 551, Dam Neck Annex, or Crash Captain's Watch Desk, Building 100, NALF Fentress.
4. Permit/Application Process. Any person wishing to trap furbearers must register and submit a request for area assignment with the NAS Oceana Natural Resources Manager. Trappers may request trapping areas on or after 1 October of each year. Drawings for trapping areas shall be held when it is anticipated that the demand for areas exceeds quotas.
5. Restrictions
 - a. A nonferrous metal tag bearing the trapper's name and address must be attached to each trap. Traps not marked risk confiscation by the Conservation Officer or Natural Resources Manager.
 - b. Traps must be checked at least daily.
 - c. No steel trap or snare shall be set within 200 yards of a residence or within a designated Special Services area, such as the picnic area or Boy Scout camping area.
 - d. The use of body-gripping traps with a jawsread in excess of 7½" is prohibited except when such traps are completely covered by water.
 - e. It is prohibited to set above the ground any steel trap with teeth set upon the jaws or with a jaw spread exceeding 6½", or any body-gripping trap with a jaw spread in excess of 5", baited with any lure or scent likely to attract a dog.
 - f. No trap or snare may be set in hunting areas on days that rabbit, quail, or dove are hunted unless traps remain covered by at least 6" of water at all times.
 - g. Dens or houses of furbearers may not be disturbed.

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h. Trappers must report weekly catch in writing during the season to the Natural Resources Manager. Trappers should provide information on sex, weight, and condition for each animal taken.

i. Animal carcasses shall be disposed of off station. Any trapper caught disposing of carcasses on station shall lose all trapping privileges.

**NAS OCEANA/NASO DAM NECK ANNEX/NALF
FENTRESS/NSAHR NORTHWEST ANNEX**

DEER HUNTING RULES AND REGULATIONS

2015-2016 SEASON



**SHOW SOMEONE THE JOY OF HUNTING THIS YEAR.
HAVE FUN, BE SAFE AND FOLLOW THE RULES!**

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REMINDERS:

- Private Firearms Registration REQUIRED for ALL Personal Weapons Brought on Installation including in association with Hunting, Trapping, Fishing and Archery Range Shooting.
- Hunters must follow all State and Base Hunting Regulations/Instructions. Base regulations cannot be more lenient than the State Regulations; however Base regulations can be and are stricter than State Regulations. Be sure to be in compliance with both sets of regulations.
- Dogs are not authorized for the use of hunting deer on base.
- Coyotes may be taken at NASO in accordance with State Laws.
- Sunday hunting has not been authorized for the 2015-2016 hunting seasons.

CHANGES AND UPDATES:

- **Private Firearms Registration REQUIRED for ALL Personal Firearms/Weapons Brought on Installation. See Section IV. of this document for details.**
- *Please be sure to obtain the most Current Version of the hunting area Maps, prior to commencing your hunt. Hunting areas/stands, parking locations and access roads are being updated. **Current Maps will be available at the Natural Resources Center on Oceana Blvd (Bldg 78) and will posted to the websites identified in section XVII. of this document as soon as possible.***
- **NALFF Hunting areas 18, B-4, and B-5 have been closed to hunting** until this area is no longer classified as an UXO area.
- **NASO DNA Hunting area 25 has been closed to hunting** until this area is no longer classified as an UXO area.
- **NALFF Hunting areas 10, 20, 21, and B-1 have been impacted due to Tree Removal Activities** and may no longer have trees available for establishing required safe tree stand heights and locations for elevated shooting requirements. Please scout these areas accordingly.
- **YOUTH Hunt, 26 Sept 2015. NSAHR NWA, Virginia Side ONLY, will be participating in the VA Youth and Apprentice Deer Hunting Day. All State and Installation Regulations Apply.**

REFERENCES:

[Note: Some of these references are dated. This Deer Hunting Rules & Regulations (R&Rs) document has been prepared to help inform hunters of current processes that may have changed since the below documents were prepared. This R&Rs document does not include all detailed information contained within the below references.]

- COMNAVREGMIDLANTINST 11015.2A
- OPNAVINST 5090.1D and Manual 5090.1
- NASO/NALFF Integrated Natural Resources Management Plan (INRMP)
- NASO DNA INRMP
- NSAHR NWA INRMP
- COMNAVREGMIDLANTINST 5820.2
- NASOINST 8000.16B
- Code of Virginia (<http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+TOC2901000>)
- Game Department Regulation Manual (<http://leg1state.va.us/000/reg/TOC04015.htm>)
- Hunting & Trapping in Virginia July 2015 - June 2016 Digest (<http://www.dgif.virginia.gov/hunting/regulations/>)
- North Carolina Inland Fishing, Hunting and Trapping Regulations Digest August 2015 to July 2016 (<http://www.ncwildlife.org/Hunting/LawsSafety.aspx>)
- NASO, NASO DNA, NALFF, NSAHR NWA, JEBLC, JEBLC-FS Natural Resources Program Hunting, Fishing, Trapping, Archery Range Permit Application
- NASO/NALFF/NASO DNA/NSA NWA Hunting/Trapping/Archery Permit

I. CHECK OUT AND CHECK IN OF A HUNTING AREA:

- NAS Oceana (NASO) and NASO Dam Neck Annex (DNA) hunters must check out a hunting area from NASO Security, Bldg 320.
- NALF Fentress (NALFF) hunters must check out a hunting area from NALFF Quarterdeck, Bldg 100.
- NSAHR Northwest Annex (NWA) hunters must check out a tree stand from NWA Quarterdeck, Bldg 145. Hunting is by tree stand number and not area at NWA.
- Checking out an area or tree stand is allowed 1 ½ hours before sunrise and you must be checked back in 1 ½ hours after sunset. Check posted sunrise/sunset times.
- You can only check out an area if you intend to hunt.
- Scouting is authorized during preseason scouting, during hunting season, and on Sundays during hunting season. Must check in/out areas as if hunting.
- Checking areas out in the morning before work and then keeping it checked out all day for an evening hunt is not authorized.
- Random checks will be conducted by the Conservation Law-enforcement Officer (a.k.a. Game Warden).
- Check out process:
 1. Give your base hunting pass to Security or the Quarterdeck watch and tell them what area or tree stand you would like to hunt.
 2. Provided the area or tree stand is not checked out, you will receive a laminated parking pass, a laminated hunting pass (to be kept on your person while in the field) and a key if gate entry is required. Parking for areas 1-13 at DNA requires access via a gate that has a combination lock on it. Ask for the combination if you are hunting one of those areas. All locks must be "piggy backed" so that base contract workers, Security, Fire, etc. have access through the gates as well as hunters. This involves linking locks together to the chain in a manner that allows all locks to be opened and access granted through the gate. (Example: Chain end 1 connects to lock 1, lock 2 connects to lock 1 and chain end 2 connects to lock 2.)
 3. Security or the Quarterdeck watch will place your base hunting pass on the hunter check out board for accountability purposes.
 4. You must sign out the area or tree stand in the logbook provided and write down your name, base pass number, hunting area or tree stand and Deer Management Assistance Program (DMAP) or Deer Population Reduction Program (DPOP) tag number, if you requested one.
- If you get a DMAP or DPOP tag, and do not use it to tag an animal, you must turn it back in when you go to check in from your area. Do not keep it. DMAP and DPOP tags are for ANTLERLESS DEER ONLY.
- When you go to check back in from your area or tree stand, return the parking pass, hunting area pass, access key and DMAP or DPOP tag if you had one. Sign "in" in the logbook by writing down the time you returned and Security or the Quarterdeck watch will return your base hunting pass. Security may ask you for a form of identification to ensure you get the correct permit. **Verify that you receive your own hunting permit back from Security.**
- If you killed a deer, let Security or the Quarterdeck watch know and they will page the duty beeper/phone so you can go and check in your deer. If

you used a DMAP or DPOP tag to tag your animal, let Security or the Quarterdeck watch know so they don't expect you to turn the DMAP or DPOP tag back in. DMAP and DPOP tags are for Antlerless deer only. **If you harvest more than one doe you must be issued an additional DMAP or DPOP tag from Security. Every antlerless deer killed must be checked in with a DMAP or DPOP Tag until all base DMAP or DPOP tags have been exhausted.**

- For gun hunting, if more than one person is going to hunt in an area or tree stand, the area must be checked out at the same time to both hunters.

II. STAND AND BLIND REGULATIONS:

1. Lock on, chain on and ladder stands are authorized and must be stenciled clearly with your last name, base permit number and phone number.
2. Screw in steps and removable ladder steps are authorized. No large nails or spikes may be driven into the tree where your stand is located.
3. Tree stands may be hung during the scouting season or on the day that you hunt and can be left up all season.
4. Tree stands, screw in steps and ladder steps must be removed within 30 days after the season ends.
5. Tree stands must be placed at least 12' off the ground.
6. Ground blinds are authorized and may be used for bow hunting only.
7. All gun hunting (shotgun or muzzleloader) and crossbow hunting must be done from a tree stand. No shooting from the ground with any type of gun or crossbow.
8. Permanent tree stands may still be in place at NASO, DNA, and NALFF. These stands are not maintained, may be unsafe, and are not authorized for use. **Do Not USE these stands.**
9. NWA has permanent stands that are maintained on a regular basis. These stands **ARE** authorized for use. Stands are identified on the base hunting map for checkout. Stands that have been designated unsafe will not be authorized for check out regardless of if they are identified on the map. Before utilizing a permanent stand, ensure the tree stand ID number on the stand matches the tag issued to you at check-in and matches the current Hunt Stand Map. Do not use permanent tree stands that have not been issued to you.

III. PARKING AND SERVICE ROAD USE:

1. Park in designated areas only. Place parking pass in the front window of your vehicle. Parking areas are marked by a 12" by 12" yellow sign that will be attached in plain site on a tree, fence or post.
2. Locations of parking areas are designated on the base hunting maps. Do not park in front of any locked gates or park in such a fashion that will block access (i.e., to roads, buildings, etc.).
3. Service roads are not to be driven on, except to get to designated parking areas. Only authorized vehicles for Official Government Business are authorized to utilize these roads.
4. You may not drive on a service road with your vehicle to go pick up game that you may have harvested.
5. You may walk on service roads to get to and from your hunting area or tree stand.
6. Deer hauling carts are authorized for use on service roads.

IV. WEAPONS REGULATIONS:

- **REGISTRATION:**

Starting 01 January 2015 no hunters will be allowed on the installations with a personal firearm/weapon that has not been registered with Navy Security.

- a. To register your weapon please fill out the registration paperwork found in the enclosures of COMNAVREGMIDLANTINST 5820.2 and take it to **NAS Oceana Security, Bldg 320**, for processing.
- b. Once Security has completed the review of the paperwork and you have met all of the requirements to be authorized to carry a weapon on the installation you will be issued a CNRMA Regional Security Directorate Authorization to Carry Private Firearms permit/card.
- c. You will need to have this card with you whenever you are carrying your weapon on the installation.
- d. You will need to present this card to Gate Guards when accessing an installation.
- e. You will need to present this card when approached by law enforcement officers.
- f. You will need to present this card at each weapons qualification event.
- g. If you do not have this card with you and you have your weapon on base you are subject to penalties as defined in COMNAVREGMIDLANTINST 5820.2, and NASOINST 8000.16B.
- h. There will not be a sign-up list to attend the 2015-2016 Hunting Weapons Qualifications that will allow you access with an Unregistered Weapon.

- **NASO (NAS Oceana):**

- a. ***No shotguns!***

- b. Muzzleloader, Bow and Crossbow only.
 - i. Archery equipment must be hand-held and hand-drawn (release aids are permitted).
 - ii. Muzzleloader must be .45 caliber or larger, loaded from the muzzle of the gun. Muzzleloader hunting is authorized 6 days a week during state approved seasons in **DESIGNATED AREAS ONLY**. Follow State Hunting Regulations regarding Authorized Muzzleloader weapon utilization.

- **DNA (NASO Dam Neck Annex):**

- a. Bow, Shotgun, Muzzleloader and Crossbow are authorized.
 - i. Archery equipment must be hand-held and hand-drawn (release aids are permitted).
 - ii. Shotguns must be 20-gauge or larger and used with buckshot (#1, 0, 00, and 000) only. **NO SLUGS!**
 - iii. Muzzleloader must be .45 caliber or larger, loaded from the muzzle of the gun. Muzzleloader hunting is authorized 6 days a week during state approved seasons in **DESIGNATED AREAS ONLY**. Follow State Hunting Regulations regarding Authorized Muzzleloader weapon utilization.

- **NALFF (NALF Fentress):**

- a. Bow, Shotgun, Muzzleloader, and Crossbow are authorized.

- i. Archery equipment must be hand-held and hand-drawn (release aids are permitted).
 - ii. Shotgun must be 20-gauge or larger and are authorized with buckshot (#1, 0, 00, and 000) or slugs (**must qualify with slugs**).
 - iii. Muzzleloader must be .45 caliber or larger, loaded from the muzzle of the gun. Muzzleloader hunting is authorized 6 days a week during state approved seasons in **DESIGNATED AREAS ONLY**. Follow State Hunting Regulations regarding Authorized Muzzleloader weapon utilization.
- **NWA (NSAHR Northwest Annex):**
 - a. Bow, Shotguns, Muzzleloader and Crossbow are authorized.
 - i. Archery equipment must be hand-held and hand-drawn (release aids are permitted).
 - ii. Shotgun must be 20-gauge or larger and are authorized with buckshot (#1, 0, 00, and 000) or slugs (**must qualify with slugs**).
 - iii. Muzzleloader must be .45 caliber or larger, loaded from the muzzle of the gun. Muzzleloader hunting is authorized 6 days a week during state approved seasons in **DESIGNATED AREAS ONLY**. Follow State Hunting Regulations regarding Authorized Muzzleloader weapon utilization.
- **The use of centerfire and rimfire rifles or handguns for hunting is prohibited on all bases.**
- Shotguns, muzzleloaders, bows and crossbows are allowed on base as long as you have your base hunting permit with you and the make, model and serial number of the weapon is written on the back of your base hunting permit.
- Extensions to increase shell holding capabilities of a weapon is **NOT** authorized. Weapon shell loading is limited to the weapon's original manufacturer's holding capacity, for deer hunting. The three shell rule still applies to migratory birds. Guns must be completely unloaded while transiting on and off base and walking to and from your hunting area. Load only after getting in your tree stand.
- **No smokeless powder authorized in any type of muzzleloader hunting!**
- Muzzleloaders must be uncapped but may be loaded with powder and a bullet while transiting on and off base. The cap/primer must be removed while going to and from your hunting area. Install the cap/primer only after you get into your tree stand.
- **All weapons when not in use must be secured inside of a locked vehicle or locked camper shell/truck bed cover and not left in plain sight.**

V. QUALIFICATIONS AND LICENSING REQUIREMENTS:

1. All hunters must attend base Hunter Indoctrination (INDOC) annually. This 45 minute indoctrination is normally held at the CNATTU auditorium three times before hunting season starts (August - September). 1 additional INDOC will be held at NWA. Attending this indoctrination will allow you to hear all changes to the rules and regulations during the past year. INDOC will allow you to hunt with a shotgun using buck shot at DNA, NALFF or NWA (once you have acquired the base hunting permit from MWR and the appropriate state permits). See the posted Annual Training and Qualifications Calendar for dates, times, and locations for all Base required training and weapons qualifying.
2. All muzzleloader hunters must qualify yearly at a 50 yard target.

- Muzzleloader qualifications are held at the DNA shooting range twice a year before the season starts.
 - Each hunter must score 150 points and is allowed three shots. Each bull's eye shot is worth 75 points and each shot on the paper plate not in the bull's eye is worth 50 points.
 - Once you qualify with a muzzleloader you will be able to hunt any base that allows muzzleloader hunting.
3. All bow hunters must qualify yearly.
- Bow qualifications are held several times before the hunting season starts and once after the season starts.
 - Your equipment will have a safety inspection performed on it by a board member prior to qualification. Your arrows must be marked with the last four digits of your social Security number in permanent ink or etched on the shaft. The same applies during hunting season.
 - Four deer targets will be placed at different distances from the stand at the Natural Resource Center. Targets will range from a nearly straight down shot out to approximately 25 yards.
 - Each prospective bow hunter will get two shots at three of the deer targets and must put one arrow in the kill zone as determined by the board member present.
 - Three attempts are allowed to qualify.
 - You must have 6 arrows and 6 broad heads of the same type to attempt the bow qualification.
4. All crossbow hunters must qualify yearly.
- Crossbow qualifications are held several times before the hunting season starts and one after the season starts.
 - Your equipment will have a safety inspection performed on it by a board member prior to qualification. Your arrows must be marked with the last four digits of your social Security number in permanent ink or etched on the shaft. The same applies during hunting season.
 - Four deer targets will be placed at different distances from the stand at the Natural Resource Center. Targets will range from a nearly straight down shot out to approximately 25 yards.
 - Each prospective crossbow hunter will get two shots at three of the deer targets and must put one arrow in the kill zone as determined by the board member present.
 - Three attempts are allowed to qualify.
 - You must have 6 arrows and 6 broad heads of the same type to attempt the crossbow qualification.
5. Shotgun slug hunters must qualify yearly at a 50 yard target.
- Slug qualifications are held at the DNA shooting range twice a year before the season begins (completed at the same time as the Muzzleloader qualification).
 - Each hunter must score 150 points. Each bull's eye is worth 75 points and each shot on the paper plate not on the bull's eye is worth 50 points.
 - Each person is allowed three shots.
 - Once you qualify with a slug you will be able to hunt NWA and NALFF as these are the bases in the area that allow hunting with slugs.
6. Each hunter must purchase a base hunting pass from the ITT ticket Office at NASO or DNA, (\$20), a license to hunt in VA (from an authorized state license vendor), and a state big game hunting license (from an authorized state license vendor) with the appropriate bow, crossbow and muzzleloader stamps if you intend to hunt with those types of weapons on base.

7. Every hunter must present a Hunter's Safety course card (any state will do, all bow and crossbow hunters must present a Bow Hunter safety course card, and after 01 Jan 2015 all hunters must present their CNRMA Regional Security Directorate Authorization to Carry Private Firearms card prior to having a board member stamp your base hunting pass. Before you can hunt, a board member must stamp the back of your base hunting pass with a "deer hunter", "archery", "muzzleloader," "slug" or "crossbow" stamp, depending on what weapon(s) you qualified and with which you intend to use for hunting. The "deer hunter" stamp is used if you are a shotgun hunter only, using buck shot only at NALFF, DNA or NWA.
8. On the back of your base hunting pass, you must write the make, model and serial number of each weapon with which you qualified. The hunting pass must be laminated with the lamination paper provided by the board member after your pass has been fully stamped and approved.
9. **You cannot qualify with more than one muzzleloader or one slug shotgun. You can only qualify with one compound bow. In addition to the one compound bow, you can qualify with one other type of bow i.e. recurve and can hunt with both during the season. You may qualify with only one crossbow.**

VI. TRACKING:

1. If you cannot find an animal after shooting it on an evening hunt and further tracking is required, you must contact Security or the Quarterdeck within 1 ½ hours after sunset.
2. If you are unable to find your animal within 2 hours after sunset inform Security you have wounded an animal and need to red tag the area. They will place a red tag on the area so it cannot be checked out the following morning by another hunter.
3. Once you red tag an area you must return the following morning, check out the area that was red tagged to continue tracking your animal.
4. No weapons are allowed back in your hunting area while tracking an injured animal.
5. Tracking time will be allowed until 1200 hours on the day you checked out the area for tracking purposes.
6. If the animal you are tracking goes outside of your area, you must red tag that area. Do not track into another area if you do not have it checked out.
7. You may retrieve a harvested animal that runs into any open field adjacent to the area you are hunting, except if it is part of an airfield/runway clearing or part of another hunting area.
8. Do NOT enter Airfield/Runway Clearings. If your deer runs out and drops in the airfield clearing area, notify the Security Office Immediately, so that the appropriate Natural Resources Staff can assist you with obtaining your animal.

VII. CHECKING IN GAME:

1. All area bases that allow hunting operate under the guidance of the Deer Management Assistance Program (DMAP) or the Deer Population Management Program/Damage Control Assistance Program (DPOP/DCAP); therefore, all deer killed on area bases must be checked in. NASO participates in DPOP/DCAP. DNA, NALFF, and NWA participate in DMAP.
2. If you killed a deer, let Security or the Quarterdeck watch know and they will page the duty beeper/phone so you can go and check in your deer. If you used a DMAP or DPOP tag to tag your animal, let Security or the Quarterdeck watch know so they don't expect you to turn the DMAP or DPOP

tag back in. DMAP and DPOP tags are for Antlerless deer only. **If you harvest more than one doe you must be issued an additional DMAP or DPOP tag from Security. Every antlerless deer killed must be checked in with a DMAP or DPOP Tag until all base DMAP or DPOP tags have been exhausted.**

3. All deer shot on NASO, DNA and NALFF will be checked in at the NASO Natural Resource Center (NRC), Bldg 78 (across from the horse stables).
4. All deer shot at NWA will be checked in at the Deer Check Station, Bldg 295.
5. The check-in process will consist of a SQMB member, Natural Resources authorized volunteer, a Conservation Law-enforcement Officer, or other Navy Natural Resources Program staff member (whoever is on duty at the time) removing the deer jaw bone, weighing the deer and taking down other information required in support of the DMAP program. Normally the process takes about 10 minutes.
6. To check your deer in with the state of Virginia, call 1-866-GOT-GAME prior to arriving at the NRC building to help expedite the process. Have your confirmation number available prior to checking in your animal, if possible. Remember to correctly select DMAP or DPOP as appropriate.
7. Whether a buck or doe, leave all genitals on the deer you shoot to ensure proper sex identification.

VIII. HUNTING SEASON DATES:

- **NASO and DNA, Regular Deer Hunting Season:** will be 01 OCT 2015 - 02 JAN 2016.
 - Hunting Only Occurs Monday-Saturday during authorized seasons.
 - Note: Small Game Hunting is authorized on Saturdays at NASO ONLY.
 - Archery Seasons are 03 Oct 2015 - 13 Nov 2015 and 01 Dec 2015 - 02 Jan 2016. Archery is also authorized during firearm and muzzleloader seasons. **A Bow Permit is required for later Archery season.**
 - General Firearms season is 01 Oct 2015 - 30 Nov 2015.
 - Late Muzzleloader Season is 12 Dec 2015 - 02 Jan 2016.
- **NASO ONLY, Extended Deer Hunting Season:** will be from 03 JAN 2016 - 28 FEB 2016. (Muzzleloader, bow and crossbow will be allowed six days a week (Mon-Sat) in designated areas for harvest of antlerless deer only.)
- **NALFF Deer Hunting Season:** will be 01 OCT 2015 - 02 JAN 2016.
 - Hunting Only Occurs Monday-Saturday during authorized seasons.
 - Note: During Late Muzzleloader Season Saturdays are reserved for Small Game Hunting ONLY.
 - **NO Squirrel Hunting at Anytime!**
 - Archery Seasons are 03 Oct 2015 - 13 Nov 2015 and 01 Dec 2015 - 02 Jan 2016. Archery is also authorized during firearm and muzzleloader seasons. **A Bow Permit is required for later Archery season.**
 - General Firearms season is 01 Oct 2015 - 30 Nov 2015.
 - Late Muzzleloader Season is 12 Dec 2015 - 02 Jan 2016.
 - During Late Muzzleloader Season, bow, crossbow, and muzzleloader will be allowed Monday-Friday ONLY.
 - **During Late Muzzleloader Season Saturdays are reserved for Small Game Hunting ONLY.**
- **NWA Deer Hunting Season:** will be 01 OCT 2015 - 02 JAN 2016 (VA side); 12 SEP 2015 - 01 JAN 2016 (NC side)
 - Hunting Only Occurs on Monday, Tuesday, Thursday, and Saturdays during authorized seasons.

- Note: Small Game Hunting is only authorized after the deer hunting season, only on Saturdays, and only on VA side.
 - **NO Squirrel Hunting at Anytime!**
 - Virginia Side:
 - Archery Seasons are 03 Oct 2015 – 13 Nov 2015 and 01 Dec 2015 – 02 Jan 2016. Archery is also authorized during firearm and muzzleloader seasons. **A Bow Permit is required for later Archery season.**
 - General Firearms season is 01 Oct 2015 – 30 Nov 2015.
 - Late Muzzleloader Season is 12 Dec 2015 – 02 Jan 2016.
 - North Carolina Side:
 - Archery Season is 12 Sep 2015 – 02 Oct 2015.
 - Archery is authorized during both Muzzleloader and Gun Seasons.
 - Muzzleloader Season is 03 Oct 2015 to 16 Oct 2015.
 - Gun Season is 17 Oct 2015 – 01 Jan 2016.
- **NWA Youth Deer Hunt:** will be 26 Sep 2015 (VA side ONLY.)
- **Scheduled Hunting Closures During Authorized Seasons (NO Hunting, Unless Otherwise Authorized):**
 - Sundays (Scouting is authorized)
 - Thanksgiving Day (NWA may authorize until Noon)
 - Christmas Day

IX. HUNTING AREA LOCATIONS and RESTRICTIONS:

- NWA is the only base which utilizes permanent tree stands when assigning certain hunting locations.
- **Hunting area boundaries without assigned permanent tree stands** are identified by a red/white/red band marked with spray paint on a series of trees. This marked tree line defines your hunting area boundary.
- **#of Hunters Per Hunting Area:**
 - A maximum of 2 muzzleloader hunters per area is authorized. Check-in must be at the same time.
 - A maximum of 4 bow hunters per area is authorized.
 - 1 muzzleloader hunter and 1 bow hunter in the same area is authorized. Check in must be at the same time.
 - A maximum of 2 Shot-gun hunters per area is authorized. Check-in must be at the same time.
- Know your area boundaries and stay inside of it during your entire hunt.
- Ensure you are utilizing the most current Hunting Area Map to identify your Hunting Area, parking, and access-ways.
- Shoot only inside of your area. Shooting out into fields and/or other hunting areas that border the area is not authorized.
- Do not cut across farmer's fields, to get to your hunting area.
- Follow all State Regulation Fire Arm Ordinances regarding weapons discharge distances from buildings, dwellings, places of worship, roadways, streets, public land/public areas, etc. In addition to statewide requirements, ensure to comply with any locality (Virginia Beach, Chesapeake, and Currituck Co., as appropriate) requirements that are identified in the associated State Hunting Regulations.

X. SCOUTING:

1. Preseason scouting will follow the end of the previous hunting season and end two weeks prior to the pending hunting season.
2. During this time, you are allowed to scout any area that you would like to hunt.
3. You must use the exact same check out and check in process as is required during the normal hunting season.
4. This is the time to hang your lock on, chain on and ladder stands if you desire. Reminder, putting a stand in an area does NOT guarantee you being able to hunt that particular area. It is on a first come first served basis.
5. Scouting during the hunting season on Sundays is allowed. All area bases are closed to hunting on Sundays.
6. Scouting and Hunting can be secured at anytime (Sunrise to Sunset) during the preseason or regular season, depending on base operations. Secured areas will be marked with a black tag and access will NOT be authorized.

XI. QUALITY DEER MANAGEMENT (QDM):

1. QDM is voluntary and **HIGHLY encouraged** at NASO, DNA, NALFF, and NWA.
2. For those that would like to participate in QDM, the QDM program recommends criteria on Buck takes (mature buck takes only) and encourages the take of does or antlerless deer. If archery hunting, a Buck should have antlers outside the ears and be at least 6 points. If Black Powder hunting, a buck should have antlers outside the ears and be at least 8 points. Take as many does as possible (utilize all antlerless deer tags available).
3. NASO is part of the State Deer Population Control Program (DPOP). This program is an integral part of deer management on NASO. This program extends the hunting season for an additional two Months (Jan & Feb). This program emphasizes the take of does through the use of State issued tags to each base. These tags are 1st come 1st served. These tags allow you to save your State Issued tag for that special buck, while enabling you to collect deer meat. You are not limited to 1 DPOP tag. If you take a doe, but do not want the meat please obtain a DPOP tag for the doe & notify the Conservation Law-enforcement Officer (a.k.a. CLEO or Game Warden) for meat donation options (i.e., hunters for the hungry, other soldiers in need, etc.). Follow proper check in/out procedures. Do **NOT** put your personal State Issued Deer tag on a doe, as you are required to use the Base DPOP tags until they run out.
4. The Deer Management Assistance Program (DMAP) applies to DNA, NALFF, and NWA. This program stresses the take of does through the use of State issued tags to each base. These tags are 1st come 1st served. These tags allow you to save your State Issued tag for that special buck, while enabling you to collect deer meat. You are not limited to 1 DMAP tag. If you take a doe, but do not want the meat please obtain a DMAP tag for the doe & notify the CLEO/Game Warden for meat donation options (i.e., hunters for the hungry, other soldiers in need, etc.). Follow proper check in/out procedures. Do **NOT** put your personal State Issued Deer tag on a doe, as you are required to use the Base DMAP tags until they run out.

XII. DRESSING & STORAGE OF DEER:

1. Deer Temporary Storage: The NASO Natural Resources Center (NRC), Building 78, has a walk in cooler where hunters can hang their deer if they desire.
 - If there is room in the cooler, place your name, phone number and confirmation number on the label provided and secure it to the deer.
 - Cost is \$1 a day and must be paid when you pick up your deer.
 - Deer may be hung for 10 days only and then must be removed for processing.
 - Call the NRC to arrange a time to pick up your deer from the cooler.
 - All deer must be field dressed prior to hanging in the cooler.
2. Deer cleaning/dressing and disposal: Facilities are available at the NASO NRC/Checkstation (Building 78) and NWA Checkstation (Building 295).
 - NWA hunters:
 - a. May either field dress in the woods; or
 - (Note: No field-dressing is permitted within 200YDs of occupied buildings, roads, trails, or agricultural areas.)
 - b. Bring their animals to the NWA checkstation (Building 295) for dressing. Remains must be disposed of properly in the Building 295 dumpster.
 - DNA hunters:
 - a. May either field dress; or
 - (Note: No field-dressing is permitted within 200YDs of occupied buildings, roads, or trails.)
 - b. Bring their animals to the NASO NRC (Building 78) for dressing. Remains must be disposed of properly in the Building 78 Parking lot dumpster.
 - NASO and NALFF Hunters:
 - a. MUST either field dress and bury the remains in the woods; or
 - (Note: No field-dressing is permitted within 200YDs of occupied buildings, roads, trails, agricultural areas, or within Airfield Clear Zone Boundaries.)
 - b. Haul out the entire deer and bring it to the NASO NRC (Building 78) to dress. Remains must be disposed of properly in the Building 78 Parking lot dumpster.
 - Disposal of Remains in authorized dumpsters (NASO Bldg 78 parking lot dumpster; NWA Bldg 295 dumpster):
 - a. Remains should be bagged and secured in a black/non-transparent plastic/garbage bag and placed in the dumpster.
 - b. Dumpster doors must be shut and secured after each deposit.
 - c. Dumping of animal remains without bagging and securing is not authorized.
 - d. Dumping of animal remains without proper permits and tags is not authorized.
 - e. Dumping of animal remains harvested from a location other than NASO, DNA, NALFF, or NWA is not authorized.
 - f. Violation of the dumpster rules can result in the issuance of a federal and/or state ticket and hunting privilege suspension.
3. Garden/Water Hose Utilization:
 - The water hose at NASO Building 78 comes from a non-potable well water source (do not drink water that comes from this hose).
 - The water hose at NWA Building 295 is potable water.
 - Anyone utilizing the hoses at either of these sites must roll the hoses back up and shut off the water after each use.

XIII. GUEST HUNTERS:

1. Guest hunters must go through the exact same qualification process as active duty, retired military or current DoD civilian hunting members.
2. Guest hunters must sign in and out with a sponsor and they must hunt the same area as their sponsor.

XIV. VIOLATIONS OF GAME LAWS AND BASE REGULATIONS:

1. A hunter who violates any State or Base regulation is subject to proper disciplinary action (see references for more details). Depending on the type of infraction the Sportsman's Quality Management Board (SQMB) may be requested to review and make disciplinary recommendations to the Conservation Law-enforcement Officer (CLEO). The CLEO will then submit these recommendations as appropriate for approval to the Natural Resources Manager and/or Base Commanding Officer. The SQMB is made up of active duty & retired military personnel assisting the Base Natural Resources Recreation Program.
2. Should a violation be committed, the CLEO has the authority to confiscate your base hunting pass and weaponry (depending on the violation). The CLEO will notify the SQMB if there is an infraction for them to review and provide their recommendation.
3. The SQMB will conduct Violation Assessments, as requested by the CLEO, every Saturday at 1200 hours throughout the season.
4. The SQMB will make disciplinary recommendations, as requested, to the CLEO for approval.
5. Discipline (in addition to any State or Federally issued tickets by the CLEO) ranges from 15 days of no hunting to a total loss of all base hunting privileges.
6. Major weapons violations i.e. hunting on base with a high-powered rifle, unauthorized weapons on base, etc. carry the same, if not harsher, consequences as breaking the law in the civilian sector.
 - Deer is the only Big Game allowed to be shot. No other big game can be harvested even if there is an open season for it.
 - Foxes are allowed to be taken during regular state fox hunting season.
 - Do not shoot bears.
 - Coyotes may be shot at NASO in accordance with State Laws.
 - Loss of an access key to a hunting area constitutes a breach of base security and the offense will be processed by the Federal CLEO.
 - In addition to Penalties Listed above and in the CNRMA Instruction:
 - a. Parking in unauthorized areas = Lose hunting privileges for Ten-days.
 - b. Leaving an animal in the cooler longer than 10 days = Lose hunting privileges for 30 days.
 - c. Under certain conditions a Lifetime Hunting Banishment can be issued.

XV. BLAZE ORANGE REQUIREMENTS:

1. Blaze orange is required to be worn while transiting to and from your hunting area or tree stand.
2. 100 square inches (roughly the size of a baseball cap) of blaze orange is required to be worn. The Board recommends that you wear a blaze orange vest as well as a cap when transiting to and from your hunting area.
3. Once in your tree stand, you may remove your blaze orange but it must be within one arm length and visible from a 360 degree view for other hunters to see.

XVI. ARCHERY RANGE UTILIZATION:

1. Bow targets (hay bales) are for the use of all personnel that have purchased a base hunting pass and have appropriately registered their firearms with Security or placed their name and weapons information on the weapons qualification list (see section IV. of this document for details).
2. Safety is the number one priority while practicing archery and as such, no one is allowed down range while another member is shooting arrows at a target.
3. Field tips are authorized for use at the NRC bow range. **Broad Heads are not to be shot in the hay bales.**
4. You may bring your own targets and use broad heads from the A Platform **ONLY.**

XVII. POINTS OF CONTACT AND WEBSITES:

- Conservation Law-enforcement Officer (Game Warden), NRC, Building 78: (757-433-2151)
- NASO/DNA Security/Game Check-in, Building 320: (757-433-3103)
- NALFF Quarterdeck, Building 100: (757-433-2259)
- NWA Security/Quarterdeck, Building 145: (757-421-8000)
- Websites:
 - https://www.navfac.navy.mil/navfac_worldwide/atlantic/fecs/mid-atlantic/about_us/environmental_norfolk/natural_resources.html
 - http://www.cnic.navy.mil/regions/cnrma/installations/nas_oceana/about/departments/natural_resources/hunting-information.html
 - http://cnic.navy.mil/regions/cnrma/installations/nsa_hampton_roads/nsa_northwest_a_nnex/about/HuntingSeason0.html

NOTE: For other hunting program questions related to Small Game, Waterfowl, Furbearer, etc. contact the NRC.

**2015-2016 NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and NSAHR Northwest Annex
Hunting Season Weapons Qualification and Training Schedule**

*****Must Have Weapons Registered with NASO Base Security Prior to Bringing on Installation*****

AUGUST 2015

SUN	MON	TUE	WED	THU	FRI	SAT
						1 Bow Qual 0800-0900 Bldg 78 NASO NRC
	3	4	5 Bow Qual 1700-1800 Bldg 78 NASO NRC	6	7	8 BP & Slug Qual 0800-? Dam Neck Range NASO DNA
9	10	11	12	13 Bow Qual 1700-1800 Bldg 78 NASO NRC	14	15 IBEP 0800-1700 Bldg 78 NASO NRC
16	17	18 Bow Qual 1700-1800 Bldg 78 NASO NRC	19 INDOC 1700-1830 Bldg 223 NASO CNATTU	20	21	22
23	24 Bow Qual 1700-1800 IBEP(part 1) 1800-2200 Bldg 78 NASO NRC	25 IBEP(part 2) 1800-2200 Bldg 78 NASO NRC	26	27	28	29
30	31					

**2015-2016 NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and NSAHR Northwest Annex
Hunting Season Weapons Qualification and Training Schedule**

*****Must Have Weapons Registered with NASO Base Security Prior to Bringing on Installation*****

SEPTEMBER 2015 (Updated 01 Sep 2015)

SUN	MON	TUE	WED	THU	FRI	SAT
		1 Bow Qual 1700-1800 Bldg 78 NASO NRC	2 INDOC 1700-1830 Bldg 223 NASO CNATTU	3	4	5
6	7 Labor Day	8 Bow Qual 1700-1800 Bldg 78 NASO NRC	9	10 Bow Qual 1700-1800 Bldg 78 NASO NRC	11	12 RESCHEDULED FOR 13 SEP 2015
13 Bow Qual 0800-0900 Bldg 78 NASO NRC BP & Slug Qual 0800-? Dam Neck Range NASO DNA	14	15	16 INDOC 1700-1830 Bldg 223 NASO CNATTU	17	18 Bow Qual 1700-1800 Bldg 78 NASO NRC	19
20 IBEP 0800-1700 Bldg 78 NASO NRC	21	22	23 INDOC 1700-1830 Bldg 7 NSAHR NWA Galley	24 Bow Qual 1700-1800 Bldg 78 NASO NRC	25	26
27	28	29	30			

**2015-2016 NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and NSAHR Northwest Annex
Hunting Season Weapons Qualification and Training Schedule**

******Must Have Weapons Registered with NASO Base Security Prior to Bringing on Installation******

OCTOBER 2015

SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18 IBEP 0800-1700 INDOC 1100-1200 Bow Qual 1130-1300 Bldg 78 NASO NRC	19	20	21	22	23	24
25	26	27	28	29	30	31

Deer Hunting Location Map







NASO Dam Neck Annex

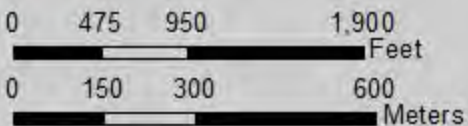
Virginia Beach, Virginia

Revised 30 September 2014



Legend

-  Parking
-  Archery Only
-  Shotgun, Archery
-  Blackpowder, Shotgun, Archery
-  Explosive or Range Safety Fan
-  Installation Boundary



UXO
NO
HUNTING

(1996)

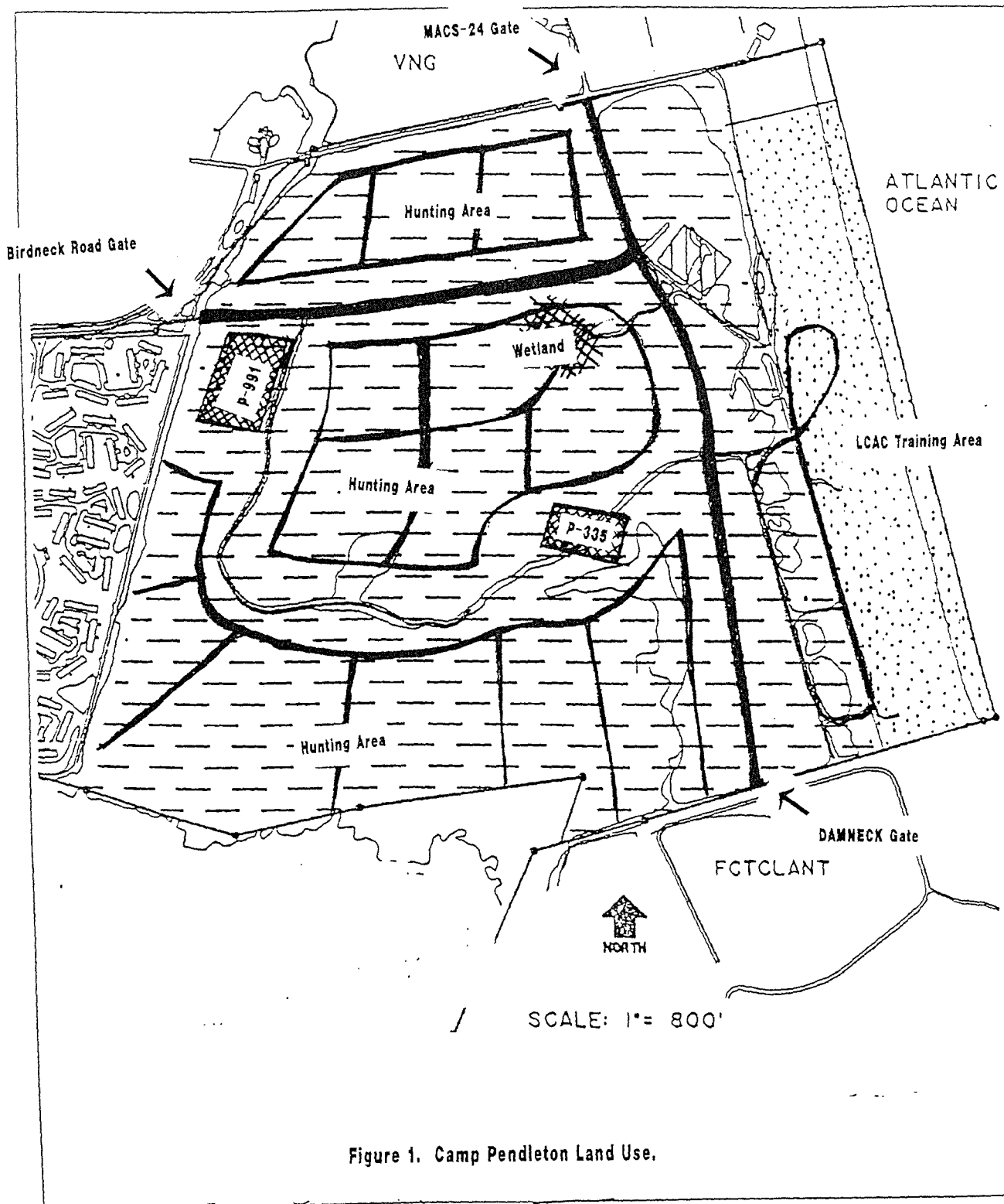


Figure 1. Camp Pendleton Land Use.

Requirements to Validate Hunting and Fishing Permits

1. **Hunting Permits** for NAS Oceana, NALF Fentress, NASO Dam Neck Annex and NSA Hampton Roads, Northwest Annex can be purchased from NAS Oceana MWR ITT Bldg 430. Permits are \$20 and can be purchased on Monday-Friday 0900-1700. **THERE ARE NO REFUNDS – PURCHASING A PERMIT AND SUBSEQUENT FAILURE TO COMPLETE A PROFICIENCY QUALIFICATION OR ATTEND REQUIRED INDOCTRINATION WILL RESULT IN YOUR INABILITY TO HUNT.**
2. Purchase of permit **does not** give authority to hunt until you complete the following in accordance with COMNAVREG MIDLANT INSTRUCTION 11015.2:
 - Hunter Indoctrination
 - Bow, Black Powder or Shotgun Slug Qualifications
 - Approved Hunter Safety Course and IBEP(for bowhunters)
3. The NAS Oceana Natural Resources Bldg. 78 at 800 Oceana Boulevard has a calendar of event times/dates posted. Additional information may be obtained from: the NASO Natural Resources Website, http://www.cnmc.navy.mil/regions/cnrma/installations/nas_oceana/about/departments/natural_resources/hunting-information.html; or the NAVFAC Regional Website, https://www.navy.mil/navfac_worldwide/atlantic/fecs/mid-atlantic/about_us/environmental_norfolk/natural_resources.html>
4. **DO NOT FILL IN PERMIT! LEAVE PERMIT BLANK UNTIL YOU COMPLETE A HUNTING APPLICATION!** Applications may be obtained at any scheduled required event (qualification, indoctrination, IBEP) or by setting up an appointment with Natural Resources personnel at the Natural Resources Bldg. 78:
5. In order to validate your permit at the above location you must provide the following items:
 - A. Appropriate VA State hunting or fishing licenses
 - B. Approved State Hunter Safety Card
 - C. IBEP Card (Bowhunters only)
 - D. Identification
 - E. Proof of completion of NAS Oceana Hunter Indoctrination and Qualification
4. If you have any questions about the hunting program, please call the Natural Resource Center (NRC) Building 78 @ (757) 433-2151. MWR personnel do not have information on the hunting or fishing programs.

Fishing Permits for NAS Oceana, NASO Dam Neck Annex, JEB Little Creek and Fort Story, and WPNSTA Yorktown can be purchased from: NAS Oceana MWR ITT Bldg 430, Monday-Friday 0900-1700. Permits are \$8. Fishing must be in accordance with COMNAVREG MIDLANT INSTRUCTION 11015.1. **THERE ARE NO REFUNDS!**

1. Call Natural Resource Center (NRC) Building 78 @ (757) 433-2151 to complete an application. **This MUST be done before fishing!**
2. Provide valid VA State fishing license.

**APPLICATION FOR: NAS OCEANA / NASO DAM NECK ANNEX / NALF FENTRESS /
NSAHR NORTHWEST ANNEX / JEB LITTLE CREEK / JEBLC FORT STORY
NATURAL RESOURCES PROGRAM
HUNTING - FISHING - TRAPPING - ARCHERY RANGE PERMIT**
(Circle All that Apply)

Comment [WMFCNMPO1]: Recommend to updating this form to include: a check box indicating if this is a Guest Application, and if so need to provide sponsor information and signature line; and checkboxes to tell us what type of hunting or trapping will be conducted.

This document was first vetted and approved 10/95 and has received minimal changes since then, except to update Installation Name Changes and the addition of the Recreation Fishing and Archery Activities.

DATE: _____ FEDERAL PERMIT NO: _____

AMOUNT RECEIVED: \$ _____ DAILY / SEASONAL
(Circle one)

1. Personal Data.

Name: _____ Phone: (Work) _____
Rank/Rate: _____ (Home) _____
Address: _____
Vehicle Lic#: _____
SSN#: (Last four) _____ Driver's Lic#: _____

State/County Hunting License Number: _____
Big Game License Number: _____
Fishing License Number: _____
Trapping License Number: _____

2. Person to Contact in Case of Emergency.

Name: _____ Telephone: _____
Address: _____

I, the undersigned understand that hunting, fishing, trapping, and archery are inherently dangerous sports and I voluntarily assume the risks associated with hunting, fishing, trapping or archery onboard: Naval Air Station Oceana (NASO), Virginia Beach, Virginia; NASO Dam Neck Annex, Virginia Beach, Virginia; Joint Expeditionary Base Little Creek (JEBLC), Virginia Beach, Virginia; and JEBLC Fort Story, Virginia Beach, Virginia; Naval Auxiliary Landing Field (NALF) Fentress, Chesapeake, Virginia; and Naval Support Activity Hampton Roads (NSAHR) Northwest Annex, Chesapeake, Virginia and Currituck County, North Carolina. I hereby release, indemnify and will hold harmless, acquit, and discharge, the United States of America, the United States Navy, all officers, organizations, military and civilian personnel, and activities of the United States or the United States Navy and any other individual or organization connected with the United States or the United States Navy from any and all cause or causes of action, including personal injury, illness, death, property damage, costs charges, claims, demands and liabilities of whatever kind, name, or nature in any manner arising out of use or enjoyment of said permit or any control exercised over said use, participation, property, facilities, equipment, or individual in the use of enjoyment of any permit. I have read and I understand the provisions of COMNAVREG MIDLANT INST 11015.2 and 11015.1. I am aware that a violation of the above notice will result in revocation of my permit and civil prosecution.

Comment [WMFCNMPO2]: Why doesn't this include the following statement: "I consent to inspection at any time by duly authorized personnel (Navy, Federal, and State), for purposes of safety, security, or compliance with said instruction. Subject to penalties provided by law, I attest that I am not prohibited by Chapter 44 of title 18, U.S. Code, from possessing firearms or ammunition; and that the possession of firearms or ammunition will not violate a statute of the Commonwealth of Virginia or an ordinance applicable to the locality in which I reside. I agree that this release not only binds me, but also my family, heirs, assigns, administrators, and executors."

Recommend adding this information to this form.

APPLICANT SIGNATURE **DATE** **OFFICIAL SIGNATURE** **DATE**

PRIVACY ACT STATEMENT

This statement is provided in compliance with the provisions of the Privacy Act of 1974 (Public Law 93-579) which requires that Federal agencies must inform individuals who are requested to furnish personal information about themselves as to certain facts regarding the information requested below.

- Authority.** 5 U.S.C. § 301; 10 U.S.C. §§ 972 (5), 1201-1222, 2733, 2734-2734b, 2737, 5947, 6148, 7205, 7622-7623; 28 U.S.C. §§ 1346, 2671-2680; 31 U.S.C. §§ 71-75, 82a, 89-92, 95a, 240-243, 951-953; 37 U.S.C. § 802; 38 U.S.C. § 105; 42 U.S.C. §§ 2651-2653; 44 U.S.C. § 3101; 49 U.S.C. § 1901.
- Principal Purposes.** The primary use of this information is personal identification verification and to approve and record licensing data.
- Mandatory/Voluntary Disclosure, Consequences of Disclosure.** Disclosure is voluntary. Failure to provide information may result in denial of base fishing/boating privileges.
- COMNAVREG MIDLANT INST 11015.2 ; COMNAVREG MIDLANT INST 11015.1

Comment [WMFCNMPO3]: Need to add hunting, trapping, and archery (not just fishing/boating).

**Enclosure 3. Commander, Navy Region Mid-Atlantic Instruction (COMNAVREG
MIDLANT INST) 11015.3 (Natural Resources Management for Fish and
Wildlife, Feral Animals, Invasive Species, and Certain Pests)**

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DEPARTMENT OF THE NAVY

COMMANDER
NAVY REGION, MID-ATLANTIC
6506 HAMPTON BLVD.
NORFOLK, VA 23508-1273

IN REPLY REFER TO:

COMNAVREG MIDLANT
INST 11015.3
REG ENG/Code 90
12 MAR 2003

COMNAVREG MIDLANT INSTRUCTION 11015.3

Subj: NATURAL RESOURCES MANAGEMENT FOR FISH AND WILDLIFE, FERAL ANIMALS, INVASIVE SPECIES, AND CERTAIN PESTS

Ref: (a) E.O. 13112
(b) NAVFAC P-73, Vol. II
(c) OPNAVINST 5090.1 (Series)
(d) 18 U.S. Code § 42
(e) 16 U.S. Code §§ 703-704
(f) 16 U.S. Code §§ 668-668c
(g) 16 U.S. Code § 1361, *et seq.*
(h) 50 C.F.R. pt. 10
(i) 50 C.F.R. pt. 21
(j) SECNAVINST 6401.1 (Series)
(k) NASOCEANAINST 3750.2 (Series)

1. Purpose. To prescribe procedures and assign responsibility for management and control of fish and wildlife, feral animals, invasive species, and certain pests within Commander, Navy Region, Mid-Atlantic (COMNAVREG MIDLANT) Area of Responsibility (AOR). This includes the areas of Naval Weapons Station (WPNSTA), Yorktown (including Cheatham Annex); Naval Air Station (NAS), Oceana (including Naval Auxiliary Landing Field [NALF] Fentress, Camp Pendleton, and Dam Neck Annex); Naval Station (NAVSTA), Norfolk (including St. Julien's Creek Annex and St. Helena Annex); Naval Support Activity (NAVSUPACT), Norfolk (including Northwest Annex); Naval Amphibious Base (NAVPHIBASE), Little Creek; Fleet and Industrial Supply Center (FISC), Norfolk (Craney Island Fuel Depot and Yorktown Fuel Terminal); and Norfolk Naval Shipyard (NAVSHIPYD Norfolk), Portsmouth, VA (only New Gosport Annex, Scott Center Annex, and South Gate Annex).

2. Policy

a. Per references (a) through (c), the Navy is authorized to take measures to control invasive species.

b. References (d) through (g), the Lacey, Migratory Bird Treaty, Eagle Protection, and Marine Mammal Protection Acts, respectively, protect designated wildlife and control activity involving protected wildlife parts. Violations of these statutes may result in criminal prosecution. Regulations contained in references (h) and (i) implement reference (e) and list species protected by Federal law. Reference (j) describes government responsibility for preventing injury and diseases from animals.

12 MAR 2003

3. Definitions

a. Per reference (a), an "invasive species" is a species that is non-native (or alien to the ecosystem under consideration), and whose introduction causes, or is likely to cause harm to economic, environmental, or human health.

b. Per reference (e), "take" means to pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.

c. Per reference (c), "pest" refers to any organism (except for microorganisms that cause human or animal diseases) that adversely affects the well-being of humans or animals, attacks real property, supplies, equipment or vegetation, or is otherwise undesirable.

d. Per reference (j), "feral" refers to wild animals and unowned dogs, cats, or other domestic animals.

4. Responsibilities

a. Regional Engineer. The Commanding Officer, Navy Public Works Center/Regional Engineer (PWC/RE), Norfolk, as the Regional Environmental Program Manager, is responsible for management and control of, and for providing services pertaining to, fish and wildlife, feral animals, invasive species, and pests. On behalf of COMNAVREG MIDLANT, the Regional Engineer obtains natural resources permits required by Federal law to carry out this program. Regional Engineer authority, in natural resources matters, may be sub-delegated to a properly trained Regional Natural Resources Program Manager, under the supervision of the Regional Environmental Group Head.

(1) Environmental Services Desk. The PWC/RE Environmental Group provides pest management services through the Environmental Services Department. In addition, the Environmental Services Department responds to routine service calls for removal of non-migratory birds and control of feral animals. These services may be requested through the Environmental Services Desk at (757) 444-7528 during working hours and (757) 444-3477 after hours. Requests for services involving animals, such as sea turtles, marine mammals, game animals and migratory birds or raptors, not under the purview of the Environmental Services Department, will be referred by Service Desk personnel to Natural Resources Managers.

(2) Natural Resources Specialists. Under the direction of the Regional Natural Resources Program Manager, installation Natural Resource Specialists use integrated management practices and procedures to manage fish and wildlife and control certain feral, nuisance and invasive species. Per reference (k), Natural Resources personnel also develop and execute depredation and

12 MAR 2003

dispersal procedures for Bird Animal/Aircraft Strike Hazard (BASH) purposes, and personally supervise these activities when lethal methods are required. Natural Resources Managers, and all other PWC/RE personnel involved in lethal control activities, must be properly trained and duly certified for all weapons employed in accordance with applicable regulations. These personnel are located in Storefront Compliance Departments of the Regional Environmental Group. Natural Resources personnel will also identify bird and/or other animal remains associated with aircraft mishaps in accordance with reference (k).

(3) Conservation Officers. Under the direction of Natural Resources Managers, Conservation Officers enforce fish and wildlife and other natural resources laws and regulations. They may conduct field inspections and employ approved control methods for certain species. Control measures include, but are not limited to, live trapping, relocation, and lethal methods. Conservation Officers also perform wildlife forensic investigations and respond to wildlife damage complaints.

(4) Regional Natural Resources Managers. Regional natural resources managers shall:

(a) Provide direction to natural resources managers and game wardens regarding the management of fish and wildlife and the control of feral animals, invasive species, and pests.

(b) Ensure appropriate approval and procedures are in place to properly issue, store, carry, and use firearms.

(c) Ensure the natural resource manager and game warden weapons qualifications cards are certified and remain current.

(d) Coordinate with local and regional security for required range time, qualifications, and DoD training as needed.

b. NAVSHIPYD Norfolk. Pest control services for NAVSHIPYD Norfolk are currently provided through government contract; these services may be requested through LANTNAVFACENCOM at (757) 396-5121, extension 200.

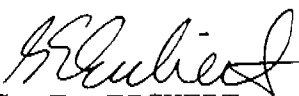
c. Security Officers. Security Officers respond to emergency wildlife complaints and requests for services. Security Officers are an after-hours emergency contact point for Natural Resources Managers, Conservation Officers, and pest management personnel. Within existing resources and according to established training priorities, Security Officers also assist Natural Resources personnel in obtaining required weapons qualifications.

12 MAR 2003

d. Airfield Facilities Division Officer. All bird/animal strikes should be investigated and reported in accordance with reference (k). Animal remains will be collected by the Airfield Facilities Division Officer and placed in appropriate BASH freezers located in Building 102 at NAS Oceana and LP-167 at Chambers Field, NAVSTA Norfolk.

e. Aviation Squadrons. All bird strikes must be reported in accordance with reference (k). Airfield Facilities or Natural Resources should be immediately contacted following any strike to ensure bird/animal remains are collected and identified.

5. Review. The Regional Natural Resources Program Manager is responsible for review and update of this instruction.


G. E. EICHERT
Chief of Staff

Distribution: www.cnrma.navy.mil

Enclosure 4. Chief of Naval Operations (CNO) Policy Letter on Feral Cats and Dogs

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DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, D.C. 20350-2000

IN REPLY REFER TO

5090
Ser N456M/1U595820
10 JAN 2002

From: Chief of Naval Operations

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG
POPULATIONS ON NAVY PROPERTY

Ref: (a) SECNAVINST 6401-1A, of 16 Aug 94, Veterinary Health Services
(b) AFPMB TIM #37, Guidelines for Reducing Feral/Stray Cat Populations on Military Installations in the United States
(c) OPNAVINST 6250.4B, dtd 27 Aug. 1998, Pest Management Programs
(d) Executive Order 13112 of 3 Feb 1999, Invasive Species

1. This letter clarifies the application of reference (a) regarding the prevention of free roaming (also called wild, feral or stray) cat and dog populations on Navy installations. The objective is to prevent injury or disease to Navy personnel, and eliminate adverse impacts on native wildlife. It requires Navy commands to institute pro-active pet management procedures in order to prevent establishment of free roaming cat and dog populations. Free roaming cats and dogs pose a potential public health threat to personnel on Navy installations, and they pose a threat to wildlife including endangered species and migratory birds.

2. Existing policy at Paragraph 4-2c(4) of reference (a) states "Dogs, cats, and other privately-owned or stray animals will not be permitted to run at large on military reservations." Consistent with this policy, Navy commands must ensure the humane capture and removal of free roaming cats and dogs. Consistent with this requirement, Trap/Neuter/Release (TNR) programs will no longer be established on Navy land. All existing TNR programs on Navy land must be terminated no later than 1 January 2003.

3. Responsible pet ownership is a key factor in eliminating free roaming cat and dog populations. In consultation with supporting Army Veterinary Office, installations shall implement appropriate pet management measures to preclude establishment

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG
POPULATIONS ON NAVY PROPERTY

of feral cat/dog populations, including, but not limited to the following:

Require installation residents to keep and feed pet animals indoors or under close supervision when outdoors (such as on leash and collar or other physical control device - cage, fenced yard etc.).

Encourage neutering or spaying of cats and dogs before they reach reproductive age (exceptions to this policy can be made on a case by case basis as determined by the Installation Commander).

Require routine vaccinations of cats and dogs for rabies and other diseases as required by federal, state and local laws and ordinances. A current vaccination record is required at time of registration of pets.

Require microchipping registration (or other system of pet identification approved by supporting veterinary office) of all pet cats and dogs brought onto installations. Installation residents must register cats and dogs and have pets wear registration or identification tags at all times.

Prohibit the feeding of feral animals on the installation.

Provide educational materials to pet owners regarding installation regulations and general pet management.

Enforce prohibition of abandonment of animals on installations.

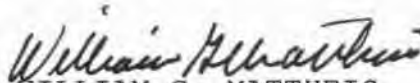
Comply with all humane and animal control regulations at the federal, state and local level (and their equivalents in host nation countries).

Navy installations in Europe that do not have a supporting veterinary office contact 100th Medical Detachment (VA HQ) (011) 49-622-177-2868; for all other locations that do not have a supporting veterinary office the POC is the VETCOM HQ, Commander (210) 221-6522.

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG
POPULATIONS ON NAVY PROPERTY

4. Effective prevention, management and elimination of feral cat and dog populations requires close coordination and cooperation between natural resources, pest management, security, veterinary, and housing personnel to develop and implement an effective and humane program. Reference (b) provides information for preventing free roaming cat populations on military installations. General pest management guidelines are detailed in reference (c). Every effort should be made to work with other federal, state and local agencies to support reference (a) and reference (d) by eliminating free roaming cat and dog populations on Navy land. Navy commands should work with local animal control agencies to determine the best approach for the ultimate disposition of the captured animals. Every effort should be made, if practical, to find homes for adoptable feral cats and dogs.

5. My point of contact on this issue is Mr. Joe Cook, CNO N456M, at (703) 602-5335, or DSN 332-5335.



WILLIAM G. MATTHEIS

Deputy Director, Environmental
Protection, Safety and Occupational
Health Division

Distribution:

CINCLANTFLT (N465)
CINCPACFLT (N465)
COMNAVRESFOR (01E, N46)
CNR (91)
CNET (44)
COMNAVSECGRU (N443)
COMNAVTELCOM (N451)
BUMED (NEGC-EPWR)
COMNAVVAIRSYSCOM (AIR.OY)
COMSPAWARSYSCOM (07-1)
COMNAVSUPSYSCOM (4A2, 421)
COMNAVSEASYSYSCOM (SEA 00T)
COMNAVFACECOM (ENV, 09)
CINCUSNAVEUR (N4, N76)
COMSC (N00EP)
COMNAVMETOCCOM (N13)

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG
POPULTIONS ON NAVY PROPERTY

Distribution:
CHBUMED (NEHC-EPWR)
DIRSSP (SP20161)
ONI (411)

Copy to:
OASN (I&E)
OAGC (I&E)
CNO, N44, N46, 09BF
CMC, LFL
COMNAVREG MIDLANT
COMNAVREG SE
NTC GREAT LAKES
COMNAVRESFOR
COMNAVREG SW
COMNAVREG PEARL HARBOR
COMNAVMARIANAS
COMNAVREG NW
CNFJ
CNFK
PACNAVFACENCOM PEARL HARBOR HI (CODE 23)
LANTNAVFACENCOM NORFOLK VA (CODE 2032)
SOUTHWESTNAVFACENCOM SAN DIEGO CA (CODE 03EN)
SOUTHNAVFACENCON CHARLESTON SC (CODE 064)
ENDFLDACT NE PHILADELPHIA PA (CODE 18)
ENGFDACT WEST SAN BRUNO CA (CODE 053)
ENGFDACT CHES WASHINGTON DC (CODE 20E)
ENGFDACT NW POULSBO WA (CODE 05EC4)
CO PWC GREAT LAKES
CO PWC GUAM
CO PWC JACKSONVILLE
CO PWC NORFOLK
CO PWC PEARL HARBOR
CO PWC PENSACOLA
CO PWC SAN DIEGO
CO PWC SAN FRANSICO BAY
CO PWC WASHINGTON DC
CO PWC YOKOSUKA
CO CBC PORT HUENEME
CO CBC GULFPORT
OESO
MESO
DODVSA/OTSG (Chief Animal Medicine)

**Enclosure 5. Naval Air Station Oceana, Naval Auxiliary Landing Field Fentress, and Naval
Air Station Oceana Dam Neck Annex Prescribed Burn and Smoke Management Plan
(2010)**

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**ON HOLD PENDING UPDATED LAND CONDITION ANALYSIS IS
FINALIZED and BURN AREAS ADJUSTED ACCORDINGLY.**

NAVAL AIR STATION OCEANA

NAVAL AUXILIARY LANDING FIELD FENTRESS

NASO DAM NECK ANNEX

PRESCRIBED BURN AND SMOKE MANAGEMENT PLAN

Prepared by: _____ **Date:** _____
**Natural Resources Manager, NAVFAC MidLant PWD Oceana,
Environmental
(757) 433-3461**

Reviewed by: _____ **Date:** _____
**Regional Natural Resources Manager, NAVFAC MidLant
(757) 341-0495**

Reviewed by: _____ **Date:** _____
**Environmental Division Director, NAVFAC MidLant PWD Oceana,
Environmental
(757) 433-3437**

Reviewed by: _____ **Date:** _____
**Public Works Officer, PWD Oceana
(757) 433-3321**

Approved by: _____ **Date:** _____
**Commanding Officer, NAS Oceana
(757) 433-2922**

- Distribution:**
- Executive Officer, NAS Oceana**
 - OIC, NALF Fentress**
 - Fire and Emergency Services, CNRMA**
 - Security Department, NAS Oceana**
 - Air Operations, NAS Oceana**
 - Base Operations, NAS Oceana**
 - Safety Department, CNRMA/NAS Oceana**
 - VDOF Local Forester**

Please sign below by respective department listing indicating you have reviewed this plan. Please review within one week of the date annotated by the Natural Resources Specialist line on the cover sheet of this plan.

Distribution:

Executive Officer, NAS Oceana:

OIC, NALF Fentress:

Fire and Emergency Services, CNRMA:

Security Department, NAS Oceana:

Safety Department, CNRMA/NASO:

Air Operations, NAS Oceana:

Base Operations, NAS Oceana:

Local Forester, VDOF:

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DRAFT

Plan developed in accordance with the 2009 Guidance for Implementation of Federal Wildland Fire Management Policy. Some verbiage in this document is taken directly from this guidance document.

DEFINITION: Wildland fire is a general term describing any non-structure fire that occurs in the wildland. There are two categories of wildland fire: wildfire and prescribed fire. Wildfire includes unplanned fire ignitions or prescribed fires that are declared wildfires (fires outside of planned management prescriptions). Prescribed fire ignitions are planned. Prescribed, or controlled, burning is defined as skillfully applying fire to forest and grassland fuels, in a definite place, for a specific purpose, and under exacting conditions to achieve management objectives.

BURN TECHNIQUES: For the purposes of this plan, all burning will be accomplished utilizing a combination of strip-head fire and backing fire techniques as appropriate.

PURPOSE/JUSTIFICATION: The main objectives of controlled burning are to reduce forest fuel (i.e. pine needles, fallen wood, leaves, etc.) accumulations and thick understory, improve wildlife habitat, reduce potential for an uncontrollable fire, and to maintain vegetation in compliance with security and runway requirements. Prescribed burning may be used also as a form of site preparation for planting.

Objective 1: Implement hazard reduction prescribed burning within areas that are designated in accordance with national fire management parameters.

Rational for Objective: Hazard reduction prescribed burning reduces the amounts of fuels in the forest. This would reduce the probability of major fires of long duration, which are difficult and expensive to suppress, as well as pose a greater threat to human health and private & government properties.

Strategies:

- Implement hazard reduction burns within designated areas.
- Participate in wildland urban interface programs that support reduction of fuel accumulations and development of fire breaks where off-base development and smoke-sensitive locations are threatened by base wildfires.

Objective 2: Implement sustainable ecosystem based habitat management prescribed burning within areas that are designated in accordance with national fire management parameters.

Rational for Objective: Hazard reduction and ecological enhancement prescribed burning alters the vegetation structure to either reduce or enhance wildlife and plant species as dictated by the installation's Integrated Natural Resources Management Plan (INRMP). Objective would support such INRMP programmatic areas as invasive species control, ecological restoration, bird/animal aircraft strike hazard species control, protected species management, etc.

Strategies:

- Implement hazard wildlife habitat reduction burns within designated areas.
- Implement restoration/enhancement burns within designated areas.

TIME FRAME/SEASON: Virginia State Code 10.1-1142-B designates the period from February 15 to April 30 as fire season. Due to other Navy directives the Navy cool season burning dates run from 01 Feb to 15 April. The general public is prohibited from any burning before 1600 hours. Federal facilities are exempt from state law due to exclusive jurisdiction, but should comply with the intent of the law. Although NAS Oceana may at some point need to perform a growing season burn for specific management purposes, every effort will be made to burn during the cool season.

The Bases will follow Virginia sanctioned burn bans. Exceptions can be made upon approval by the Bases' Commanding Officer (CO). The CO may re-instate burning privileges under the federal lands exclusive jurisdiction.

Air quality issues in the Hampton Roads area, as in most urban areas, are most often felt during the summer months, which are characterized by hot, humid weather, and the accompanying stagnant air mass. These conditions are typically unfavorable for prescribed burning. The environmental conditions make burning difficult, the desired effects of prescribed fire treatments are harder to achieve, and smoke management parameters, which are a key component of prescribed fire burn planning, generally prohibit burning during these times of year (2006 USFWS GDSNWR).

PLAN APPROVAL: This plan is part of the Integrated Natural Resources Management Plan (INRMP). Upon signature of this plan it will be adopted into the INRMP as an approved plan and no further signatory approvals will be required beyond the signatures on the INRMP. In the event that there are major changes specific to the Fire Plan and not to the INRMP in general, the fire plan will be revised and new signatures will be required on the plan before updating the INRMP with the revision.

NEPA REVIEW: As the Prescribed Burn and Smoke Management Plan Units were reviewed under the INRMP's associated Environmental Assessment (EA), no additional NEPA review is required. In the event that new burn areas are added to the Burn Plan additional NEPA review will be required prior to Plan approval and inclusion in the INRMP.

Restrictions on when and how to burn are tied to multiple variables to include but are not limited to: military mission requirements; National Environmental Policy Act (NEPA); Threatened and Endangered Species (T&E) considerations; Migratory Bird Treaty Act (MBTA); water quality and impacts on riparian areas; administrative constraints imposed by Congress (e.g., roadless and wilderness area designations); impacts on archeological resources; smoke management program requirements; and other state or federal environmental or forestry regulations.

SMOKE MANAGEMENT PLAN: Each Burn Area will specify required conditions upon which burning may take place to minimize impacts to identified downwind sensitive smoke receptors (Appendix D). These sensitive targets include hospitals, nursing homes; interstate or other major

high-speed highways, runways, and heavily populated areas. Target areas around NAS Oceana include Interstate 264 to the North, and heavily populated areas to the west and north of the installation. Target areas on NAS Oceana include the airfield, Tomcat Boulevard and Hornet Drive, the Branch Medical Facility and the Married Officers Quarters (MOQ) and Bachelors Officers Quarters (BOQ). Sensitive areas around and on board NALF Fentress include Mount Pleasant Road, Fentress Airfield Road, and the Operations building 100. Areas surrounding and on board Dam Neck Annex that are considered smoke sensitive include Dam Neck Road, the Medical Dental Facility, the MOQ and Combined Bachelors Quarters, the Navy Lodge, and densely populated areas to the south (Sandbridge) and to the west including Ocean Lakes Elementary School.

Each burn area plan includes the following details:

- Reason for burn.
- Required weather conditions including direction and speed of surface and transport winds.
- Required mixing height.

Preferred wind direction will be indicated in the description of the burn areas and in Appendix D. Weather conditions will be checked for appropriate burning conditions commencing 24 hours prior until the onset of burning. Given that general weather conditions are appropriate for burning, the areas to be burned each day will be decided upon based on wind direction and any air operations restrictions. Air operations restrictions are determined by contacting the Air Operations Officer. Additionally, the following burn area descriptions contain a priority listing of High, Med. or Low to be used in the decision making process on the day of a burn. Although these areas have been prioritized, weather and site conditions may direct prescribed burning to lower priority areas. Note that certain low priority areas may be burned in advance of higher priority areas to provide crew training, to test communication procedures and test equipment. Some of these areas are smaller than high priority burn areas and are located in accessible and secure locations.

The size of the designated burn areas has been kept relatively small to help reduce emission generation during a given burn event.

DESCRIPTION OF BURN AREAS:

Burn Areas are listed in order of burn priority for the year (the first burn area listed is the #1 priority burn for the year, the second listed is the #2 priority burn for the year, etc.). Burn priority rankings were established through coordination with Base Ops, Planning, and Natural Resources.

Acreages and mapped areas for burn units have been updated, as such some information may differ from what was reported in past burn plans.

Locations of proposed burn areas are shown in Appendices A and B. A consolidated burn prescription chart is located in Appendix D. A burn history chart is provided in Appendix K. Future plans for the prescribed burning program are located in Appendix I.

NAS Oceana:

Burn Area 4-7 is a 54.14 acre parcel located in hunting areas 4 through 7 (Appendices A, B, and C). This site is recommended for burning to: facilitate control of *Phragmites* and 3 acres of Warm Season Grasses (WSG); to maintain vegetation in compliance with airfield height restrictions; and to reduce BASH. The burn area is located 400 feet west of NAS Oceana runway 5R and 1000 feet south of 5L. The burn areas are bounded: on the north/northeast and east/southeast by mowed airfield clearzone; on the south/southwest by a maintained bulldozed firebreak; and on the west by a ditch with agricultural fields as secondary containment (Appendices A, B, and C). Close coordination with NAS Oceana Air Operations will prevent impedance to aircraft using adjacent runways. Annual burning will facilitate compliance with airfield vegetation height requirements and reduce BASH potential. This area was burned in 2006 and again in January 2007. Weather conditions and staff availability prevented burning from occurring in 2008. Burning can proceed with wind direction between 270° to 30° and a mixing height of 1,640 feet. (Priority: High)

Burn Area 47 is a 22.01 acre site consisting of early successional woods and WSG plots (Appendices A, B, and C). Boulevard. The area is located between the NAS Oceana skeet range and the MWR long-term storage area, approximately 1600 feet south and west of the intersection of Potters Road and Mitcher Blvd. Active or abandoned concrete roads and the runway clearzone define most boundaries and act as firebreaks. A ditch along the NE boundary acts as a secondary firebreak. The site was drumchopped in 1997 to meet airfield clearzone height restrictions and receives periodic burn or mowing treatments to maintain it. Burning will economically prepare the site for development of a wildlife management area, maintain airfield vegetation height requirements and remove undesirable pioneer plant species. In 1998, 10 acres of native warm season grasses (WSG) were planted and added to this parcel for burning. This area is located on the fringe of the airfield clearzone by runway 14L. The warm season grass portion of this area was last burned in 2006. In 2008 the MWR skeet range installed a new fence which altered the boundary of this parcel reducing the acreage from 51.80 acres to the current 22.01 acres. Burning can proceed with wind direction between 300° to 30° and a mixing height of 1,640 feet. (Priority: High)

Burn Area 41/41A is a 21.94/4.03 acre site, respectively, and consists of hunting area 41, a portion of the airfield clearzone planted in WSG in 1998, and an adjacent field to the northeast (Appendices A, B, and C). The area is located 1800 feet west of Oceana Boulevard and 400 feet northeast of the approach end of Runway 32R. Burning will facilitate compliance with airfield vegetation height requirements and maintenance of portions of the area in an early successional stage. The adjacent field east of the ditch (area 41A) was added this year in an attempt to reduce deer bedding locations in close proximity to the runway. Area 41 is bounded: on the east and south

Burn Area 2 is a 57.12 acre parcel of loblolly pine located north of burn area 3 in hunting areas 2 and 1 (Appendices A, B, and C). Approximately 30 acres of this area received pre-commercial pine thinning in the spring of 1997 and a prescribed burn in 1998, 1999, 2001, 2003, 2004, and 2006. The section of woods north of this area was cleared in 2004. Prescribed burning will prevent re-invasion of hardwoods in this stand and reduce the fuel loading in the remaining 20 acres. This area will be burned in two sections with a firebreak dividing the ~20 and ~30 acre plots. Firebreaks have been established on the north, northeast and south sides of this tract. Fentress Airfield Road will serve as a firebreak on the east and agricultural fields will provide a break on the west. Burning can proceed with wind direction between 30° and 180° with a minimum mixing height of 1,640 feet. (Priority: High)

Burn Area 3 is a 74.75 acre parcel of prior converted croplands located 3500 feet east of the approach end of NALF Fentress Runway 23 and approximately 800 feet north of Fentress Airfield Road in hunting areas 3 and 4 (Appendices A, B, and C). These fields contain grasses, early successional shrubs and near-mature pine and hardwood trees. This area will be burned for wildlife management and to alleviate competition to pine species. Drainage ditches bound the area to the south. Agricultural fields serve as firebreaks to the west and north. Plowed firebreaks and Fentress Airfield Road contain this area on the east. This area was burned in 2004. Burning can proceed with wind direction between 30° and 180° with a minimum mixing height of 1,640 feet. (Priority: Med.)

Burn Area 19 is a 22.93 acre parcel located east of burn area B-2 and inside the old taxiway in hunting area 19 (Appendices A, B, and C). Burning is prescribed to improve timber stand quality. The old taxiway will serve as the firebreak to the north, south, east and west. Burning can proceed with wind direction between 270° and 60° with a minimum mixing height of 1,640. (Priority: Med.)

Burn Area B-2 is a 23.48 acre S-shaped timber stand of Loblolly Pine located east of Carter Rd. and south of Mt. Pleasant Rd. in hunting area B-2 (Appendices A, B, and C). Prescribed burning is being used to improve the quality of the timber, the appearance and wildlife habitat. Firebreaks include the tarmac to the east and agricultural fields to the north, south, and west. Burning can proceed with wind direction between 300° and 60° with a minimum mixing height of 1,640. (Priority: Low)

Dam Neck Annex:

Over several years DNA has not received the desired prescribed burning attention, due to weather conditions and staff availability issues. DNA burn areas need to be reassessed before burning is initiated, DNA will not undergo prescribed burning in 2009. Appropriate areas may

be mowed to maintain desired habitat structure. A general map of the past burn areas is located in Appendix A. For further information regarding any of these sites please contact the installation Natural Resources Manager.

RESPONSIBILITIES:

Training requirements for individuals involved with the prescribed burning program are located in Appendices G & H.

NAVFAC MidLant Regional Natural Resources Managers:

1. Act as or designate an appropriately trained person to act as burn boss and conduct the safety brief for any given burn.
2. Supervise burning procedures on the day of the burn (acting burn boss).
3. Release burn crew from burn site after mop-up (acting burn boss).
4. Review the burn plan.
5. Provide technical assistance.

NAS Oceana Natural Resources Specialist:

1. Develop prescribed burn plan.
2. Coordinate personnel and equipment prior to burn.
3. Conduct post-burn evaluation.
4. Notify chain-of-command and concerned parties prior to burning.
5. Provide 4 portable radios with access to Security and Fire Dept. frequencies .
6. Establish firebreaks.
7. Maintain training log of crew/personnel members (Appendix H)

NAS Oceana Public Works Officer:

1. Review prescribed burn plan.

Air Operations:

1. Coordinate burning requirements with flight traffic patterns.
2. Notify burn crew if smoke interferes with flight operations.

Navy Region Mid-Atlantic Fire and Emergency Services:

1. Provide standby fire crew in case of emergency.
2. Coordinate available assistance from the local fire department.
3. If requested by the Natural Resources Manager, make hourly site inspections for three consecutive hours after burn crew personnel have secured the burn site.

NAS Oceana/NALF Fentress/Dam Neck Annex Security Department:

1. Provide traffic control in the event of emergencies or impaired visibility due to smoke.

2. Liaison with NALF Fentress and the Chesapeake Police Department for law enforcement support in accordance with the memorandum of understanding between the City of Chesapeake and NAS Oceana.

NAS Oceana Public Affairs:

1. Provide burn information to inquiring individuals, nearby residents, and the news media if requested.

REQUIRED WEATHER CONDITIONS:

The following conditions must be met before burning is initiated (Appendix D):

- No significant rain three to seven days prior to burning.
- Winds of 10 mph or less with gusts no higher than 15 mph.
- Preferred relative humidity of 30 to 50 percent.
- Preferred temperature of 20 to 50 degrees F.
- Front no less than four hours distant.
- Specific wind direction may be required to reduce smoke (see burn area description section of plan or Appendix D).
- Per the Virginia Department of Forestry, no prescribed burning will occur above the 500 CSI (Cumulative Severity Index) maximum, which will be checked prior to burning commencement.

BURN PREPARATION:

Notification:

All concerned parties in the notification section of this plan will be contacted and informed of the necessary details specific to the proposed burn (Appendix F). Weather and air operations are the controlling factors and will generally limit coordination to less than 24 hours and almost always less than one week prior to burning.

Fire Breaks:

Establishment of fire control breaks is discussed in the preceding burn area descriptions. Secondary firebreaks, consisting of roads, runways, ditches, clearzones, and agricultural fields are located around all burn areas, which further prevent fire from escaping outside of Navy property as well as protect structures on board the installations.

Personnel/Materials:

A list of work crew personnel and equipment needed to control the burn is contained in the equipment section of this plan and Appendices E and F.

Required Clothing:

A list of required field clothing is contained in the personal protection equipment section of this plan (Appendix E).

Day of Burn Procedures:

1. Obtain current weather and burn forecast information.
 - Virginia Department of Forestry; (757) 465-6840; www.state.vipnet.org/dof/index.html
 - National Oceanic and Atmospheric Administration; www.nws.noaa.gov/
 - NAS Oceana (latest observation); (757) 433-2177/433-2274
2. Notify all concerned parties prior to and immediately after burning.
3. Conduct a briefing by the Burn Boss covering the following items:
 - Burn objectives
 - Techniques to be used
 - Safety
 - Burn boundaries
 - Radio transmission signals
 - Use of fire tools
 - Chain of Command: natural resources staff, headed by the burn boss, gives direction to the work crew. Natural resources staff will remain in radio contact with the tower and fire department should there be any issues that arise requiring a halt to or redirection of the burning operation. Such direction may be given by the Commanding Officer (Command Duty Officer in the absence of the CO), Air Operations, or the Public Works Officer.
4. Burn in accordance with burn plan prescriptions recording appropriate information throughout the burn.

Note: Example data sheets for tracking and recording information are provided in Appendix J.

Burn Completion:

When all open flames within 25 feet of the burn perimeter and all smoldering material are extinguished, and the burn has been completed to the satisfaction of the burn boss, he/she may release the burn crew from the site. If requested, by the Regional Natural Resources Manager or designated burn boss, the Navy Regional Fire and Emergency Services and/or NALF Fentress field crews will make hourly site inspections for three consecutive hours after the burn crew has secured

the site. Burn crew personnel should be called back only if fire escapes the burn perimeter or open flames persist within 100 feet of the burn perimeter during winds over 25 mph.

Post Burn Evaluation:

Each burn event will be evaluated in respect to the following questions:

- Was there adherence to the burn plan?
- Were pre-burn preparations made?
- Were conditions of weather, fuel and fire behavior within planned limits?
- Was the burning technique employed correctly?
- Was the fire confined by the fire control breaks?
- Did any accidents or near accidents occur?
- What were the environmental effects on soil, air, vegetation, water and wildlife?
- Were objectives met?
- Were costs comparable with benefits derived?

Note: Example data sheets for tracking and recording information are provided in Appendix J.

EMERGENCY ACTION:

1. In the event of an emergency, when called for assistance, the Fire Chief will assume command of the scene and will coordinate extinguishment of the fire using a unified command with all resources needed to control the incident:
 - a. Fire chief to be briefed by the Burn Boss/wildland fire fighting expert. Briefing will include discussion of onsite wildland fire personnel, weather information, and wildland fire fighting techniques. The Burn Boss will be incorporated as part of the unified command;
 - b. Stop lighting new sections but let the existing fire continue to burn. However, under certain conditions, and in coordination with the Fire Department, backfires may be used to help control or extinguish fires.
 - c. Continue normal burning procedures.
2. In case of a fire escape that cannot be controlled by the burn crew and the Navy Regional Fire and Emergency Services, the following will be contacted for assistance (the call for additional resources will only be made by the incident commander): (Appendix F has additional contact information for these offices)
 - a. Virginia Department of Forestry (757) 365-6209
 - b. Virginia Beach Fire Department (757) 385-5000
 - c. Chesapeake Fire Department Dispatch (757) 382-6165

“WATCH OUT” SITUATIONS:

IF ANY OF THE FOLLOWING CONDITIONS EXISTS, THE BURN WILL BE HALTED AND EXISTING FIRE WILL BE PLOWED OUT:

- Fire behaves erratically.
- Spot fires occur and are difficult to control.
- Winds shifting or other unforeseen changes in weather.
- Smoke not dispersing as predicted.
- Public Roads or sensitive areas ‘smoked in’.
- Burn does not comply with all laws, regulations and standards.
- Large fuels igniting and burning, not enough personnel available to secure before dark, and likely to ‘smoke in’ sensitive areas

REFERENCES:

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EPA. 1998. Wildland Fire and Air Quality Policy.

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United States Department of Agriculture, Forest Service Southern Region. 1989. A Guide for Prescribed Fire in Southern Forests. February, Technical Publication R8-TP 11. 03 March 2010. <http://www.bugwood.org/pfire/>

COMMONWEALTH OF VIRGINIA. 2009. STATE AIR POLLUTION CONTROL BOARD. 9VAC5 CHAPTER 130. REGULATION FOR OPEN BURNING.

[VDOP]. 2010. Prescribed Fire and Smoke Management. 03 March 2010. <http://www.dof.virginia.gov/fire/prescribed-smoke-mgmt.shtml>

Review and Update of the 1995 Federal Wildland Fire Management Policy (January 2001)

Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy (June 20, 2003)

2009. Guidance for Implementation of Federal Wildland Fire Management Policy.

<http://www.fws.gov/BackBay/DocPubComment.htm>

U.S. Fish and Wildlife Service. 1998b. Fire Management Plan, Great Dismal Swamp National Wildlife Refuge.

Great Dismal Swamp National Wildlife Refuge and Nansemond National Wildlife Refuge Final Comprehensive Conservation Plan. July 2006.

<http://www.dof.virginia.gov/fire/vpfc.htm>

**APPENDIX A
GENERAL BURN AREA MAPS:**

DRAFT

NASO Dam Neck Annex Burn Areas

Project: NASO DNA Prescribed Burn Areas - General
Date Created: 17 Feb 2009
Data Set: Natural Resources Program;
2008 VGIN Aerial Color Imagery

Projection: Transverse Mercator
Datum: WGS 1984 (UTM Zone 18N)
Scale: 1:24,759
□ : Prescribed Burn Area



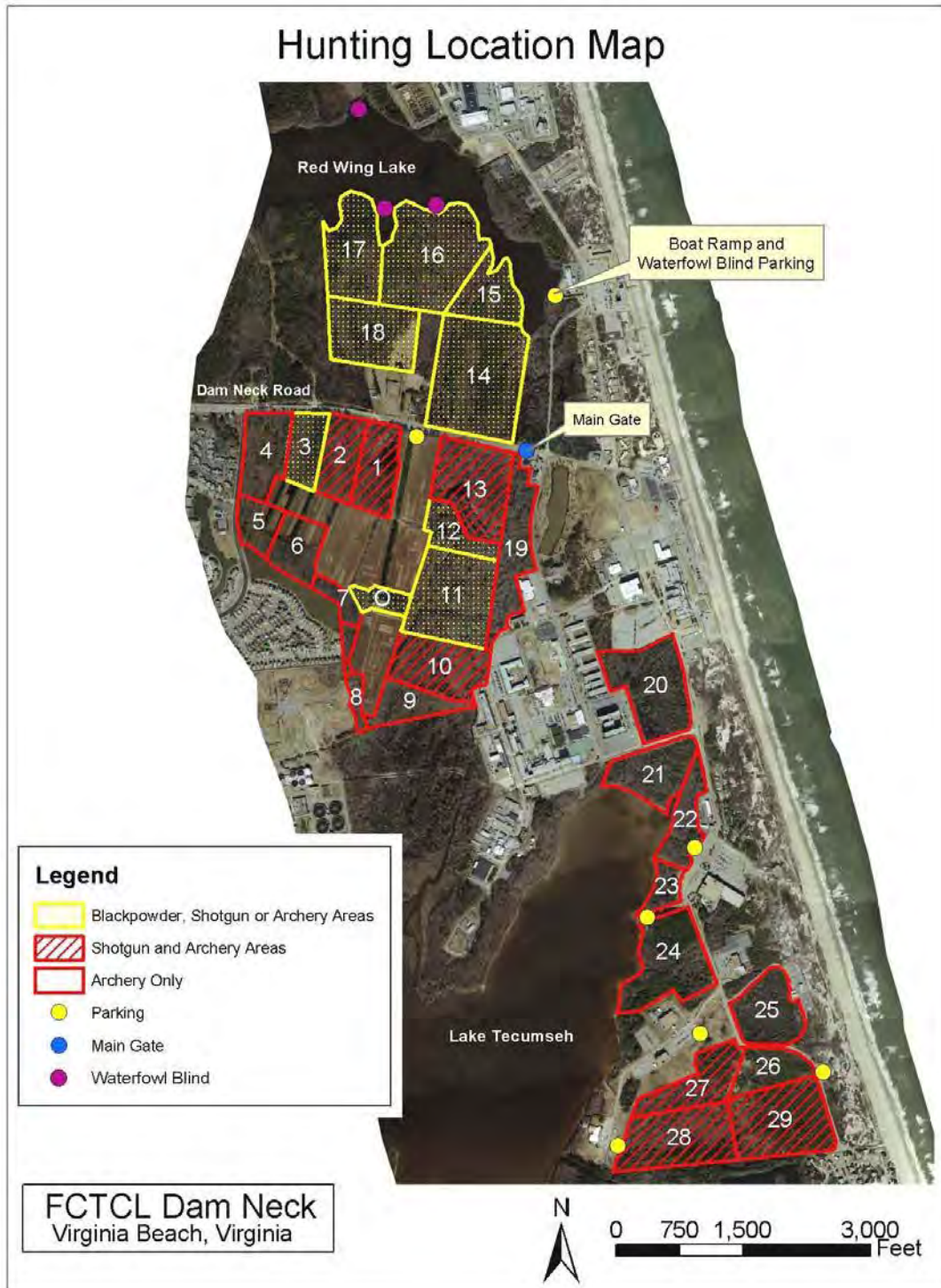
APPENDIX B
2009 SITE SPECIFIC BURN AREA MAPS:

DRAFT

**APPENDIX C
BASE HUNTING AREA MAPS:**

DRAFT

Dam Neck Annex Hunting Areas



**APPENDIX D
CONSOLIDATED BURNING PRESCRIPTION CHART:**

Base	2009 Order	Priority	Burn Area	~Acres	Veg. Type	Wind Direction (degrees)	Wind Speed	Rain	Pref. Rel. Humidity (%)	Pref. Temp. (degrees F)	Fronts	Cumulative Severity Index, Max.	Required Personnel, Min.
NASO	1	High	4-7	54.14	(phrag.) WSG & Shrub	270 to 30	<= 10mph with gusts no higher than 15mph	No significant rain three to seven days prior to burning.	30 to 50	20 to 50	No less than four hours distance	500	8
	2	High	47	22.01	Early Successional Woods; WSG & Shrub	300 to 30							
	3	High	41/41A	21.94/4.03	WSG & Shrub	300 to 120							
	4	High	53	43.61	(phrag.) grass/shrub early successional	270 to 30							
	5	High	9	9.15	WSG & Shrub	270 to 30							
NALFF	6	Med.	5/5A	21.51/40.32	Mixed, early successional wood/shrub	300 to 240							
	7	Med.	B-6	21.66	Mixed, early successional wood/shrub	60 to 230							
	8	High	21	18.12	Mixed, early successional wood/shrub	180 to 60							
	9	High	2	57.12	Forest	30 to 180							
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 20px; height: 15px; background-color: blue; border: 1px solid black;"></div> Immediate priority, open to consideration during State Burn Bans due to Base Ops Safety and Security around the Airfield. </div>													
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 20px; height: 15px; background-color: red; border: 1px solid black;"></div> High priority </div>													
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 20px; height: 15px; background-color: yellow; border: 1px solid black;"></div> Medium priority </div>													
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 20px; height: 15px; background-color: green; border: 1px solid black;"></div> Low priority </div>													

APPENDIX E

CREW AND EQUIPMENT:

Burn Plan Work Crew and Materials Needed

1. Minimum of 8 personnel made up of active duty/retired military, DoD civilians or other personnel under DoD cooperative agreements.
2. Minimum of 4 portable radios.
3. Backpack pumps.
4. Fire tools (flappers, rakes, shovels).
5. 4 drip torches.
6. Matches, fuel and mixing container.
7. Compass.
8. First aid kits.
9. Maps and/or aerial photographs.
10. Fireproof clothing and boots.
11. Water coolers and cups.
12. Personal Protective Equipment (PPE)

Required Personal Protective Equipment (PPE)

1. Hardhat.
2. Leather gloves.
3. Bandanna or other smoke inhalant protection.
4. Leather boots.
5. Nomex fire proof or 100% cotton clothing.

Natural Resources Prescribed Burn Equipment Inventory

Date of Inventory	Item	Available Quantity	Operational Status	Comments
Feb 2008	Water Bags	7 ea		
Feb 2008	Road Smoke Signs	2 ea		
Feb 2008	Ear Plugs	900 pairs		
Feb 2008	1st Aide Kit/Emergency Burn	1 ea		
Feb 2008	Burn Shrouds	6 ea		
Feb 2008	Saline Bottle	5 ea		
Feb 2008	Fire Rake	6 ea		
Feb 2008	Axe	2 ea		
Feb 2008	Shovel	1 ea		
Feb 2008	Flapper	11 ea		
Feb 2008	Gloves	20 pairs		
Feb 2008	Helemet	10		
Feb 2008	Goggles	8 ea		
Feb 2008	Filtered Bandit Scarf	10 ea		
Feb 2008	Nomex Shirt	17 ea		
Feb 2008	Nomex Pants	1 ea		
Feb 2008	Drip-Torch	4 ea		
Feb 2008	Gas Can	6 ea		
Feb 2008	Panama Pump	1 ea		
Feb 2008	ATV	2 ea		
Feb 2008	Burn Tailor	1 ea		
Feb 2008	Tractor	3 ea	1 available, 2 off-line (as of Feb 2009).	Primarily utilized for firebreak installation and fuel/veg height reduction. Equipment repairs require tires and hydraulic fluid

APPENDIX F

CONTACT LISTS:

Prescribed Burn Notification List (Non-Crew)

Contact & Email	Phone
1. Commanding Officer –	
Executive Officer-	
2. Base Fire Departments: NAS Oceana – Chief Assistant Chief or Acting Chief	
3. Base Security –	
4. Air Operations –	
5. Base Operations –	
6. Public Works Officer –	
7. Public Affairs Officer –	
8. OIC Dam Neck Annex –	
9. OIC NALF Fentress –	
10. Medical/Dental Clinics: NAS Oceana – (disaster preparedness/emergency services)	
11. Base Safety –	
12. Virginia Division of Forestry – Waverly Regional Office Chesapeake and Va. Beach Field Office Command Center	
13. Virginia Air Pollution Control Board (PReP)	
14. Virginia Beach Fire Department	
15. Chesapeake Fire Department	
16. Back Bay National Wildlife Refuge	
17. Command Duty Officer – Quarter Deck	

APPENDIX G

PRESCRIBED BURN FIRE FIGHTER TRAINING REQUIREMENTS:

The training program is currently under construction. There is currently no official Navy identified mechanism for obtaining the core and refresher training portions of these requirements. Because of this issue core and refresher training is being phased into the training requirements. There is NO substitution for taking the advanced training (as appropriate) or the burn day training. Once the training program is finalized, there will be no substitutions for taking core, refresher, and burn day trainings. Our goal is to promote safety through training and actions.

Core Training

Required for all new prescribed burn fire-fighters (and those old fire-fighters that have not taken the course), one time course:

1. I-100, all online (<<http://training.nwcg.gov/courses.html>>)
2. S-110, all online (<<http://training.nwcg.gov/courses.html>>)
3. S-190 (<<http://training.nwcg.gov/courses.html>>)
4. S-130, online & field day components (<<http://training.nwcg.gov/courses.html>>)

Advanced Training

Required for all prescribed burn Burn Bosses, one time course:

1. Virginia Dept of Forestry Prescribed Burn Certification Course

Refresher Training

Required annually for ALL prescribed burn fire-fighters who have completed Core and/or Advanced Training:

1. Annual Refresher Course
 - a. *Note: Advanced training course can substitute for refresher training during a given year.*
 - b. *Refresher Training is not required for potential prescribed burn fire-fighters taking the Core Training courses for the 1st time. Refresher Training will be required for following years.*

Burn Day Training/Briefing

Required for all prescribed burn fire-fighters that will be participating in that particular day's burn. This training will temporarily substitute for core and refresher training until the training program is finalized. Fire-fighters who miss the burn day training will not burn on that day. Burn Day training will be provided by the burn boss or burn boss identified support personnel.

Certificates of completion and contact information for each individual should be forwarded to the Installation Natural Resources Program Manager and the Assistant Fire Chief in Charge of Training. Copies will be stored in the prescribed burning training documentation files.

APPENDIX I

FUTURE PLANS FOR PRESCRIBED BURNING PROGRAM:

1. Establish Cooperative Agreements with state, city, and federal agencies as appropriate to provide services to support prescribed burning activities. The need to set up cooperative agreements is warranted because the NAVY does not have a dedicated large pool of prescribed-burn/wildland fire fighters available to carry out base specific burning requirements. In southeastern Hampton Roads, VA the days available to burn are limited due to weather restrictions, smoke management restrictions (Urban Area influences), species/habitat restrictions, etc. The various restrictions coupled with a small pool of people to conduct burns results in many burn objectives not being met for all bases in Hampton Roads, VA.
2. Conduct habitat and fire management assessments for NASO, NASO DNA, and NALFF with State and Federal Wildlife agencies, as appropriate. Many burn areas have not been burned as originally scheduled as such these areas have become overgrow or have accumulated heavy fire fuels. Given this knowledge these areas will require additional work to get them under control for safe burning conditions and into intended habitat structure.
3. Develop and implement a mandatory training program for people assisting with prescribed burning activities on Navy Property in Hampton Roads, VA. (Appendix G)
4. Research programs which may have funding available in support of prescribed burning initiatives (i.e. Forestry Program, Base Operations, etc.).

APPENDIX J
STATE AND FEDERAL PRESCRIBED/WILDLAND FIRE REPORTING DOCUMENTS

VA State Prescribed Burn Management Plan

Form 69
08/01/1999
f069_po.dot

VIRGINIA DEPARTMENT OF FORESTRY PRESCRIBED BURN MANAGEMENT PLAN

page 1

I. Location and Identification

Landowner Information

Name: _____ Phone Number: _____
Address: _____

Tract Information

County: _____ Coordinates: _____
Location: _____
Acres: _____ Tract #: _____ Parcel: _____ Map Attached: Yes No
Reason for the burn: Site Prep Fuel Reduction Wildlife

II. Weather

Prescription Conditions

A. Surface Wind _____
Direction MPH
B. Transport Wind _____
Direction
C. Mixing Height (meters) _____
D. Relative Humidity (%) _____
E. Temperature _____
F. Cumulative Severity Index _____

Burn Day

	Forecast		On Site	
	Day	Night	Prior	At Conclusion
A. Surface Wind	Direction MPH	Direction MPH	Direction MPH	Direction MPH
B. Transport Wind	Direction MPH	Direction MPH		
C. Mixing Height (meters)	_____	_____		
D. Relative Humidity (%)	_____	_____	_____	_____
E. Temperature	_____	_____	_____	_____
F. Cumulative Severity Index	_____			

III. Objectives of the Burn

VA State Prescribed Burn Management Plan...continued

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VIRGINIA DEPARTMENT OF FORESTRY PRESCRIBED BURN MANAGEMENT PLAN

page 2

IV. Screening for Smoke Sensitive Targets

Use double 30 degree template. Attach map.

- A. None within 20 miles: Proceed with burn, follow recommendations to reduce smoke impact for all forestry burns. (located in VA Smoke Management Guide)
- B. Target(s) within 10 to 20 miles: The following minimum conditions must be met, and the above mentioned recommendations should also be followed.
 Mixing Height: 500 meters (1,640 ft.)
 Ventilation Factor of 2,000

$$[\text{Mixing Height (meters)} \times \text{Transport Wind Speed (meters/sec)}]$$
- C. Target(s) within 10 miles: All of the conditions in A and B above must be met and the following should be considered. The distance to the target, nature of the target, size of the burn, amount and nature of the fuel, fuel moisture, topography, and presence of organic soil. These factors along with the meteorological conditions all combine to determine the quantity and duration of the smoke produced.

SPECIAL CAUTION IS NECESSARY

An alternative to burning may need to be prescribed unless conditions change allowing the potential target(s) to not be impacted by the smoke from your burn.

V. Other Considerations

- A. Department of Forestry Regional office notified, as well as county fire department dispatcher.
- B. Home owners within 1,000 feet. (Permission required through the Emission Standards for Open Burning according to the State Air Pollution Control Board.)
- C. Local Ordinances and the Forest Fire Laws of Virginia.
- D. Keep fires out of large piles of debris and sawdust piles which may produce smoke for extended periods of time. It is DOF policy not to burn bulldozed piled debris as a site preparation method.
- E. If smoke does cross a road you need to place a flag person at both ends with radio communications.
- F. Burn to be completed 1 hour prior to sunset.
- G. What are the fuel conditions and characteristics? _____

VI. Burning Plan / Strategy

A. Equipment On Site	Recommended	Actual
Number of tractor / fire plow units	_____	_____
Number of pickups	_____	_____
Additional water supply	_____	_____
Burn trailer	_____	_____
Number of hand carried radios	_____	_____
Other, specify _____		

VA State Prescribed Burn Management Plan...continued

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VIRGINIA DEPARTMENT OF FORESTRY
PRESCRIBED BURN MANAGEMENT PLAN

page 3

B. Personnel On Site

	Recommended	Actual
Number of DOF employees	_____	_____
Number of non-DOF employees	_____	_____
Landowner(s) list	_____	
Other, specify	_____	

C. Ignition Pattern (starting point shown on map) _____

D. Ignition Method Drip Torch Aerial Other _____

E. Special Fire Control and Smoke Considerations _____

E. Planned Mop-up Activities _____

Prepared By

PRINT NAME	SIGNATURE	DATE
CERTIFICATION NUMBER	PHONE NUMBER	

VA State Prescribed Burn Management Plan...continued

Form 69
08/01/1999
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VIRGINIA DEPARTMENT OF FORESTRY
PRESCRIBED BURN MANAGEMENT PLAN

page 4

EVALUATION IMMEDIATELY AFTER THE BURN

Evaluation By

PRINT NAME

SIGNATURE

1. Acres Burned _____
2. Spotting _____ Distance (comments) _____
3. Any Escapes _____
4. Objectives Met _____
5. Smoke Problems _____
6. % Understory Vegetation Consumed < 25% 26-50% 51-75% >75%
7. % Material > 3" Diameter Consumed < 25% 26-50% 51-75% >75%
8. % Of Area With Crown Discoloration < 25% 26-50% 51-75% >75%
9. Live Crown Consumption _____
10. Adverse Publicity _____
11. Remarks _____

FUTURE EVALUATION

Evaluation By

PRINT NAME

SIGNATURE

DATE

1. Insect / Disease Damage _____

2. Tree Mortality _____
3. % Understory Kill < 25% 26-50% 51-75% >75%
4. Soil Movement _____
5. Other Remarks _____

Federal Interagency Wildfire Coordinating Group Fire Reporting Documents



**NWCG PRESCRIBED FIRE
GO/NO-GO CHECKLIST**

Yes	No	Questions
		Are ALL fire prescription elements met?
		Are ALL smoke management specifications met?
		Has ALL required current and projected fire weather forecast been obtained and are they it favorable?
		Are ALL planned operations personnel and equipment on-site, available, and operational?
		Has the availability of ALL contingency resources been checked, and are they available?
		Have ALL personnel been briefed on the project objectives, their assignment, safety hazards, escape routes, and safety zones?
		Have all the pre-burn considerations identified in the prescribed fire plan been completed or addressed?
		Have ALL the required notifications been made?
		Are ALL permits and clearances obtained?
		In your opinion, can the burn be carried out according to the prescribed fire plan and will it meet the planned objective?

If all the questions were answered "YES" proceed with a test fire. Document the current conditions, location, and results

PMS 421 (1/02)

Federal Interagency Wildfire Coordinating Group Fire Reporting Documents...continued



NWCG AGENCY ADMINISTRATOR
GO/NO-GO PRE-IGNITION APPROVAL

Prescribed Fire Name: _____ Date: _____

Instructions: The Agency Administrator's Go/No-Go Pre-Ignition Approval is the intermediate planning review process (i.e., between the Prescribed Fire Complexity Rating System Guide and Go/No-Go Checklist) that should be completed before a prescribed fire can be implemented. The Agency Administrator's Go/No-Go Pre-Ignition Approval evaluates whether compliance requirements, prescribed fire plan elements, and internal and external notifications have been completed and expresses the Agency Administrator's intent to implement the prescribed fire plan. If ignition of the prescribed fire is not initiated prior to expiration date determined by the Agency Administrator, a new approval will be required.

Yes	No	Key Element Questions
		Is the prescribed fire plan up to date? <i>Hints: changes, amendments, seasonality.</i>
		Have all compliance requirements been completed? <i>Hints: cultural, threatened and endangered species, smoke management, NEPA.</i>
		Is risk management in place and the residual risk acceptable? <i>Hints: Prescribed Fire Complexity Rating Guide completed with rational and mitigation measures identified and documented.</i>
		Will all elements of the prescribed fire plan be met? <i>Hints: Preparation work, mitigation, weather, organization, prescription, contingency resources.</i>
		Have all internal and external notifications and media releases been completed?
		Are key agency staff fully briefed and understand prescribed fire implementation?
		Other: _____

Recommended by: _____ Date: _____
FMO/Prescribed Fire Burn Boss

Approved by: _____ Date: _____
Agency Administrator

Approval expires (date): _____

PMS 422 (1/04)

Federal Interagency Wildfire Coordinating Group Fire Reporting Documents...continued

INCIDENT BRIEFING	1. INCIDENT NAME	2. DATE PREPARED	3. TIME PREPARED
4. MAP SKETCH			
ICS 201 (12/93) NFES 1325	PAGE 1	5. PREPARED BY (NAME AND POSITION)	

Enclosure 6. Pollinator Management



ACQUISITION,
TECHNOLOGY
AND LOGISTICS

OFFICE OF THE UNDER SECRETARY OF DEFENSE

**3000 DEFENSE PENTAGON
WASHINGTON, DC 20301-3000**

SEP 05 2014

**MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY
(INSTALLATIONS, ENERGY AND ENVIRONMENT)
ASSISTANT SECRETARY OF THE NAVY
(ENERGY, INSTALLATIONS AND ENVIRONMENT)
ASSISTANT SECRETARY OF THE AIR FORCE
(INSTALLATIONS, ENVIRONMENT AND LOGISTICS)
STAFF DIRECTOR, DEFENSE LOGISTICS AGENCY (DSS-E)**

SUBJECT: Department of Defense (DoD) Policy to Use Pollinator-Friendly Management Prescriptions

This memorandum expands DoD policy to use current best management practices, as appropriate, specifically to protect pollinators (e.g., bees, birds, bats, butterflies, moths) and their habitats, and establishes policy to coordinate with partners on pollinator issues.

In accordance with DoD Instruction 4150.07 "DoD Pest Management Program" (May 2008) and DoD Instruction 4715.03 "Natural Resources Conservation Program" (March 2011), it is DoD policy to, when possible and to the extent practicable, use native landscaping and minimize the use of pesticides, to include herbicides, in sensitive habitats (e.g., in wetlands or where listed species may occur).

Further, it is DoD policy for Military Departments to coordinate, when appropriate and to the extent feasible, with other agencies (e.g., U.S. Fish and Wildlife Service, Bureau of Land Management, and Environmental Protection Agency) and non-governmental organizations (e.g., Bat Conservation International, and Pollinator Partnership) on habitat and pollinator issues. This policy is not intended to, and does not create, expand, or diminish any legally enforceable substantive or procedural responsibilities.

My point of contact is Mr. Peter Boice at 571-372-6905 or l.p.boice.civ@mail.mil.

John Conger
Acting Deputy Under Secretary of Defense
(Installations and Environment)



Pollinator Friendly Pesticide Applicator Best Management Practices

October 2014

Background

Pollinators, such as bees, bats, birds, and butterflies, are essential to the majority of the flowering plants in our environment and to the production of more than 130 different food crops. Pollinators are highly sensitive to many pesticides, especially insecticides. Your help as pest management personnel is critical to the continued safety of our food supply and environment. Proper pesticide use avoids harm to pollinators and their food sources, water, and habitats.

Use an integrated pest management (IPM) approach:

- Monitor and assess pest populations to determine if levels warrant control.
- Select the best combination of pest control options that minimizes risks to pollinators.

Read and Follow the Pesticide Label

On pesticide labels, look under the “Environmental Hazards” and “Directions for Use” headings for important information on protecting pollinators. Some labels warn against use of the product on blooming crops by stating, “Do not apply to blooming crops or weeds if bees are visiting in the treatment area.” Some labels limit at-bloom applications to times when bees are not actively visiting, such as late evening. Apply the product in a manner consistent with the label directions.

Be Alert to Bloom

Presence of bloom is the key factor in pollinator exposure to pesticides. Honey bees and other pollinators are most at risk of poisoning when bee-toxic pesticides are applied to weeds or other vegetation that is blooming. Avoid applying any bee-toxic pesticides on blooming plants that attract bees. Keep pesticide drift from nearby blooming weeds that are attracting bees.



Timing of Pesticide Application

The time of pesticide application is very important. Apply pesticides that are toxic to bees in the evening when most honeybees have stopped foraging and returned to their hives. This allows the maximum time for the pesticide to decompose before the bees come into contact with it the next day.

Avoid Residual Toxicity

Use insecticides with short residuals. Do not apply insecticides having a long residual to blooming crops.

Check the Weather

Environmental conditions affect pesticide persistence. Daytime applications at low temperatures may cause some classes of pesticides to remain toxic much longer than during warm weather. Cloud cover also may prolong toxicity due to lower levels of ultraviolet light which breaks down many pesticides. Do not apply bee-toxic pesticides with extended residual toxicity on nights when dew is forecast. Dew may re-wet pesticides and increase bee exposure. Environmental conditions also affect bee activity. When high daytime temperatures encourage bees to begin foraging earlier or continue later than usual, adjust application times of bee-toxic pesticides accordingly. Experience shows that when bee-toxic pesticides are applied before or during cold nights, followed by warm summer days, the incidence of bee kills greatly increases.

Use Less Hazardous Pesticides

Neonicotinoid pesticides (i.e. pesticides with the active ingredient clothianidin, dinotefuron, imidacloprid, and thiamethoxam) may potentially cause adverse effects to pollinators. The EPA is taking steps to change these pesticide labels so they better protect bees by being clearer and more precise in their directions for pesticide application.

Use of neonicotinoid pesticides should be avoided in areas where pollinators may be present. Also avoid using them on any flowering plants. Use on flowering plants may result in exposure to bees even if applied when the plant is not flowering because they are taken up systemically and have a long residual.

Use the Least Hazardous Pesticide Formulation

Granular formulations are the least hazardous when bees are present because they are the least likely to drift. Dust and microencapsulated formulations are most hazardous to bees because they are similar in size to pollen and tend to stick to bee hairs. Dusts almost always drift more than other formulations. Emulsifiable concentrate formulations are usually less hazardous to bees than wettable powders because the powders remain toxic in the field longer. Spray formulations are usually safer to bees than dusts, but there are differences among spray types. Generally, water soluble formulations are safer than emulsifiable formulations, and fine sprays are less dangerous than coarse sprays. Sprays of undiluted pesticides may be more dangerous than diluted sprays.

Minimize Drift

Honey bees will visit the blooms of crops and/or weeds near target crops and be unintentionally impacted there by drift and pesticide residues. Keep the product on the intended area and apply pesticides with equipment that has been calibrated for the particular application. When appropriate, use ground applications instead of aerial applications to reduce risk of drift out of the target area.

Communicate with Beekeepers

Cooperation and communication among applicators and beekeepers greatly increases the likelihood of success in protecting pollinators and their habitats. Take the initiative to establish good relations and communication with commercial and local beekeepers. Notify beekeepers of future pesticide applications planned in the area so that they may attempt to protect their bees.

Learn about Local Regulations/Programs

Check for specific local ordinances pertaining to pollinators, especially beehive locations or designated preserves (if applicable). Some regions require that commercial beehive operations register the location where hives are being kept. Many states have regulations intended to reduce the hazard of insecticide applications to bees.

References

- The Center for Integrated Pest Management's Pollinator Protection: <http://pesticidestewardship.org/pollinatorprotection/Pages/default.aspx>
- EPA Pollinator Protection: <http://www2.epa.gov/pollinator-protection>



Contact Information

For more information regarding integrated pest management approaches, contact the installation Applied Biology Professional Pest Management Consultant. A list of Applied Biology contacts can be found at <http://www.afpmb.org/content/navfac-applied-biology-center>.



Enclosure 7 Avian Protection Guidance

Projects should reference and implement applicable avian collision with powerline reduction/avoidance guidelines/procedures. These documents can be obtained from the following websites:

<<http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/guidance-documents.php>>;

<<http://www.aplic.org/>; and

<<http://www.dodpif.org/plans/app.php>>.

Projects should also reference the REDUCING BIRD COLLISIONS WITH BUILDINGS AND BUILDING GLASS BEST PRACTICES document from USFWS (located in INRMP Appendix J, Enclosure 7).



Photo by crocsid / Wikimedia CC:BY

REDUCING BIRD COLLISIONS WITH BUILDINGS AND BUILDING GLASS BEST PRACTICES

US FISH AND WILDLIFE SERVICE
DIVISION OF MIGRATORY BIRD MANAGEMENT
FALLS CHURCH, VIRGINIA

JANUARY 2016

**A Special Thanks to
Our Contributors!**

U.S. Fish & Wildlife Service would like to extend a special note of appreciation to the number of highly knowledgeable experts and authorities on bird interactions with building, glass and lighting infrastructure that contributed to the content and review of this document. This product is a true representation of the power of partnerships and coordination across agencies and institutions. This document will continue to be updated with the best available information, and our partnerships with experts in the field will be critical in making that happen. Thanks to all of you for the important work you do for bird conservation!

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OVERVIEW

The U.S. Fish and Wildlife Service (Service) has responsibility to protect and conserve migratory birds as part of four international treaties (Mexico, Japan, Canada, and Russia) and the Migratory Bird Treaty Act. As part of this mission, the Service is working to address human-caused sources of mortality by developing and providing information on options for reducing hazards to migratory birds. Bird collisions associated with building glass and building lighting are hazards where a variety of potential avoidance and minimization options exist. This document is intended to provide straight-forward options for reducing bird collisions with buildings by offering recommendations for simple, no cost building occupant best practices; low cost avoidance and minimization actions; and strategies for new buildings, building renovations, and building retro-fits.

THE ISSUE

Birds generally do not see clear or reflective glass (Klem and Saenger 2013). Glass reflectivity and transparency create a lethal illusion of clear airspace that birds do not see as a barrier. During the daytime, birds collide with windows because they see reflections of the landscape in the glass (e.g., clouds, sky, vegetation, or the ground); or they see through glass to perceived habitat (including potted plants or vegetation inside buildings) or to the sky on the other side. At night, during spring and fall bird migrations when inclement weather occurs, birds can be attracted to lighted structures resulting in collisions, entrapment, excess energy expenditure, and exhaustion (Manville 2009). This phenomenon has resulted in a number of concentrated avian mortality events. These mass events are less common at city, office or residential buildings, but still a possibility under the right weather and lighting conditions. The majority of collisions with both residential and urban buildings happen during the day, as birds fly around looking for food. Large avian mortalities at night more frequently occur at communication towers, offshore drilling platforms and in other situations where there is a bright light source in a dark area, especially during inclement weather.

Annual bird mortality resulting from window collisions in the U.S. is estimated to be between 365-988 million birds (Loss et al. 2014). While most people consider bird/glass collisions an urban phenomenon involving tall, mirrored-glass skyscrapers, the reality is that 56% of collision mortality occurs at low-rise (i.e., one to three story) buildings, 44% at urban and rural residences, and <1% at high-rises (Loss et al. 2014).

In an effort to reduce bird collisions with building glass, the Service's Division of Migratory Bird Management has compiled the following list of best practices and best available technologies. These best practices are grouped into measures that can be implemented at residences and office buildings, and provides options for both new buildings, and for existing building renovations and retro-fits. Many of these measures not only provide protection to birds, but also provide energy and cost savings to building owners.

THE AVOIDANCE/MINIMIZATION OPTIONS

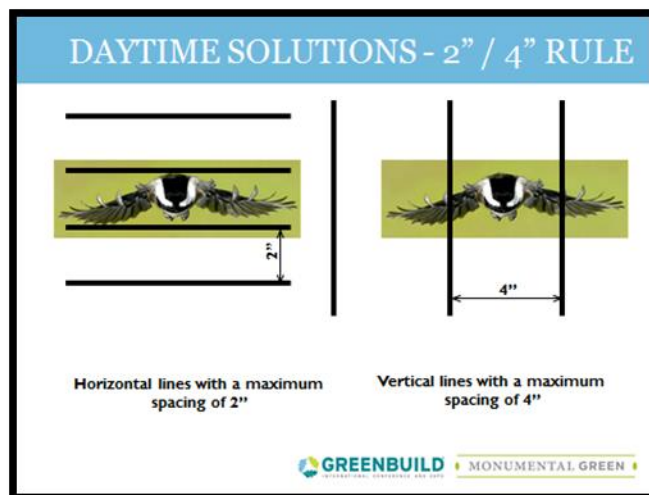
The Service recommends the following options to avoid and minimize bird/glass collisions. Any mention of trade names or commercial products in this document or the documents or websites referenced within does not constitute endorsement or recommendation by the Federal government. Readers should be aware that each product has benefits and limitations. Users of these products should work with technical experts to determine which specific product may work best for a particular application.

GLASS OPTIONS

There are a variety of glass and window design options that can be integrated into building designs to reduce mortality from bird collisions. The goal of these glass options is to create a visual signal or cue to help birds detect and avoid glass. To make an effective virtual cue, all window treatment should be applied to at least the first two to three stories or the height of the adjacent vegetation. However, applying treatments to just the first story windows or known problem windows can be helpful as well.

Create Your Own Pattern

The key to creating bird-friendly glass is to increase visual noise on the surface of the glass. Visual noise is a visible pattern that breaks up transparent or reflective areas of glass enough that birds perceive they cannot fit through the transparent or reflective areas. There is still research needed to determine the most effective dimensions of various visual patterns on glass for bird strike prevention. However, in general, vertical stripes that are at least 1/4 inch wide with a maximum spacing of 4 inches, and horizontal stripes that are at least 1/4 inch wide with a maximum spacing of 2 inches have been effective at preventing strikes of most birds (Sheppard 2011; Klem 2009). Because hummingbirds are so much smaller than other birds, closer spacing of the elements of any pattern (striped or otherwise) will be necessary. Also, when using patterns other than stripes, closer spacing of elements is recommended because a series of smaller images like dots will not break up the glass as much as stripes using the 2" X 4" spacing rules.



The image shows how pattern spacing on glass can work to deter birds. Images by ABC and Roy Hancliff

Pattern color contrast is important as well. Use colors that contrast well against the background or reflections (e.g., white stripes may be more effective than black stripes if there is a consistent reflection of dark color on the glass surface). The image to the right depicts the importance of the contrast between the color of the window pattern and the background. Notice that the white stripes are significantly more visible than the black stripes with the dark reflections on this window.



Applying a product to the outer surface (surface #1) of the glass is always most effective. Applying a product to surface #2 or #3 (inner surfaces) can be effective if surface #1 is not so reflective that the pattern beneath is not visible to birds(see Fig. 1).

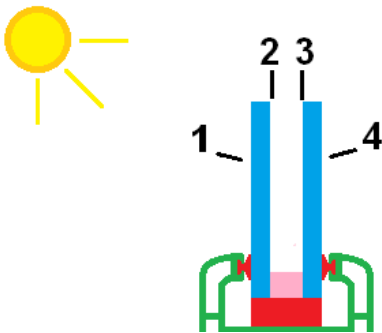


Image by NcLean/CC BY

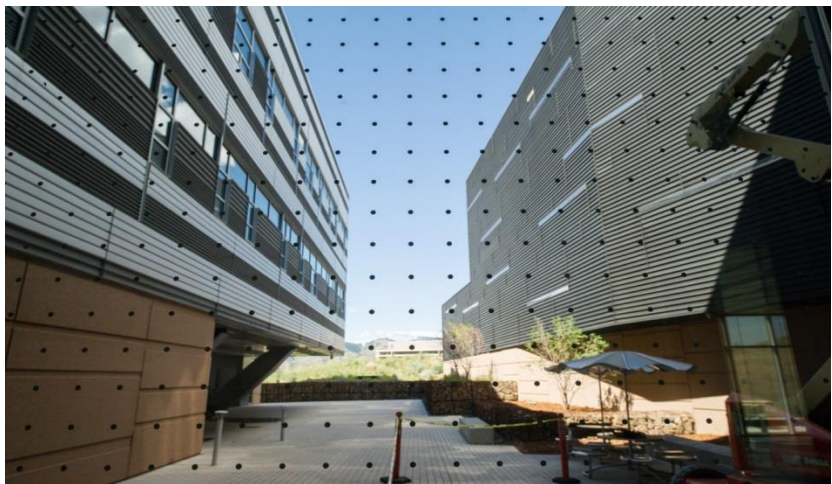
Fig 1: Window Surface Diagram – Depicts surface #1 (outside facing pane), surface #2 (inside of outside facing pane), surface #3 (inside of inside facing pane and) and surface #4 (inside facing pane).

This image shows an example of a striped glass pattern that can be effective for preventing strikes of most birds (smaller spacing may be needed for hummingbirds). This particular pattern has been applied to the exterior surface (surface #1) of the window.



Striped glass pattern. Photo by Christine Sheppard, ABC

This image shows an example of non-striped pattern that can be effective for preventing strikes of most birds (smaller spacing may be needed for hummingbirds). This pattern has also been applied to the exterior surface (surface #1) of the window.



Dot pattern applied to the exterior of a National Renewable Energy Laboratory (NREL) building to help prevent bird collisions. Dots are approximately 1/2" in diameter spaced 2" vertically and horizontally. Photo by Dennis Schroeder, NREL 31193

There are several ways you can create your own patterns on glass. To see recommendations for creating your own patterns on glass, visit the ***Solutions and Materials*** section of the [Bird-Safe Glass Foundation resources webpage](http://www.birdsafeglassfoundation.org/contact-us/resources/) (<http://www.birdsafeglassfoundation.org/contact-us/resources/>).

Install a Special Film, Glass or Covering

External Films and Coverings

There are several effective external film and glass covering options. Some options are more expensive, but are highly effective. Films are good for retrofit applications. A drawback, however, is that they only have a guarantee lifetime of 5 to 7 years, although they may last longer. To see a list of the latest recommendations in external films and covering products, visit the ***Solutions and Materials*** section of the [Bird-Safe Glass Foundation resources webpage](http://www.birdsafeglassfoundation.org/contact-us/resources/) (<http://www.birdsafeglassfoundation.org/contact-us/resources/>).



A bird friendly film was applied at the entrance of the Ding Darling Education Center at the J. N. "Ding" Darling National Wildlife Refuge. Photo shows entrance before (left) and after (right) application. Photos by USFWS

Fritted Glass

Fritting is the use of ceramic lines, dots or patterns that are most often placed on the #1 surface (outside-facing pane) or #2 or #3 (interior panes) (see [Fig. 1](#)) of insulated glass. Fritting is a commonly used measure, but is more expensive than other types of window coverings. This technique allows humans to see through the glass while reducing the transparency of the glass. It also provides energy savings by reducing heat gain, while still allowing day-lighting of buildings (Sheppard 2011). To see a list of the latest recommendations in fritted glass products, visit the ***Solutions and Materials*** section of the [Bird-Safe Glass Foundation resources webpage](http://www.birdsafeglassfoundation.org/contact-us/resources/)



Fritted glass on window. Photo by Christine Sheppard, ABC

(<http://www.birdsafeglassfoundation.org/contact-us/resources/>).

Ultraviolet Patterned Glass

Birds see in the ultraviolet (UV) spectrum so using glass that reflects UV light in a pattern can reduce bird collisions. While this glass is typically more expensive than other treatments, it is comparable in price to other energy-efficient glass (Eisenberg 2010). As of 2015, few UV patterned products are available. However, this option may be desired when seeking a product that is generally not visible to humans, but provides some benefit to birds. To see a list of the latest recommendations in ultraviolet patterned glass products, visit the ***Solutions and Materials*** section of the [Bird-Safe Glass Foundation resources webpage](http://www.birdsafeglassfoundation.org/contact-us/resources/) (<http://www.birdsafeglassfoundation.org/contact-us/resources/>).

Screens and Netting

Installing external screens or netting on windows is an effective and relatively inexpensive treatment. Screens reduce reflection and injury by providing a cushion between the bird and the window. This treatment can be installed on individual panes or attached to a façade. To be effective, the netting must be placed far enough in front of the window that a bird hitting it will not collide into the glass behind. The netting should have openings no larger than ½ inch. Several companies sell screens or other barriers that can be attached with suction cups or eye hooks. These treatments can be used on new construction, renovations, and retro-fits. To see a list of the latest recommendations in screen and netting products, visit the ***Solutions and Materials*** section of the [Bird-Safe Glass Foundation resources webpage](http://www.birdsafeglassfoundation.org/contact-us/resources/) (<http://www.birdsafeglassfoundation.org/contact-us/resources/>).



Basic home window screen. Photo by Christine Sheppard, ABC



Window netting installed feet from window on slanted wooden beams. Photo by USFWS

Architectural Features

Building designers can use features such as overhangs, shutters, louvers, mesh and awnings to reduce glass reflections or reduce visibility into transparent areas.



Shading was applied around the windows on the exterior of the Research Support Facility (RSF) at the National Renewable Energy Laboratory (NREL) to reduce glare and overheating of the building interior. These windows are also bird friendly. Photo by Dennis Schroeder, NREL 19798



Shutters overhang windows at a facility at the San Diego Zoo. Photo by Christine Sheppard, ABC

LIGHTING OPTIONS

Eliminating or reducing unnecessary lighting is one of the easiest ways to reduce collisions while also saving energy and reducing costs to building owners. Note that these measures will not eliminate collisions, and their effectiveness is highly dependent on local conditions, including the degree of bird friendly design and practices of neighboring buildings.



Lighting Design

- a. Avoid unnecessary lighting, including perimeter lighting.
- b. Install motion sensors on all lights (both interior and exterior) that activate only when people are present. Motion sensors are fairly inexpensive and save energy. This is especially important during the bird migration periods (early April through late May and mid-August through early November), and periods of inclement weather.
- c. Ensure all exterior lighting is “fully shielded” so that light is prevented from being directed skyward. “Fully shielded” light fixtures are defined as those with an opaque shield so that all light is emitted below the lowest light emitting part of the fixture. “Fully shielded” is the same as “zero up light” and “dark sky compliant”. See [Appendix A](#) for examples of acceptable fixtures.
- d. Comply with all Federal Aviation Administration obstruction and marking guidelines by ensuring that required obstruction lighting is comprised of only L-864 strobe lights with appropriate flash rates and extinguish all steady burning L-810 lights ([FAA 2007](#), Patterson 2012).

Lighting Operation

- a. Ensure that any lights that are not motion-activated are turned off at night; especially architectural lighting, upper story interior lighting, and lobby or atrium lighting.
- b. Eliminate the use of decorative/vanity lighting during the bird migration periods (early-April through late May and mid-August through early November). This includes upward directed spot- and flood-lights, and roof-top lighting.
- c. “Lights Out” programs exist throughout major cities across the country to encourage buildings to reduce light pollution during migration. For more information visit Audubon’s [Existing Lights Outs Programs](#) webpage (<https://www.audubon.org/conservation/existing-lights-out-programs>).
- d. Install window coverings to prevent light spill.

LANDSCAPING OPTIONS

Exterior

- Where habitat is adjacent to, seen through or reflected in any glass structures (e.g., windows, bus shelters, guard rails, glass walls, etc.), treat the glass using one of the [Glass Options](#) listed above. Avoid creating an effect where landscaping funnels birds towards glass panes (e.g., walkways, passageways, edges) or where approaches to a building (vehicles or people) flush birds towards windows.



An example of where trees and shrubs are reflected in the glass and create a type of funnel effect near the entrance of a building. Photo by USFWS

- Avoid using glass in supplemental structures (e.g., bus shelters, guard rails, glass walls, etc.). When it is not possible to avoid using glass for these structures, use only highly effective [Glass Options](#) to treat these structures (see the Birdsafe Glass Foundation website's (<http://www.birdsafeglassfoundation.org/contact-us/resources/>) list of tested materials for information on product effectiveness).

Interior

- If you have indoor plants, trees or shrubs, either treat the adjacent glass or move all plants away from clear glass windows far enough that they can't be seen from the outside by birds. If you were at window level looking in, could you see the plant? If the answer is "yes", then birds can probably see it too.



An example of where a potential bird hazard has been created by placing plants inside of a building near the window. Photo by USFWS

IMPLEMENTATION

Measures for a Residence

Assess your home's risk for bird collisions

Not all windows are equally hazardous. The most hazardous windows are likely those that are most reflective of bird habitat (e.g., trees, shrubs, flowers, sky), and closest to areas where you see birds when they are active.

Professional assistance is available to assess your home's risk for bird impacts, and to identify specific problem areas and apply avoidance/minimization measures. However, these services are likely at a cost to the homeowner. One example of this type of service is the Fatal Light Awareness Program (FLAP), which offers a risk assessment service for this purpose. To learn more about this service, visit the [FLAP BirdSafe Building Risk Assessment website \(http://www.flap.org/bird-safe-consulting.php\)](http://www.flap.org/bird-safe-consulting.php) and contact their assessment team to see if a local assessment can be arranged. You can also pinpoint problem areas by conducting regular monitoring around your home for dead or injured birds, or noting where you observe collisions.

You can also do your own assessment by conducting regular monitoring around your home, especially in areas that are potentially problematic. Monitoring can identify problem areas and tell you how frequent collisions occur. Monitoring is recommended even after collision prevention measures have been applied to ensure treatments are working. To monitor around your house, follow these basic steps in the early morning (around 8am or before) at least a few times a week and daily, if possible, during bird migration periods (early April through late May and mid-August through early November):

1. Walk around your house looking at the ground below windows for dead birds;
2. Inspect each window for feather spots or bird imprints; inspect windows daily when bird feeders are in use;
3. If you find a dead or injured bird, per 50CFR 21.31(a), you may pick it up only if you intent to take it immediately to a rehabilitator. If you do not intend to take the bird to a rehabilitator, you should not attempt to handle the bird, unless you are permitted to do so. If the bird is still alive and you would like to try to help it and/or you need to move the bird, locate a licensed wildlife rehabilitator where you can take the bird, or contact a wildlife official or agency or local licensed wildlife pest control company that is permitted for the possession, handling, transport, and disposal of migratory birds.
4. If helpful, maintain a personal log of information about any dead or injured birds you find during your searches including the species and locations where the birds were found. Logs can be useful for helping you remember where collisions occur and revealing recurring problem areas over time.

Basic guidance for monitoring can be found in the **Monitoring** section of the [Bird Safe Glass Foundation resources webpage](http://www.birdsafeglassfoundation.org/contact-us/resources/) (http://www.birdsafeglassfoundation.org/contact-us/resources/).

Implement Measures

After you have identified which windows may be causing bird collisions, you should follow the steps below to reduce the risk of collision.

1. Ensure proper operation of window covers

Proper operation of window covers can help reduce bird collisions, but should be paired with a window treatment using one of the [Glass Options](#) listed above for optimal results.

- **If you have blinds**, keep them partially opened during the daytime when birds are concentrated, especially during bird migration periods (early April through late May and mid-August through early November), and closed completely at night. A partially open blind during the day will appear as a striped pattern that can break up reflections.
- If, during the day, you notice birds are still colliding, it may mean a reflection is still occurring, and you should consider an exterior window treatment.
- **If you have shades**, apply a pattern to the shade on the window side and keep them closed as much as possible during the day, particularly when the room is not in use. Use strong contrasting colors in the design so the bird can see it through the window and any reflection. At night, close them completely to keep the escape of indoor lighting to a minimum.



[Photo](#) by Elf/ [WC PD](#)

2. Apply a window treatment

Exterior treatments applied on the outside of see-through windows and reflective glass is the most effective action to prevent bird-glass collisions. However, applying treatments on the inside can also be helpful. If you can see the markings from the outside of the window from window level, birds probably can too. Check this several times during the day, as reflections may only occur during certain light conditions. See options under [Glass Options](#) for a list of window treatment options for existing structures.

3. Distance bird feeders appropriately

Once you have treated your glass, be sure to place your bird feeder 3-feet or less from your windows; the closer, the better. If your feeders cannot be placed within 3 feet of a window, they should be placed at least 30 feet away.

4. Reduce light trespass

You can reduce light trespass into the environment with appropriate lighting structures and operation (refer to items under [Lighting Options](#)).

5. Follow landscaping best practices

Following landscaping best practices will ensure a hazardous condition is not created (refer to items under [Landscaping Options](#)).

Measures for Commercial and Institutional Buildings

Avoiding or reducing bird collisions with windows for commercial and institutional buildings can be challenging. First, office buildings have a wide range of architectural styles, floor levels, size, type and configuration of windows. All of these factors influence the risk of bird collisions. Second, occupants of commercial and institutional buildings may not own the building, making actions to reduce collisions more difficult. However, whether you own the building or are simply a building occupant, there are a number of measures you can take to make your building more bird friendly.

The following measures will help reduce bird attraction to your building, and many of them will save in overall building maintenance and energy costs.

Assess your building's risk for bird collisions

Professional assessments are available to assess your building's risk for bird impacts and for identifying specific problem areas (note: this is likely at a cost). The Fatal Light Awareness Program (FLAP) offers a risk assessment service for this purpose. To learn more about this service, visit the [FLAP BirdSafe Building Risk Assessment website \(http://www.flap.org/bird-safe-consulting.php\)](http://www.flap.org/bird-safe-consulting.php) and contact their assessment team to see if a local assessment can be arranged. There are also several ways to conduct your own assessment to identify potential problem areas. Not all windows are equally hazardous. Check to see which of your windows are most reflective of bird habitat (e.g., trees, shrubs, flowers, sky), and closest to areas where you see birds when they are active. You can also use direct observations of collisions (e.g., dead birds, feather prints on windows, etc.) to pinpoint problem areas.

An effective and recommended way to identify and verify problem areas is by monitoring regularly around your building for dead or injured birds, especially in areas that are potentially problematic. Monitoring can help you track and confirm where regular collisions are occurring and help you influence changes in these areas (e.g., moving plants away from windows) or open a dialogue with building management for where collision prevention measures may be necessary. Monitoring is recommended even after collision prevention measures are applied to ensure treatments are working properly. When establishing your monitoring program, follow these basic steps:

- Consider establishing a standardized monitoring plan that all employees helping with the monitoring effort can follow. Assign people to certain days and times, and map out the route to follow. It is suggested monitoring be done at least once in the early morning (around 8am or before) a few times a week and daily, if possible, during bird migration periods (early April through late May and mid-August through early November).
- Collect information about any dead or injured birds that employees report or find during building searches in a personal log. Logs can be useful for revealing recurring problem areas over time, and can help communicate and support why and where avoidance and minimization measures may be necessary to those who will need to assist in implementing these measures (e.g. building managers, building tenants).

- If you find a dead or injured bird, per 50CFR 21.31(a), you may pick it up only if you intent to take it immediately to a rehabilitator. If you do not intent to take the bird to a rehabilitator, you should not attempt to handle the bird, unless you are permitted to do s. If the bird is still alive and you would like to try to help it and/or you need to move the bird, locate a licensed wildlife rehabilitator where you can take the bird, or contact a wildlife official or agency or local licensed wildlife pest control company that is permitted for the possession, handling, transport, and disposal of migratory birds.

Basic guidance for monitoring, including suggested fields to be included in a tracking spreadsheet can be found in the **Monitoring** section of the [Bird Safe Glass Foundation resources webpage](http://www.birdsafeglassfoundation.org/contact-us/resources/) (<http://www.birdsafeglassfoundation.org/contact-us/resources/>).

Implement Measures

After you have identified which windows may be causing bird collisions, you should follow the steps below to reduce the risk of collision.

Use Window Covers (Blinds and Shades)

Window covers should be paired with a window treatment using one of the [Glass Options](#) listed above for optimal results in helping reduce bird collisions.

- **If you have blinds**, keep them partially opened during the daytime when birds are concentrated, especially during bird migration periods (early April through late May and mid-August through early November), and close them completely at night. A partially open blind during the day will appear as a striped pattern that can break up reflections. If, during the day you notice birds are still colliding, it may mean reflection is still occurring, and you should consider an outside window treatment.
- **If you have shades (and it is OK with building management to do so)**, apply a pattern to the shade on the window side and keep them closed as much as possible during the day, particularly when the room is not in use. Use strong contrasting colors in the design so the bird can see it through the window and any reflection. At night, close them completely to keep the escape of indoor lighting to a minimum.

Avoid or Minimize Evening Lighting

- **Building Occupants** – If the lights are on when you are leaving for the evening, turn the lights off, especially in windowed offices, and encourage others to do the same.
- **Building Owners** – Conduct building cleaning during the daytime. This will reduce bird incidents at night and provide energy and cost savings. Daytime cleaning may also result in salary savings by eliminating nighttime overtime cleaning costs.

Avoid or Minimize Interior Landscaping

If you have indoor plants, trees and shrubs, move them away from clear glass windows far enough that they can't be seen from outside by birds. If you can see the plant standing at window level and looking in, then birds can probably see it too.

Apply a Window Treatment or Barrier

If you are a building occupant, this is something you will likely have to work with building management to approve and implement since it requires modification of the building windows. However, if it is an option, exterior treatments applied on the outside of see-through windows and reflective glass is the most effective action to prevent bird-glass collisions. If exterior treatments are not an option, applying treatments on the inside can also be helpful. If you can see the markings from the outside of the window at window level, birds probably can too. Check this several times during the day, as reflections may only occur during certain light conditions See items under **Glass Options** for a list of window treatment options for existing structures.

Educate Others

Take steps to educate building owners and occupants about the risk of bird collisions and the simple steps that can be taken to reduce collisions such as turning off lights and closing window coverings at night.

Measures for New Buildings, Building Renovations and Retro-fits

Building Design

- Follow the [LEED Pilot Credit 55: Bird Collision Deterrence](http://www.usgbc.org/Docs/Archive/General/Docs10402.pdf) recommendations for new construction (<http://www.usgbc.org/Docs/Archive/General/Docs10402.pdf>).
- Minimize the number of, or co-locate roof-top antennas. Make all antennas free standing (i.e., no guy wires).
- Use [architectural features](#) to reduce the amount, reflectivity, and transparency of glass.
- If clear glass corridors, skyways, walkways, or courtyards are proposed it is imperative to use bird collision mitigation measures.

Glass Design/Pattern

- Avoid over-use of glass: keep the percentage of total glass below American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) standard of 40% of surface area ([ANSI/ASHRAE/IES Standard 90.1 2013](#)).
- Use smaller pane sizes – less than 2.5 square meters - when possible.
- Do not use reflective glass. Use opaque, etched, or patterned glass that meets the suggested [pattern dimensions](#), or has a Materials Threat Score of less than 30 (see [LEED Pilot Credit 55: Bird Collision Deterrence](#); U.S. Green Building Council 2011). Refer to items 1-6 under [Glass Options](#) for glass and window design and treatment recommendations.

Lighting

- Refer to items under [Lighting Options](#) for best practice recommendations for lighting design and operation.

Landscaping

- Refer to items under [Landscaping Options](#) for landscaping best practices.

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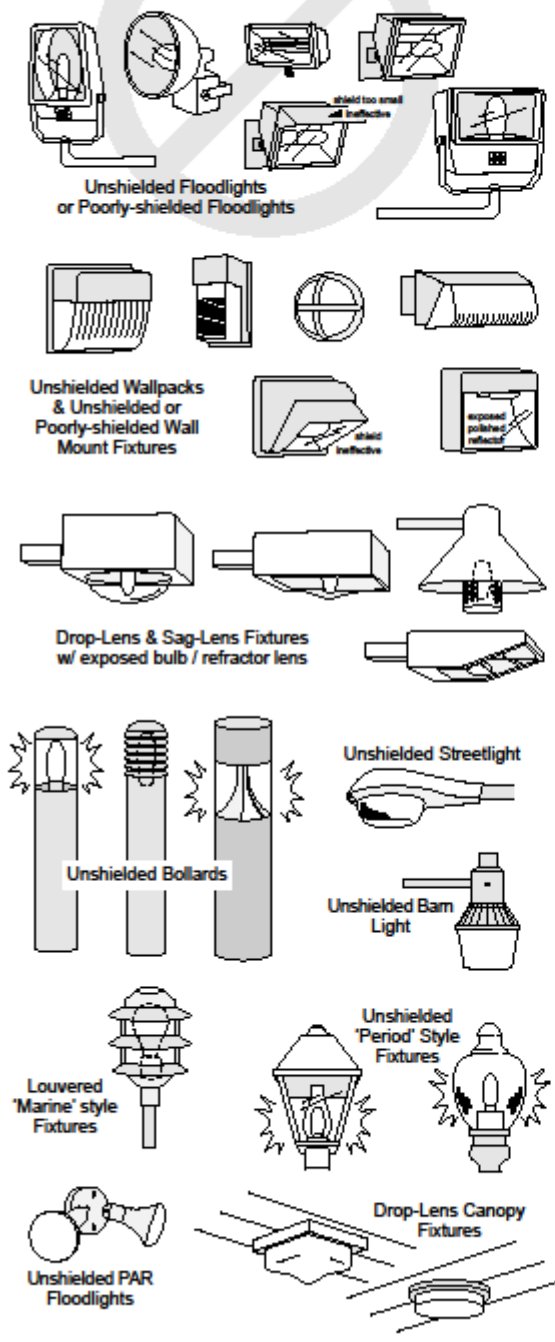
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APPENDIX A. Examples of lighting fixtures.

Examples of Acceptable / Unacceptable Lighting Fixtures

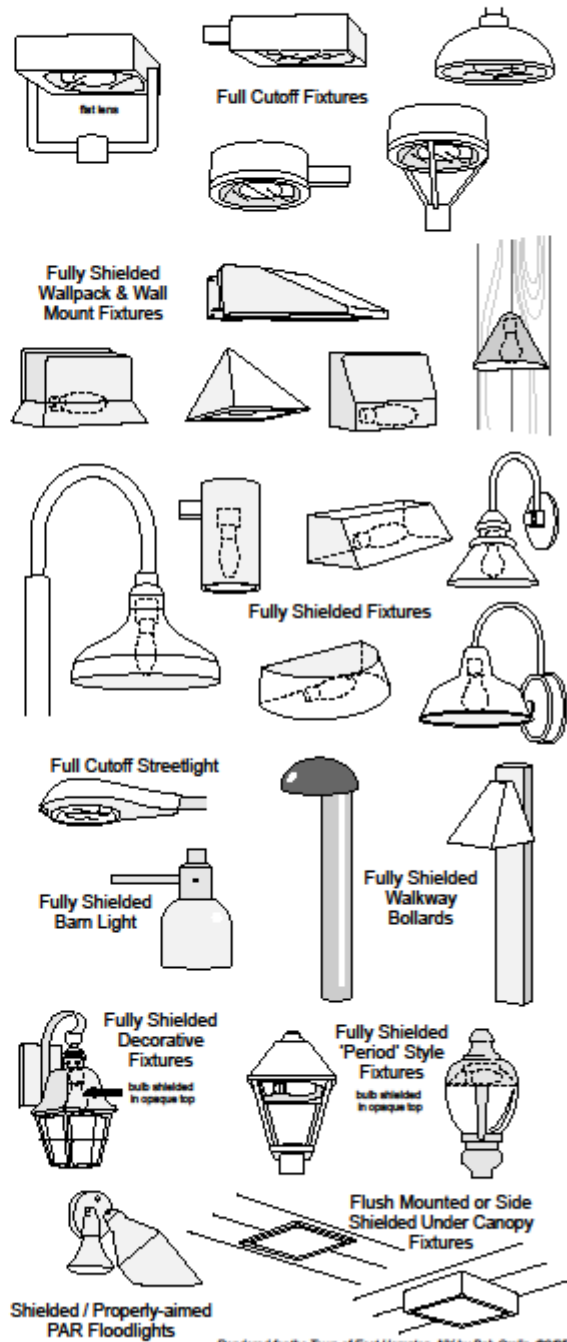
Unacceptable / Discouraged

Fixtures that produce glare and light trespass



Acceptable

Fixtures that shield the light source to minimize glare and light trespass and to facilitate better vision at night





Appendix K

Educational Outreach

- Enclosure 1 Hazards/Safety: Black Bear**
- Enclosure 2 Hazards/Safety: Diseases**
- Enclosure 3 Cat Control**
- Enclosure 4 Commander, Navy Region Mid-Atlantic (CNRMA) Environmental Management System**
- Enclosure 5 NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and Naval Security Activity Hampton Roads Northwest Annex Hunting, Fishing, and Archery Range**
- Enclosure 6 Venomous Snakes of Naval Facilities in Southeastern Virginia**
- Enclosure 7 Compliance: Wildlife**
- Enclosure 8 Navy Region Mid-Atlantic Beach and Dune Protection**
- Enclosure 9 Noxious and Invasive Weeds Prevention During Construction Activities**
- Enclosure 10 Zoonotic Disease: When Humans Animals Intersect**
- Enclosure 11 Commanding Officer's Environmental Policy**

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Enclosure 1. Hazards/Safety: Black Bear

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Hazards/Safety: Black Bear



- **Avoid Contact**
- **Don't get between an adult and their cub (see a cub look for an adult)**
- **Don't turn your back on the animal**
- **Don't run, back away slowly**
- **Make yourself look big (open wide arms)**
- **Speak in a loud, authoritative voice (not a scared voice)**
- **If attacked, fight back (most black bear will back down to resistance)**



Enclosure 2. Hazards/Safety: Diseases

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Hazards/Safety: Diseases

- Lyme's Disease
- West Nile Virus
- Equine Encephalitis
- Rabies
- Distemper



Protect yourself from mosquito-borne illnesses: When working or playing outdoors, utilize Mosquito repellents; Cover as much of your body as possible with clothing; Reduce the amount of standing water that may be supporting breeding populations of mosquitoes.

Protect yourself from tick-borne illnesses: When working or playing outdoors, utilize Tick repellents (spray all clothing, including hats); Cover as much of your body as possible with clothing; Tuck your pant legs into your boots and Tuck your shirt into your pants; Utilize duct tape around your pant bottoms and boots, your waist line, and your shirt sleeve arm openings (to seal potential openings for ticks to get to our skin); Wear a hat and tuck your hair into the hat.

Protect yourself from Rabies and other diseases by avoiding contact with wildlife. Admire from afar, do not try to pick up, touch, or come in contact with any animals (wild or domesticated).

Enclosure 3. Cat Control

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Military bases often struggle with how to manage domestic cat populations. Frequent transfers of personnel often means cats are left behind, abandoned to fend for themselves. Lucky cats find a new human, but most are not so fortunate. Abandoned cats face many dangers: being hit by cars, starving, freezing temperatures, disease, and more. If not spayed or neutered, cat populations can explode.

Free-roaming cats kill native wildlife, including many rare and endangered species, and can also threaten the health and safety of military personnel and their children. Base commanders must deal with how to humanely and cost-effectively resolve the issue of too many free-roaming cats. *As a cat owner, you are an important part of the solution.*



Photo: Dr. Gill Ewing

Cat killing a Yellow-rumped Warbler at a bird bath.

The Skinny on Cats

Domesticated in Egypt over 4,000 years ago, house cats are descendants of the European and African wild cat. Now considered a separate species, *Felis catus* was introduced all over the rest of the world by European explorers and settlers. Recent estimates place the U.S. pet cat population at 90 million. No one knows how many stray or feral cats are out there—best estimates range from 60 to 100 million.




-  **Stray cats are lost or abandoned by their owners.**
-  **Truly feral cats live entirely on their own without any human assistance.**
-  **A female cat can have two to three litters per year, with four to eight kittens per litter.**



Photo: Microsoft

Cats kill small animals such as chipmunks.

Keeping Cats Indoors Is Good For People

Stray cats often congregate around a food source such as garbage dumps and mess halls, or where people leave food out for them. They can be a nuisance around base housing, where people may feed birds, tend flower gardens, or have children's sand boxes.

Outdoor cats are exposed to many diseases and parasites, some of which can be transmitted to people:

Rabies, a deadly virus, can infect cats, wildlife, and humans. Outdoor cats are more likely to contract rabies than any other domestic animal.

Cat-scratch Disease: is transmitted from cat to cat by fleas, and from cat to human by a scratch or bite. While cats show no symptoms of the disease, it can cause severe illness in people.

Toxoplasmosis is caused by a tiny parasite found in the intestines of cats and in the tissues of many animals. People can contract this disease by not washing their hands after coming into contact with cat litter or soil contaminated with cat feces. If contracted by a pregnant woman, abortion of the fetus or blindness or retardation in the newborn can result.

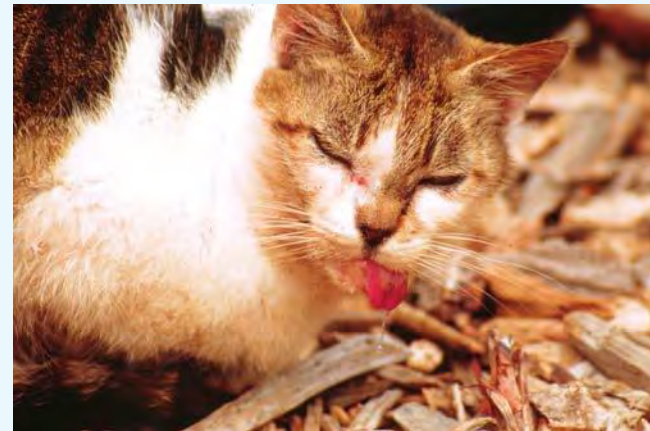


Photo: Alan Hopkins

Cats are not wildlife and struggle to survive outdoors.

Cats can also transmit **fleas**, **roundworm**, and **hookworm** to humans. In the southwest, cases of the most lethal form of **plague** in humans have been linked to outdoor cats.

Keeping Cats Indoors Is Good For Cats

Many people don't realize the daily hazards that outdoor cats face. The average life expectancy of a free-roaming cat is less than five years, while indoor cats commonly live to 12 - 20 years. Cats who roam are in constant danger from:

Cars: Millions of cats are run over by cars annually. In colder climates, cats may crawl into car engines to get warm and are killed or maimed when the car is started.

Injuries: Abscesses, broken limbs, disease, torn ears, scratched eyes, internal injuries, parasites, and death can result from encounters with dogs, other cats, coyotes, raccoons, foxes, hawks, and owls.

Overpopulation: Cats who have not been spayed or neutered are the greatest cause of cat overpopulation. As a result, millions of cats must be euthanized each year because there are not enough homes for them.

Poisons and Traps: Pesticides, rodenticides, and antifreeze poison and kill thousands of outdoor cats yearly. Cats may be caught in traps set for furbearing animals.

Parasites: Outdoor cats suffer from debilitating parasites such as ear mites, fleas, ticks, and worms.

Inclement Weather: Outside cats suffer from extreme weather conditions and natural disasters, such as hurricanes, floods, fires, and tornadoes.

Disease: In addition to rabies, outdoor cats risk exposure to fatal diseases such as feline leukemia and feline immunodeficiency virus (FIV). While vaccines are available for some diseases, they are not 100 percent effective. A vaccine for FIV is not available.

Human Cruelty: Unfortunately, it is not uncommon for animal shelters and veterinarians to have to treat cats who have been shot, stabbed, or set on fire.

Keeping Cats Indoors Is Good For Birds

Isn't it natural for cats to kill birds?

No! Cats are not native to North America or many other parts of the world. Our wildlife did not evolve with this abundant and efficient predator, and thus have few defenses against them. Millions of animals may be killed each year by outdoor, pet cats in the U.S. Stray and feral cats add to the toll.

The Truth About Cats and Wildlife

- 🐾 **Even well-fed cats kill wildlife.** This is because cats are born predators and the urges to hunt and eat are controlled by different parts of their brain.
- 🐾 **Belled cats kill wildlife.** Cats quickly learn to silently stalk their prey. Wild animals don't necessarily know a ringing bell means danger.



Photo: Michael Stubbfield

Cats kill rare species such as this Piping Plover chick.

- 🐾 Once caught by a cat, few small animals survive the ordeal. Even if the animal escapes, infection from a cat's teeth or claws, or internal injury usually result in death.

Tips for Happy Indoor Cats

Kittens who are kept indoors from the start usually show no desire to go outside as adults. With patience and time, most outdoor cats can become happy indoor pets. The following tips will help:



Photo: Dr. Jeff Price

An indoor cat is a safe and happy cat.

- 🐾 Play with your cat for at least 15 minutes each day.
- 🐾 Paper bags and cardboard boxes provide places to play when they are alone.
- 🐾 Provide window shelves and bird feeders to keep your indoor cat entertained.
- 🐾 Give your cat a nutritious diet, including constant access to clean water.
- 🐾 If your cat must go outside, train him to wear a harness and leash or provide a safe outside enclosure such as a screened porch or cat run.
- 🐾 Plant kitty grass in indoor pots so your cat can safely graze.
- 🐾 Keep the litter box clean.

Indoor Cats Can Slip Out, So Remember To:

- 🐾 Spay or neuter your kitten as early as eight weeks old, *before* it can breed. Your cat will be healthier and won't contribute to the overpopulation problem.
- 🐾 Attach an ID tag to your pet's collar or get a microchip implanted containing your contact information.
- 🐾 Provide routine veterinary care, including an annual check up and vaccinations.

Cat ownership is a responsibility, so please do your part.

For the Sake of Cats, Wildlife and People:

- 🐾 *Never* abandon cats. If you are transferred and can't take your cat with you, find a good home or contact a veterinarian or local humane society for help.
- 🐾 Do not feed stray cats—this only increases the cat overpopulation problem. Take them to a local shelter or call your base animal control officer for help.

For more information: contact your base veterinarian, local humane society, or www.denix.osd.mil/DoDPIF.



Don't Let Your Cat Go AWOL!



Indoor Cats Are Safe Cats

**Enclosure 4. Commander, Navy Region Mid-Atlantic (CNRMA) Environmental
Management System**

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CNRMA's Environmental Policy Statement is the foundation of the EMS and reflects CNRMA's commitment to integrate mission accomplishment with environmental stewardship.

CNRMA's policy is communicated through the acronym, "CARE", which summarizes the key concepts:

- C – Comply with all rules
- A – Always improve
- R – Reduce waste
- E – Eliminate pollution



CNRMA EMS facilities include:

- NAVSTA Norfolk
- NSA Norfolk
- NAS Oceana
- NAVPHIBASE Little Creek
- WPNSTA Yorktown
- NAVSUBASE New London
- NAVSTA Newport
- NAS Brunswick
- NAES Lakehurst
- NWS Earle
- NCTAMS LANT DET Cutler
- NAS JRB Willow Grove
- NSA Mechanicsburg
- NSA Philadelphia
- Philadelphia Naval Business Center
- NSGA Sugar Grove

To learn more about CNRMA's EMS, please visit our Website:
www.cnrma.navy.mil/environmental/Environmental_management_system.htm



Commander Navy Region Mid-Atlantic (CNRMA)

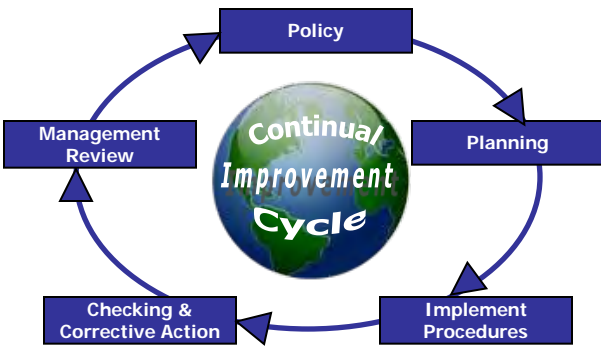
Environmental Management System



www.cnrma.navy.mil/environmental/environmental_management_system.htm

CNRMA

Environmental Management System (EMS)



The EMS Cycle of Continuous Improvement

What is EMS?

EMS is a set of management processes and procedures that allows an organization to:

- analyze, control and reduce its impact on the environment
- operate with greater efficiency and control

The EMS management tool is used to plan, implement, review, and improve the actions CNRMA takes to meet environmental goals. The CNRMA EMS must be:

- Mission focused
- Integrated into existing business processes
- Flexible in order to optimize mission performance while minimizing negative environmental impacts

The EMS is based on the International Organization for Standardization (ISO) 14001 Standard

CNRMA's EMS Goals include:

-  Reduce energy and water use
-  Increase purchase of alternative fuel vehicles, hybrid, and plug-in hybrid vehicles
-  Reduce greenhouse gas emissions
-  Reduce use of petroleum in fleet vehicles
-  Increase use of alternative fuels and renewable energy
-  Integrate green building concepts in major renovations and new construction
-  Expand purchase of green products and services; increase recycling
-  Procure, use, and dispose of electronic equipment in an environmentally-sound manner
-  Reduce purchase and use of toxic and hazardous materials

What is your role?

All personnel working for or on behalf of CNRMA have roles and responsibilities regarding CNRMA's EMS. Following are some examples:

- Know CNRMA's environmental policy, or the "CARE" acronym
- Know and comply with the environmental procedures that apply to your job
- Know how your job could impact the environment (i.e. potential spills, emission of air pollutants, material and energy use)
- Know what your installation's significant environmental aspects are
- Incorporate concepts of conservation and pollution prevention in your day-to-day activities
- Know what to do in the event of a spill or environmental emergency:
 - * Contain the spill if safe to do so
 - * Notify your supervisor
 - * Call Emergency Communications Center

Think about activities you do everyday that may impact the environment:

- Do you recycle?
- Do you buy "green" office supplies?
- Do you print double-sided copies?
- Do you conserve energy and water?
- Do you comply with all environmental laws applicable to your job?



Enclosure 5. NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and Naval Security Activity Hampton Roads Northwest Annex Hunting, Fishing, and Archery Range

Fishing: Questions & Answers

Q: What permits are needed to fish and where can they be purchased?

A: Authorized patrons and guests between the ages 16 and 65 must obtain as appropriate, Virginia (state or county) freshwater fishing licenses and Base fishing permits. Virginia Saltwater fishing licenses are required for anyone attempting saltwater fishing except when fishing from MWR piers that maintain pier licenses. Dependents and guests under the age of 12 must be directly supervised by an adult, 18 years of age or older, who holds a valid fishing license and station permits. Permits are sold at the NAS Oceana and NASO Dam Neck Annex MWR ITT offices and they are currently valid, in authorized locations only, at: NAS Oceana, NASO Dam Neck Annex, NSA Northwest Annex, JEB Little Creek, and JEBC Fort Story. Permits are currently \$8.00 for a full calendar year, but the cost is subject to change.

Q: When can I Fish?

A: Fishing is only authorized during state sanctioned seasons. Fishing is from sunrise to sunset (dawn to dusk), unless otherwise stipulated in the Base Fishing Instruction.

Q: With what can I Fish?

A: Fishing shall be conducted only by angling with a hook and line or rod and reel, held in hand. No more than two treble hooks are permitted on any fishing lure. In catch-and-release waters, barbed hooks are discouraged and treble hooks are prohibited. A hand-held landing net may also be used to remove legally hooked fish. No live bait fish are authorized.

Q: Where can I get more specific information regarding fishing on base?

A: Visit the Natural Resources Website and view the CNRMA Fishing Instruction. The general content of the instruction is still good, but there have been updates to fishing area locations, and ticket purchasing locations. Contact the NRC for the most current information.

Q: Can I use a boat?

A: Only at those locations authorized in the Fishing instruction. The boat and trailer should be cleaned; thoroughly flushing water through the motor's cooling system, live wells, and other areas that hold water and drying the boat and equipment for five days in a sunny location before transferring it to a new body of water.

Additional Information

WARNINGS:

No off-road or 4-wheel driving is authorized.

Be aware there are venomous snakes and poisonous plants on the premises.

It is unlawful and strictly PROHIBITED to harm, disturb, or collect plants and animals.

The release of fish or other aquatic wildlife not caught on the premises is PROHIBITED.

The release of any animals or the planting of any plants without the written approval of the Base's Natural Resources Manager is PROHIBITED.

It is recommended that individuals recreating on site use insect repellent.

It is required to provide, when requested, appropriate identification, permits and passes to Base Security and Conservation Law Enforcement Officers.



Please enjoy yourself while recreating on base and help us maintain it by packing out your trash and placing your litter in appropriate receptacles.

Public Access

Hunting, Fishing & Archery range utilization is open to anyone with Base Access privileges. Members of the General Public that would like to recreate on base must have a qualified sponsor. Sponsors can be active or retired military or government civilians with current base access identification. Contact the Natural Resource Center (NRC) at 757-433-2151 or stop by the NRC, Building 78, to ensure you have all appropriate access documentation. You may also visit the Natural Resources Websites at:

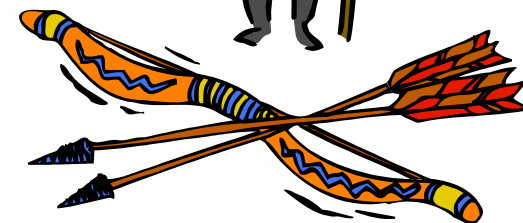
https://www.navfac.navy.mil/navfac_worldwide/atlantic/fecs/mid-atlantic/about_us/environmental_norfolk/natural_resources.html ;

http://www.cnic.navy.mil/regions/cnrma/installations/nas_oceana/about/departments/natural_resources.html ;

http://cnic.navy.mil/regions/cnrma/installations/nsa_hampton_roads/nsa_northwest_annex/about/Hunting_Season.html

Hunting, Fishing & Archery Range

*NAS Oceana,
NASO Dam Neck Annex,
NALF Fentress &
NSA Northwest Annex*



Hunting: Questions & Answers

Q: What do I need to do to hunt on the local bases?

A: (1) You must be Active Duty, dependent or retired. DoD Civilians are allowed and Non-DoD affiliated civilians are allowed with a qualified sponsor.

(2) You need a Hunter Safety Course Certificate valid in the state of Virginia and/or North Carolina.

(3) You need to attend the annual Basic Hunter Indoctrination (Indoc.) conducted by Navy Natural Resources Staff.

(4) You need to register your weapons at the NASO Security Office.

Note: The above will allow you to deer hunt with shotgun, buckshot only, at NASO Dam Neck Annex, NALF Fentress, and NSA Northwest Annex. The fee for the annual license is \$20.00 (subject to change). This license is in addition to the required State Hunting Licenses.

(5) To hunt via Shotgun with Slugs, Muzzleloader, or Archery (in addition to the above requirements):

Shotgun Slugs?

Annually, you must qualify with your shotgun by shooting 3 out of 3 slugs within a 9" circle @ 50 yards. You will be allowed to shoot from a seated rest.

Note: Slugs are only allowed for use at NSA Northwest Annex.

Muzzleloader?

Annually, you must qualify with your muzzleloader by shooting 3 out of 3 slugs within a 9" circle @ 50 yards. You will be allowed to shoot from a seated rest. Flintlock, Percussion Cap and In-Lines are allowed on NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and NSA Northwest Annex only in designated hunting areas.

Archery?

You must have graduated from the International Bowhunter Education Program (IBEP). Annually, you must qualify by shooting two arrows from an elevated platform into the kill zone of each of three 3D deer targets placed at varying ranges. The ranges will vary from directly beneath the platform out to 30 yards maximum. Your archery tackle will be inspected prior to any qualification attempt and can be grounds for rejection if determined to be unsafe. The qualification will be with Broadheads attached unless you will be hunting with Mechanical Broadheads; you will be allowed to shoot field points in this instance.

Q: Where do I purchase a permit?

A: You must have both the appropriate State Hunting Permit(s) and a Base Hunting Permit. Contact the appropriate state Wildlife Agency for information on purchasing their permits. Base Hunting Permit can be purchased from the NAS Oceana or NASO Dam Neck Annex MWR ITT ticket offices.

Q: Where and when are qualifications?

A: A schedule of qualifications will be posted at the NRC/NAS Oceana Bldg. 78, made available at the Basic Indoctrination Classes, and will be posted on the Natural Resources Program Website. Muzzleloader and shotgun qualifications will be conducted at the NASO Dam Neck Annex rifle range. Bow qualifications will be conducted at the NRC/Bldg. #78. All qualifications must be observed by designated NRC representatives on scheduled days to be valid.

Q: Where can I hunt on base?

A: The NAS Oceana Natural Resources Center controls and manages all hunting aboard NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and NSA Norfolk Northwest Annex. Areas are designated at each base for Archery, Shotgun, and Muzzleloader as applicable. NAS Oceana allows Archery and Muzzleloader ONLY. NASO Dam Neck Annex and NALF Fentress allow Archery, Shotgun (Buckshot Only) and Muzzleloader. NSA Northwest Annex allows Archery, Shotgun (Buckshot and Slugs) and Muzzleloader. Maps of the exact hunting area are located on the Natural Resources website or can be obtained at the Natural Resources Center, Oceana building 78.

Q: Can I hunt anything else besides deer?

A: Yes. Small game hunting is authorized. Contact the NRC for more details.

Q: When can I deer hunt?

A: Within the State Hunting season dates, generally from Oct 1st through the 1st Saturday in January. NAS Oceana has an extended hunting season through the end of February. Operational Security and Threat Conditions will dictate closures but normally NAS Oceana, NASO Dam Neck Annex and NALF Fentress are open 6 days a week, closed only on Sundays. NSA Northwest is only open on Mondays, Tuesdays, Thursdays, and Saturdays.

Q: Can I deer hunt from the ground?

A: Ground hunting or stalking is only allowed by Archers (except crossbow archers). No ground hunting is allowed on any base by Shotgun, Muzzleloader or Crossbow hunters.

Q: Do I need a tree stand?

A: Tree stands are required of all Shotgun, Muzzleloader and Crossbow hunters. These stands must be elevated at a shooting height of 15 feet. Climbers and clip-ons are allowed with minimal tree limb removal permitted. NAS Oceana, NASO Dam Neck Annex, and NALF Fentress have no permanent tree stands available. Any permanent tree stands found on these bases are not maintained and are unauthorized for use. NSA Northwest Annex has permanent tree stands available for use. Much work has gone into the stands at NSA Northwest Annex but they are still only available for use at your own risk and judgment. You can use your own tree stand at these locations but you must use it in the vicinity of the stand you have checked out.

Q: Where do I find the Base's Annual Hunting Rules & Regulations (R&Rs)?

A: On the Oceana, Northwest Annex, and NAVFAC MIDLANT Portal Natural Resources websites. For questions regarding the R&Rs visit the Natural Resources Center, Oceana building 78, or call the NRC at 757-433-2151.

Archery Range: Questions & Answers

Q: Where is the Archery Range?

A: The range is located off of Oceana Blvd., across from the Oceana Stables, at/adjacent to the Natural Resources Center, NASO building 78.

Q: What do I need to do to use the archery range on NAS Oceana?

A: Obtain a permit from the Oceana MWR ITT ticket office and visit the NRC to fill out the appropriate paperwork and obtain required signatures and stamps. Register your weapon with NASO Security. Contact the NRC if you have additional questions.

Q: Can I use the range if I purchased a base hunting permit?

A: Yes, the hunting permit and the archery range permit are all on 1 single permit. If you qualify to be a hunter you can use the archery range for the permitted calendar year. If you do not qualify to be a hunter or you do not want to hunt but just use the archery range you may get your permit stamped for archery range use only. You are not authorized to use this range until you have obtained the range or appropriate hunting stamps, signatures and card lamination. (To get your permit stamped for archery range use only visit the NRC, Oceana Building 78.)

Enclosure 6. Venomous Snakes of Naval Facilities in Southeastern Virginia

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Characteristics of Venomous Snake

- Elliptical pupil (Figure 7)
- Pit organ: The pit organ is located on each side of the head between the eye and nostril (Figure 1) It detects heat from small mammals and other prey
- The scales under the tail form only a single row (Figure 8)
- The head is distinctly wider than the neck (However, this is also true for many nonvenomous snakes)

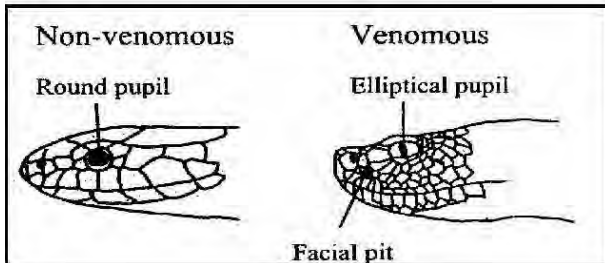


Figure 7. Facial characteristics of nonvenomous and venomous snakes of Virginia.

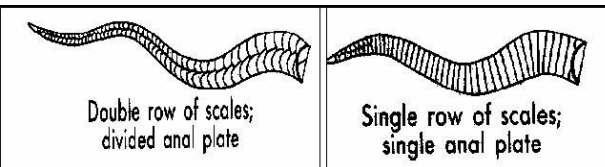


Figure 8. Undersides of tails of a nonvenomous and venomous snake.

Safety

- Wear long pants & hiking boots while in areas known to have snakes.
- Stay on hiking/designated trails.
- Avoid walking through dense piles of brush.
- Do not step over or move logs or rocks without checking for snakes first.
- Do not disturb any snakes you see. Most snakes will not strike unless provoked.
- If you are bitten by a snake seek medical attention immediately.
- DO NOT PANIC!!!

For any emergency, 1st call **911**:
757-433-9111 (NASO/NALFF)
 or
757-492-6911 (NASO DNA)
 or
757-421-8000 (NSA NWA)

Report all wildlife incidences to your local Environmental Office, Safety Office, or Security Office.

Oceana Environmental and Natural Resources: 433-3461 or 433-2151.

Information provided by:
 Chris Petersen
 Atlantic Division, Naval Facilities Engineering Command
 and
 Dr. Alan H. Savitzky
 Old Dominion University

Venomous Snakes of Naval Facilities in Southeastern Virginia



Canebrake Rattlesnake
(*Crotalus horridus*)



Figure 1. Canebrake Rattlesnake



Figure 2. Rattle of Canebrake. Shape of rattle and number of segments varies.

Description

- Black chevron-shaped markings on a dark yellow, gray or tan background color
- Orange or rust-brown stripe down the middle of the back
- Black tail with distinctive rattle
- Newborns look like adults, but rattle consists of only one segment

Size

Average length: 54 inches
Maximum length in Virginia: 67 inches

Remarks

This snake was listed as State Endangered in 1992, primarily due to habitat loss.

Copperhead
(*Agkistrodon contortrix*)



Figures 3, 4. Copperhead

Description

Chestnut to brown hourglass-shaped bands on a lighter brown to tan background color
Hourglass markings on the sides may not always match up along the back
Newborns and young have a bright yellow tail.

Size

Average length: 45.3 inches
Maximum length in Virginia: 48 inches

Remarks

This snake is often confused with a juvenile rat snake.

Cottonmouth
(*Agkistrodon piscivorus*)



Figures 5, 6. Cottonmouth

Description

Black, olive or brown bands on a lighter olive to gray background
Some individuals may appear to be all back in color, especially when out of the water
Newborns and young have a bright yellow tail.

Size

Average length: 51.8 inches
Maximum length in Virginia: 61 inches

Remarks

Habitats used by this snake include: streams, lakes, rivers and ditches. It is often confused with three common species of nonvenomous water snakes.

Enclosure 7. Compliance: Wildlife

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Compliance: Wildlife



- Threatened & Endangered Species
 - Code of Virginia
 - Code of North Carolina
- Marine Resources
- Migratory Birds
- Bald Eagles

Loggerhead Sea-Turtle



Small Whorled Pogonia



Bald Eagle, *delisted but still protected*



Canebrake Rattlesnake



Endangered Species Act (ESA); Marine Mammal Protection Act (MMPA); Bald & Golden Eagle Protection Act; Code of Virginia; Migratory Bird Treaty Act (MBTA)...etc. (there are many laws which protect wildlife, several of which cross international/country borders)

Yes, even the dead remains of a protected species are protected and you are subject to federal or state penalties if found to be in violation of the law (possession without permit is a violation).

Assume all bird species are protected (since there are very few species that are not protected).

Enclosure 8. Navy Region Mid-Atlantic Beach and Dune Protection

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Beaches and Dunes Protection

Navy Mid-Atlantic Region is dedicated to protecting this valuable resource. Measures undertaken to protect coastal beaches and dunes include:

- Installing sand fencing to protect and rebuild eroded dunes
- Posting sensitive wetland, bird nesting areas, and other significant dune management areas
- Providing boardwalks for beach access
- Restricting unauthorized vehicular access
- Shoreline stabilization
- Beach nourishment
- Stabilizing dunes through native beach grass plantings.



Beach Restoration

Training Exercises

Beaches and dunes are rare to Navy Installations. They are essential to the Navy's ability to conduct realistic training exercises; therefore, their protection is vital to the Navy's mission. To aide in their protection, training exercises are restricted to designated training areas and training units must:

- Avoid digging foxholes in vegetated areas
- Fill all excavations upon completion of the training exercise
- Remove all training material and debris from site
- Some sensitive areas including wetlands, vegetated dunes, and bird and sea turtle nesting areas are closed to training



- Enforce existing SOPs that prohibit cutting vegetation.

Awareness is the key to success!

Make all personnel aware of the importance of the beaches and dunes to the Navy's mission.

NATURAL RESOURCES CONTACTS:

NAVFAC MIDLANT Core (a.k.a., Region Office):

- (757) 341-0486
- (757) 341-0493
- (757) 341-0495
- (757) 341-0494
- (757) 341-0490

PWD JEB Little Creek/Fort Story (a.k.a., Base Contact):

- (757) 462-5351
- (757) 462-5350

PWD NAS Oceana/Dam Neck Annex (a.k.a., Base Contact):

- (757) 433-2151
- (757) 433-3461
- (757) 433-3437

To report violations (e.g., people conducting unauthorized activities on the beach or dunes; or people harassing the wildlife; etc.) or to report dead animals or alive stranded animals on the beach, please contact the Base contacts ASAP.



NAVY REGION
MID-ATLANTIC
BEACH AND DUNE
PROTECTION

Beaches and Dunes

The Navy Mid-Atlantic Region boasts over 6 miles of coastal beaches and dunes. Naval Amphibious Base Little Creek has 2.3 miles of beach along the Chesapeake Bay and supports 318 acres of beaches and dunes. Together, Naval Air Station Oceana, Dam Neck Annex and South Virginia Beach Annex (Camp Pendleton) have nearly 4 miles of beach and 280 acres of beaches and dunes habitat.



These Navy resources provide a unique and important environment for amphibious and sea to land training exercises in the region. Their protection is vital to the long-term military training mission, providing recreational opportunities for military personnel, protection from floods and storm surges, and preserving significant natural habitats that support rare species.

Recreational Opportunities

Fishing, swimming, surfing, sun-bathing, and bird watching are enjoyed by Navy personnel and their dependants on regional Navy beaches.



A Natural Community

Coastal beaches and dunes are dynamic environments. Their physical and natural features are a result of harsh conditions including strong winds, wave action, salt spray, high surface temperatures, low nutrient availability, and drifting sands. Beaches form and shift from constant deposition and movement of sand.

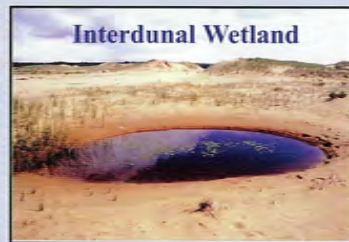


Dunes migrate and develop through prevailing onshore winds that carry sands landward. Vegetation and other irregularities trap the sand, which gradually builds into complex dune systems. This natural process has maintained coastal dunes over centuries despite severe conditions.

Wetlands

Wetlands are an integral part of a complex dune system. They support wildlife and vegetation, improve water quality, lessen flood impacts, and recharge groundwater levels. Wetlands are protected by law from impacts that may alter their physical, chemical, or biological properties.

Interdunal Wetland



Wildlife

Wildlife is abundant and diverse in the beaches and dunes habitat. A variety of birds, mammals, reptiles, amphibians, and invertebrates are adapted to this harsh environment. Some rely on this habitat exclusively while others, such as migrant birds, use it on an intermittent basis. It is especially important bird habitat hosting a variety of breeding, wintering and migratory species.



Rare, Threatened and Endangered Species

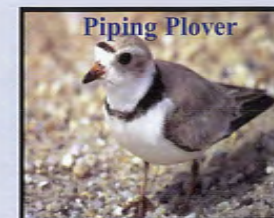
The Navy Mid-Atlantic Region's beach and dune habitat is known to support a number of rare species including two federally protected species and several state recognized rare species, and globally rare ecological communities. These include the following species.



Loggerhead Sea Turtle

Federally Protected :

- Loggerhead Turtle
- Piping Plover



Piping Plover

State Rare:

- Tiger Beetle (*Cicindela trifasciata*)
- Blue Jack Oak
- White-topped Fleabane
- American Lipocarpha
- Long Beach Seedbox
- Creeping Seedbox
- Bog Rush
- Fasciculate Beakrush

Globally Rare Natural Communities:

- Maritime Evergreen Forest
- Maritime Dune Woodland
- Interdune Pond

Marine Animal Strandings

Military personnel should report stranded (dead or alive) marine animals such as sea turtles, dolphins, whales, and seals to natural resources staff or the Virginia Science Museum's Stranding Center as soon as possible.



Loggerhead Sea Turtle Hatchling



Beached Whale

VIRGINIA AQUARIUM STRANDING TEAM (VAST), formerly known as the Virginia Science Museum's Stranding Center: **(757) 385 - 7575**

Enclosure 9. Noxious and Invasive Weeds Prevention During Construction Activities

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photo courtesy of Carolina Silvics

Kudzu vine (*Pueraria montana*)

additional resources for invasive plant species information

DoD Natural Resources, Invasive Species Management (www.dodinvasives.org)

National Invasive Species Council (www.invasivespecies.gov)

USDA National Invasive Species Information Center (www.invasivespeciesinfo.gov/)

U.S. Fish and Wildlife Service (www.fws.gov/invasives/)

U.S. Forest Service (www.fs.fed.us/invasivespecies/index.shtml)

Virginia Department of Conservation and Recreation (www.dcr.virginia.gov/natural_heritage/vaisc/)

North American Invasive Species Network (www.naisn.org/generalinformation.html)



NAVFAC Mid-Atlantic
9742 Maryland Avenue
Norfolk, VA 23511

Last Update: Feb 2017

For more information, contact:

Naval Air Station Oceana
Department of Public Works
Environmental Program
953 Hornet Dr., Bldg. 820, Suite 206
Virginia Beach, VA 23460-2190
(757) 341-1700



invasive plant species

"...the homeland is vulnerable to a different type of asymmetric attack, a biological attack from invasive species."

— Col. Robert J. Pratt



Tree-of-heaven (*Ailanthus altissima*)

photo courtesy of L. Eiser

Common invasive plants at:

Naval Air Station Oceana

NASO Dam Neck Annex

Naval Auxiliary Landing Field Fentress

Naval Support Activity Hampton Roads Northwest Annex (NSAHR NWA)

The purpose of this brochure is to provide a basic understanding of the most common invasive plants occurring at four Navy installations in the Hampton Roads region, the threats they pose, and what you can do to help control and prevent their spread.

what are invasive species?

Invasive species are plants, animals, or micro-organisms that are non-native and are likely to cause economic or environmental harm or harm to human health. They are often spread by wind, wildlife, and intentional or unintentional actions.

The Department of Defense and other Federal and state agencies have instituted policies and guidelines to prevent and control the introduction and spread of invasive species.

why are invasive plants a problem?

Invasive species can interfere with military operations and readiness, kill or shade out native plants, harm fish and wildlife and their habitats, and have negative economic impacts on crop yields and forest productivity. Furthermore, invasive species are a threat to availability of training areas, increase risk of wildfires, and can pose serious health and safety issues for people.

Economic losses and control costs have been estimated to exceed \$120 billion per year (Pimentel et al. 2005)



photo courtesy of Carolina Silvics

Common reed (*Phragmites australis*)

Invasive Plant Species Watch List

Invasive Plant Species	NAS Oceana	NASO DNA	NALF Fentress	NSAHR NWA
Alligator weed (<i>Alternanthera philoxeroides</i>)	■	■	■	■
Asian spiderwort (<i>Murdannia keisak</i>)	■			
Asiatic sand sedge (<i>Carex kobomugi</i>)		■		
Autumn olive (<i>Elaeagnus umbellata</i>)	■	■		■
Beach vitex (<i>Vitex rotundifolia</i>)				
Border privet (<i>Ligustrum obtusifolium</i>)	■	■		
Callery pear (<i>Pyrus calleryana</i>)	■	■	■	■
Chinese lespedeza (<i>Lespedeza cuneata</i>)	■	■	■	■
Chinese privet (<i>Ligustrum sinense</i>)	■	■	■	■
Chinese silvergrass (<i>Miscanthus sinensis</i>)	■			
Chinese wisteria (<i>Wisteria sinensis</i>)	■	■	■	■
Common dayflower (<i>Commelina communis</i>)	■	■	■	■
Creeping liriopie (<i>Liriope spicata</i>)	■			■
Dwarf periwinkle (<i>Vinca minor</i>)			■	
English ivy (<i>Hedera helix</i>)	■	■	■	■
European water-milfoil (<i>Myriophyllum spicatum</i>)				
Gill-over-the-ground (<i>Glechoma hederacea</i>)	■	■	■	
Golden bamboo (<i>Phyllostachys aurea</i>)	■		■	■
Japanese honeysuckle (<i>Lonicera japonica</i>)	■	■	■	■
Japanese hops (<i>Humulus japonicus</i>)	■			
Japanese privet (<i>Ligustrum japonica</i>)	■			
Japanese stilt grass (<i>Microstegium vimineum</i>)	■	■	■	■
Johnson-grass (<i>Sorghum halepense</i>)	■	■	■	■
Kudzu vine (<i>Pueraria montana</i>)	■			
Lily turf (<i>Liriope muscar</i>)				■
Mimosa (<i>Albizia julibrissin</i>)	■	■	■	■
Multiflora rose (<i>Rosa multiflora</i>)	■	■	■	■
Pampas grass (<i>Cortaderia selloana</i>)	■	■		
Parrot feather milfoil (<i>Myriophyllum aquaticum</i>)	■	■		
Periwinkle (<i>Vinca major</i>)	■			
Phragmites (<i>Phragmites australis</i>)	■	■	■	■
Porcelain berry (<i>Ampelopsis brevipedunculata</i>)			■	■
Princess tree (<i>Paulownia tomentosa</i>)			■	
Shrubby bushclover (<i>Lespedeza bicolor</i>)	■			■
Tall fescue (<i>Festuca elatior</i> [<i>F. pratensis</i>])	■			
Thorny elaeagnus (<i>Elaeagnus pungens</i>)	■	■		
Tree-of-heaven (<i>Ailanthus altissima</i>)	■		■	
White mulberry (<i>Morus alba</i>)	■		■	
White poplar (<i>Populus alba</i>)	■			

Bold = High Priority Species

Additional resources for photos and detailed descriptions of these invasive plants are listed on the back of this brochure. Additional information on controlling invasive plants is available from Natural Resources Managers.



Chinese wisteria (*Wisteria sinensis*)

photo courtesy of K. Metcalf

what you can do about invasive plants

You can help stop invasive plants by identifying these species and taking actions to prevent their introduction and spread:

- Learn about the invasive species that are in your area and what is being done about them
- Be able to identify invasive plants
- Report new invasive species and infestations to the Natural Resources Manager
- Remove invasive plants from your property
- Plant non-invasive plants on your property
- Clean boats and trailers, off-road vehicles, boots, waders, and other pathways of spread to stop hitchhiking invasive species
- Use certified "weed-free" forage, firewood, hay, mulch, and soil
- Volunteer for organized efforts to remove invasive species from natural areas and support organizations that work with invasive species

Natural Resources Managers need your help to prevent and contain the spread of these invaders.

Early Detection and Rapid Response (EDRR) is critical to identify new areas of infestation, rapidly respond, and increase the chances of success.

The Department of Defense is a leader in natural resources management and controlling invasive species.



Fast Facts

Protecting Yourself from Poisonous Plants

Any person working outdoors is at risk of exposure to poisonous plants, such as poison ivy, poison oak, and poison sumac. When in contact with skin, the sap oil (urushiol) of these plants can cause an allergic reaction. Burning these poisonous plants produces smoke that, when inhaled, can cause lung irritation.

Workers may become exposed through:

- Direct contact with the plant
- Indirect contact (touching tools, animals, or clothing with urushiol on them)
- Inhalation of particles containing urushiol from burning plants

Symptoms of Skin Contact

- Red rash within a few days of contact
 - Swelling
 - Itching
 - Possible bumps, patches, streaking or weeping blisters
- NOTE: Blister fluids are not contagious

First Aid

If you are exposed to a poisonous plant:

- Immediately rinse skin with rubbing alcohol, poison plant wash, or degreasing soap (such as dishwashing soap) or detergent, and lots of water.
 - Rinse frequently so that wash solutions do not dry on the skin and further spread the urushiol.
- Scrub under nails with a brush.
- Apply wet compresses, calamine lotion, or hydrocortisone cream to the skin to reduce itching and blistering.
 - Oatmeal baths may relieve itching.
- An antihistamine may help relieve itching.
 - NOTE: Drowsiness may occur.
- In severe cases or if the rash is on the face or genitals, seek professional medical attention.
- Call 911 or go to a hospital emergency room if you have a severe allergic reaction, such as swelling or difficulty breathing, or have had a severe reaction in the past.



Poisonous plants, from left to right: poison ivy, poison oak, poison sumac.

Images courtesy of U.S. Department of Agriculture.

Protect Yourself

- Wear long sleeves, long pants, boots, and gloves.
 - Wash exposed clothing separately in hot water with detergent.
- Barrier skin creams, such as lotion containing bentoquatam, may offer some protection.
- After use, clean tools with rubbing alcohol or soap and lots of water. Urushiol can remain active on the surface of objects for up to 5 years.
 - Wear disposable gloves during this process.
- Do not burn plants or brush piles that may contain poison ivy, poison oak, or poison sumac.
 - Inhaling smoke from burning plants can cause severe allergic respiratory problems.

When exposure to burning poisonous plants is unavoidable, employers should provide workers with:

- A NIOSH-certified half-face piece particulate respirator rated R-95, P-95, or better. This recommendation does NOT apply to wildland firefighters, who may require a higher level of protection.
- These respirators should protect against exposure to burning poisonous plants, but will not protect against all possible combustion products in smoke, such as carbon monoxide.
- Respirators must be worn correctly and consistently throughout the time they are used.
- For respirators to be effective there must be a tight seal between the user's face and the respirator.
- Respirators must be used in the context of a written comprehensive respiratory protection program (see OSHA Respiratory Protection standard 29 CFR 1910.134).
- For more information about respirators, visit www.cdc.gov/niosh/npptl/topics/respirators/

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

www.cdc.gov/niosh/topics/outdoor/

DHHS (NIOSH) Publication No. 2010-118

Telephone: 1-800-CDC-INFO

TTY: 1-888-232-6348

E-mail: cdcinfo@cdc.gov



SAFER • HEALTHIER • PEOPLE™

Enclosure 10. Zoonotic Disease: When Humans Animals Intersect

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Zoonotic Disease: When Humans and Animals Intersect



What are zoonotic diseases?

Zoonotic diseases are contagious diseases spread between animals and humans. These diseases are caused by bacteria, viruses, parasites, and fungi that are carried by animals and insects. Examples are anthrax, dengue, Ebola hemorrhagic fever, Escherichia coli infection, Lyme disease, malaria, Plague, Rocky Mountain spotted fever, salmonellosis, and West Nile virus infection.

- ◇ Animal displays
- ◇ Petting zoos
- ◇ Pet stores
- ◇ Nature parks
- ◇ Wooded and bushy areas
- ◇ Farms
- ◇ County or state fairs
- ◇ Child-care facilities or schools

How do you get zoonotic diseases?

People can get zoonotic diseases from contact with infected live poultry, rodents, reptiles, amphibians, insects, and other domestic and wild animals. A common way for these diseases to spread is through the bite of a mosquito or tick. People can get diseases in most places where they might have contact with infected animals and insects, including:

Who can get zoonotic diseases?

- ◇ Anyone who has contact with animals can get a zoonotic disease, but people may be more at risk than others. These include people with a weakened immune system, children age 5, the elderly, and pregnant women.



Zoonotic Disease: When Humans and Animals Intersect

How to prevent zoonotic diseases

- ◇ Be aware of zoonotic diseases and your potential for infection
- ◇ Wash hands thoroughly and frequently
- ◇ Avoid direct contact with certain animals and their environment
- ◇ Closely supervise children to ensure they wash their hands properly and avoid hand-to-mouth activities (thumb-sucking, eating, and use of pacifiers) after animal contact
- ◇ Use EPA-registered insect repellents that contain 20% or more DEET (N, N-diethyl-m-toluamide) on the exposed skin for protection that lasts up to several hours.
- ◇ Use products that contain repellents (such as permethrin) on clothing. Treat clothing and gear, such as boots, pants, socks and tents.
- ◇ Look for and remove ticks from your body. Parents should check their children for ticks.
- ◇ Limit the number of places around your home for mosquitoes to breed by getting rid of items that hold water.



Interesting facts about zoonotic diseases

- ◇ About 75% of recently emerging infectious diseases affecting humans are diseases of animal origin, and approximately 60% of all human pathogens are zoonotic.
- ◇ Tick-borne diseases, including Lyme disease and Rocky Mountain spotted fever, are serious public health problems, infecting tens of thousands in the United States each year. CDC is working closely with local communities, developing innovative control approaches and researching improved diagnostics.
- ◇ Almost all persons infected by rabid animals will die if not treated appropriately. Dogs are responsible for most human rabies deaths worldwide, but the public health threat of canine rabies has been virtually eliminated in the United States.
- ◇ There have been 1.5 million West Nile virus infections since 1999. 2.5 billion people are at risk for dengue in more than 100 endemic countries with 50 million cases of dengue fever each year.



Enclosure 11 Commanding Officer's Environmental Policy



NAVAL AIR STATION OCEANA ENVIRONMENTAL POLICY

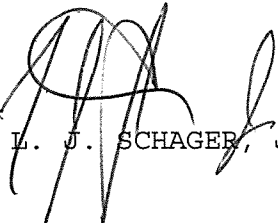
1. Environmental stewardship is essential to the safe, healthful and compliant execution of our mission and the protection and preservation of our natural resources. I expect all commands and personnel onboard Naval Air Station (NAS) Oceana, Dam Neck Annex and NALF Fentress to be active stewards of the environment in their day-to-day operations and planning.

2. To that end, NAS Oceana will establish, maintain and communicate an Environmental Management System that will:

- a. Comply with applicable laws, regulations and policies.
- b. Integrate environmental stewardship with operational decisions.
- c. Implement, modify and sustain practices that minimize and prevent creation of waste and pollutants at their source.
- d. Develop objectives and targets to minimize environmental risk and monitor progress towards those goals.
- e. Educate our workforce and supported commands on their responsibility to the environment.
- f. Foster communication throughout the installation on our environmental commitments and performance.
- g. Sustain our partnerships with public agencies and community organizations to mutually monitor and improve the quality of the environment.

3. These actions can be summarized through the acronym "CARE." We will:

- a. Comply with the rules
- b. Always improve
- c. Reduce waste
- d. Eliminate pollution


L. J. SCHAGER, JR.

Appendix L

Cross-Reference of Integrated Natural Resources Management Plan Guidance for Navy Installations to DoD INRMP Template

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Table L-1. Cross-Reference of *Integrated Natural Resources Management Plan* Guidance for Navy Installations to DoD INRMP Template

DoD <i>Integrated Natural Resources Management Plan</i> Template	Cross-Reference to Naval Air Station Dam Neck Annex 2013 INRMP Update Table of Contents
Title Page	Title Page (see front matter)
Signature Page	Signature Page (see front matter)
Executive Summary	Executive Summary (see front matter)
Table of Contents	Table of Contents (see front matter)
1. Overview	Section 1.8 Overview of the Natural Resources Management Program
a. Purpose	Section 1.1 Purpose and Authority
b. Scope	Executive Summary
c. Goals and Objectives	Section 1.3 Objectives
d. Responsibilities	Section 1.4 Responsibilities
(1) Installation stakeholders	Section 1.4.1 Installation Stakeholders
(2) External stakeholders	Section 1.4.2 External Stakeholders
e. Authority	Section 1.1 Purpose and Authority
f. Stewardship and Compliance	Section 1.5 Compliance and Stewardship
g. Review and Revision Process	Plan Updates (see front matter)
h. Management Strategy	Section 1.8 Overview of the Natural Resources Management Program
2. Current Conditions and Use	Section 2.0 Existing Conditions
a. Installation Information	Section 1.6 Location and Regional Setting and Section 1.7 Historical Overview and Military Mission
(1) General Description	Section 1.6 Location and Regional Setting and Section 1.7 Historical Overview and Military Mission
(2) Regional Land Uses	Section 1.6 Location and Regional Setting and Section 1.11 Encroachment and Adjacent Land Use
(3) Abbreviated History and Pre-Military Land Use	Section 1.7 Historical Overview and Military Mission
(4) Military Mission	Section 1.7 Historical Overview and Military Mission
(5) Operations and Activities	Section 1.7 Historical Overview and Military Mission, Section 1.7.1 Mission Impacts on the Environment, and Section 1.9 Constraints and Opportunities
(6) Constraints Map	Figure 1-4, Section 1.7.1 Mission Impacts on the Environment, Section 1.8 Overview of the Natural Resources Management Program, and Section 1.9 Constraints and Opportunities

(7) Opportunities	Figure 1-4, Section 1.7.1 Mission Impacts on the Environment, Section 1.8 Overview of the Natural Resources Management Program, and Section 1.9 Constraints and Opportunities
b. General Physical Environment	Section 2.0 Existing Conditions
(1) Climate	Section 2.1 Climate Section 2.1.1 Climate Change
(2) Physiography and Soils	Section 2.2 Physiography and Soils
(3) Hydrology	Section 2.3 Hydrology
c. General Biotic Environment	Section 2.0 Existing Conditions
(4) T & E Species and Species of Concern	Section 2.6 Rare, Threatened and Endangered Species and Significant Ecological Communities
(5) Wetlands and Deep Water Habitats	Section 2.3.5 Wetlands
(6) N/A	Section 2.3.6 Nearshore Environment
(7) Fauna	Section 2.5 Fauna
(8) Flora	Section 2.4 Flora
3. Environmental Management Strategy and Mission Sustainability	Section 1.7.2 Integration of Military Mission and Sustainable Use
a. Supporting Sustainability of the Military Mission and the Natural Environment	Section 1.7.2 Integration of Military Mission and Sustainable Use
(1) Integrate Military Mission and Sustainable Land Use	Section 1.7.2 Integration of Military Mission and Sustainable Use
(2) Define Impact to the Military Mission	Section 1.9 Constraints and Opportunities
(3) Describe Relationship to Range Complex Management Plan or other operation area plan	Section 1.10 INRMP Integration with Other Installation Plans
b. Natural Resources Consultation Requirements	Section 5.1 Natural Resources Consultation Requirements
c. NEPA Compliance	Section 5.3 NEPA Compliance
d. Beneficial Partnerships and Collaborative Resource Planning	Section 1.12 Partnerships and Outreach
e. Public Access and Outreach	Section 3.11 Outdoor Recreation and Environmental Awareness
(1) Public Access and Outdoor Recreation	Section 3.11 Outdoor Recreation and Environmental Awareness
(2) Public Outreach	Section 3.11 Outdoor Recreation and Environmental Awareness
f. Encroachment Partnering	Section 1.11 Encroachment and Adjacent Land Use
g. State Comprehensive Wildlife Plans	Section 3.10.7 General Fish and Wildlife Management
4. Program Elements	Section 3.0 Natural Resources Management Issues

a. T & E Species Management and Species benefit, Critical Habitat, and Species of Concern Management	Section 3.5 Threatened and Endangered Species Protection
b. Wetlands and Deep Water Habitats Management	Section 3.2 Wetlands and Water Quality Protection
c. Law Enforcement of Natural Resources Laws and Regulations	Section 3.11.3 Conservation Law Enforcement
d. Fish and Wildlife Management	Section 3.10 Fish and Wildlife Management
e. Forestry Management	Section 3.9 Forest Management
f. Vegetation Management	Section 3.7 Habitat Conservation and Restoration
g. N/A	Section 3.7.9 Pollinators
h. Migratory Birds Management	Section 3.10.4 Migratory Bird Management
i. Invasive Species Management	Section 3.12.3 Invasive Species
j. Pest Management	Section 3.9.1 Insect Management and 3.12 Integrated Pest Management
k. Land Management	Section 3.1 Coastal Zone Protection, Section 3.2 Wetlands and Water Quality Protection, Section 3.3 Environmental Restoration Program Sites, Section 3.4 Oil and Hazardous Substances, Section 3.6 Marine Resources Protection, Section 3.7 Habitat Conservation and Restoration, Section 3.8 Shade Tree and Urban Forest Management, Section 3.9 Forest Management, Section 3.11 Outdoor Recreation and Environmental Awareness, Section 3.12 Integrated Pest Management, and Section 3.13 Cultural Resources Protection
l. Agricultural Outleasing	N/A
m. Geographical Information Systems (GIS) Management, Data Integration, Access, and Reporting	Section 1.14 Geographic Information Systems
n. Outdoor Recreation	Section 3.11 Outdoor Recreation and Environmental Awareness
o. Bird Aircraft Strike Hazard	N/A
p. Wildland Fire Management	Section 3.9.2 Wildland Fire and Controlled Burning
q. Training of Natural Resource Personnel	Section 1.13 Training of Natural Resources Personnel
r. Coastal/Marine Management	Section 3.1 Coastal Zone Protection and 3.6 Marine Resources Protection
s. Floodplains Management	Section 3.2.2 Floodplain Protection
t. Other Leases	N/A
5. Implementation	Section 5.0 INRMP Implementation
a. Summarize Process of Preparing Prescriptions that Drive the Projects	Section 5.4 Project Development and Classification

b. Achieving No-Net-Loss	Section 5.2 Achieving No Net Loss
c. Use of Cooperative Agreements	Section 5.6 Use of Cooperative Agreements
d. Funding	Section 5.5 Funding Sources

N/A = Not Applicable

Appendix M

Naval Air Station Oceana Dam Neck Annex Natural Resources Project Implementation Schedule

- Enclosure 1 Naval Air Station Oceana Dam Neck Annex Environmental Program Requirements Project Updates/Budget Execution Plans**
- Enclosure 2 Project Justification and Cost Estimate Information**
- Enclosure 3 Annual INRMP Updates and Metrics**

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**Enclosure 1 Naval Air Station Oceana Dam Neck Annex Environmental Program
Requirements Project Updates/Budget Execution Plans**

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**Table M-1. Naval Air Station Oceana Dam Neck Annex Environmental Program Requirements Project Updates/Budget Execution Plans
Command, Navy Installations Command Environmental Programmatic Funding**

(Note: projects NOT APPROVED by Chief of Naval Operations Financial Management, are APPROVED projects, but FUNDS were NOT available)

UIC ¹	POM ¹ Cycle	Execution Year(s)	EPR ¹ #	Project Title	INRMP ¹ Section Reference	Prime Legal Driver/ Initiative ²	Estimate of Need	Actual Spent/ Executed	Status	Comments
N32442	POM-08	FY ¹ 08	3244200086	SPECIES OR HABITAT MANAGEMENT PROTECTION-OSPREY, EAGLES, SEA TURTLES	3.5 and 3.10.4	D, E, F			CNO ¹ FM ¹ Review (APPROVED) (NOT FUNDED-FY08)	
N32442	POM-08	FY08	3244200107	Soil and Water Conservation - SHORELINE STABILIZATION DNA ¹	3.7.8	H, I			CNO FM Review (APPROVED) (FUNDED-FY08)	Activity Scheduled All Funds to be Executed. Not all requested EPR funds were provided by CNIC ¹ , Additional Funding was obtained through: Agriculture Program; and NPLD ¹ "grants."
N32442	POM-08	FY08	3244200110	FISHERIES SURVEY	3.10.3	E, N, Y			CNO FM Review (APPROVED) (NOT FUNDED-FY08)	
N32442	POM-08	FY08	3244200111	Soil Erosion Control	3.2.5	G, I, K			CNO FM Review (APPROVED) (NOT FUNDED-FY08)	
N32442	POM-08	FY09	3244200086	SPECIES OR HABITAT MANAGEMENT PROTECTION-OSPREY, EAGLES, SEA TURTLES	3.5 and 3.10.4	D, E, F			CNO FM Review (APPROVED) (NOT FUNDED-FY09)	Project has been scheduled for funding.
N32442	POM-08	FY09	3244200107	Soil and Water Conservation - SHORELINE STABILIZATION DNA	3.7.8	H, I			CNO FM Review (APPROVED) (FUNDED-FY09)	Activity Scheduled All Funds to be Executed. Not all requested EPR funds were provided by CNIC, Additional Funding was obtained through: Agricultural Program; and NPLD "grants."
N32442	POM-08	FY09	3244200111	Soil Erosion Control	3.2.5	G, I, K			CNO FM Review (APPROVED) (NOT FUNDED-FY09)	
N32442	POM-10	FY10	3244200086	SPECIES OR HABITAT MANAGEMENT PROTECTION-OSPREY, EAGLES, SEA TURTLES	3.5 and 3.10.4	D, E, F			CNO FM Review (APPROVED) (FUNDED-FY10)	
N32442	POM-10	FY10	3244200107	Soil and Water Conservation - SHORELINE STABILIZATION DNA	3.7.8	H, I			CNO FM Review (APPROVED) (FUNDED-FY10)	Project has been scheduled for funding. Not all requested EPR funds were provided by CNIC, Additional Funding was obtained through: NPLD "grants."
N32442	POM-10	FY10	32442NR002	POM 10 Wetland Delineation	2.3.5 and 3.2	G, H, K			BSO ¹ Originate/Review (NOT APPROVED) (NOT FUNDED-FY10)	Rejected. (Actually, completed in FY2011 with EOY ¹ funds per approved POM12 project.)
N32442	POM-10	FY10	32442NR003	POM 10 Soil and Water Conservation Natural Resource Plan Tasks	3.2.3 and 3.2.5	H, I			CNO FM Review (APPROVED) (NOT FUNDED-FY10)	Archived.
N32442	POM-10	FY10	32442NR008	POM 10 Fisheries Survey	3.10.3	E, N, Y			CNO FM Review (APPROVED) (NOT FUNDED-FY10)	Archived. Similar to Approved, but archived project # 3244200110 from POM-08.
N32442	POM-10	FY10	32442NR009	POM 10 SOIL EROSION CONTROL	3.2.5	G, I, K			CNO FM Review (APPROVED) (FUNDED-FY10)	Project has been scheduled for funding.

UIC ¹	POM ¹ Cycle	Execution Year(s)	EPR ¹ #	Project Title	INRMP ¹ Section Reference	Prime Legal Driver/ Initiative ²	Estimate of Need	Actual Spent/ Executed	Status	Comments
N32442	POM-10	FY10	32442NR011	POM 10 SOIL and WATER CONSERVATION-CONTROL INVASIVE SPECIES	3.2.3, 3.2.5, and 3.12.3	H, I, M, X			CNO FM Review (APPROVED) (FUNDED-FY10)	Project has been scheduled for funding.
N32442	POM-10	FY10	32442NR012	POM 10 REQUIRED WETLANDS MONITORING	3.2.1	G, H, K			CNO FM Review (APPROVED) (FUNDED-FY10)	Project was originally funded, but has since been reassigned.
N32442	POM-10	FY11	3244200086	SPECIES OR HABITAT MANAGEMENT PROTECTION - Osprey, Eagles and Sea Turtles	3.5 and 3.10.4	D, E, F			CNO FM Review (APPROVED) (FUNDED-FY11)	
N32442	POM-10	FY11	3244200107	Soil and Water Conservation - SHORELINE STABILIZATION DNA	3.7.8	H, I			CNO FM Review (APPROVED) (FUNDED-FY11)	Partially funded. Used Legacy Funds to make up difference.
N32442	POM-10	FY11	32442NR003	POM 10 Soil and Water Conservation Natural Resource Plan Tasks	3.2.3 and 3.2.5	H, I			CNO FM Review (APPROVED) (NOT FUNDED-FY11)	Archived.
N32442	POM-10	FY11	32442NR005	POM 10 Soil and Water Conservation Design Shoreline Structures	3.2.3, 3.2.5, and 3.7.8	H, I			CNO FM Review (APPROVED) (FUNDED-FY11)	This should be Facilities not NR, reject due to upcoming threatened and endangered concerns with sea turtles.
N32442	POM-10	FY11	32442NR009	POM 10 Soil Erosion Control	3.2.5	G, I, K			CNO FM Review (APPROVED) (FUNDED-FY11)	Similar to Approved, but archived project # 3244200111 from POM-08.
N32442	POM-10	FY11	32442NR011	POM 10 Soil and Water Conservation - Control Invasive Species	3.2.3, 3.2.5, and 3.12.3	H, I, M, X			CNO FM Review (APPROVED) (FUNDED-FY11)	
N32442	POM-10	FY11	32442NR012	POM 10 Required Wetlands Monitoring	3.2.1	G, H, K			CNO FM Review (APPROVED) (FUNDED-FY11)	
N32442	POM-12	FY14	32442NR201	1 MA ¹ - NSS ¹ DAM NECK Threatened and Endangered Species Inventory (NASO DNA ¹)	3.5	D, E, F	\$105,840		CNO FM Review (APPROVED) (PENDING FUNDING)	Approved during POM12, currently waiting to be reapproved in POM14.
N32442	POM-12	FY12	32442NR202	MA-NSS DAM NECK Wetland Mapping Inventory (NASO DNA)	2.3.5 and 3.2	G, H, K	\$9,842		CNO FM Review (APPROVED) (FUNDED-FY11 and 12)	Scheduled for funding in FY12, but completed early with FY11 funds. FY12 funds to be reassigned to other projects that did not receive funding.
N32442	POM-12	FY12	32442NR203	MA-NSS DAM NECK Mitigation Site Monitoring (NASO DNA)	2.3.7, 4.2.2, and 4.2.3	G, H, K	\$2,000		CNO FM Review (APPROVED) (FUNDED-FY12)	Completed In-house.
N32442	POM-12	FY12-17	32442NR204	4 MA-NSS DAM NECK- Migratory and Breeding Bird Surveys (NASO DNA)	3.10.4	D, E, V	\$4,467		CNO FM Review (APPROVED) (FUNDED-FY12)	Contract Awarded.
N32442	POM-12	FY12-17	32442NR205	4 MA-NSS DAM NECK-Species of Concern and Habitat of Concern Protection	3.5 and 3.7	D, F, G	\$19,329		CNO FM Review (APPROVED) (FUNDED-FY12)	Completed In-house.
N32442	POM-12	FY12-17	32442NR206	ML ¹ NSS Dam Neck - Forest Inventory (NASO DNA) - Natural and Urban	3.9	E, I, W	\$13,405.96		CNO FM Review (NOT APPROVED) (NOT FUNDED-FY12)	Update: Going to request development of a contract SOW ¹ or Cooperative Agreement and request FY13 EOY funds.

UIC ¹	POM ¹ Cycle	Execution Year(s)	EPR ¹ #	Project Title	INRMP ¹ Section Reference	Prime Legal Driver/ Initiative ²	Estimate of Need	Actual Spent/ Executed	Status	Comments
N32442	POM-12	FY12-17	32442NR207	Timber Harvests (NASO DNA) - Siviculture	3.9	E, I, W			Region Originate/Review (NOT APPROVED) (NOT FUNDED-FY12)	Per phone conversation with NAVFAC ¹ MidLANT ¹ Core (Region) NR ¹ representative (18 Sept 2009), they have decided not to provide the requested cost estimate in this EPR submission, but to pursue the funds for this project through alternative funding methods. I re-reminded them that the guidance out of NAVFAC HQ ¹ was to submit costs into EPRweb, and that both the agricultural and forestry funds most-likely will not have funds available for projects. (Resubmitted in POM14)
N32442	POM-12	FY12-17	32442NR209	Soil and Water Conservation (NASO DNA) - Erosion Control/Repair/Assess	3.2.3 and 3.2.5	G, I, K	\$9,736		Activity Originate/Review (PENDING APPROVAL) (NOT FUNDED-FY12) (FUNDED FY12)	On hold. No current Projects identified for funding. FY12 Update: Funded and contracted an Erosion Control Assessment in FY12 to identify future potential project needs with EOY funds.
N32442	POM-12	FY17	32442NR211	MA-NSS DAM NECK- Landcover Mapping (NASO DNA)	1.13 and 2.4	D, E, M	\$88,827		CNO FM Review (NOT APPROVED) (NOT FUNDED-FY12)	DARLENE GAUTHIER has been set NOT APPROVED for project at CNO FM REVIEW for the following reason: During Round 2 of POM-12 SPP ¹ , the decision was made to accept additional "manageable risk" within the conservation program. All ERL ¹ 3 requirements are considered as manageable or acceptable risk and therefore are not approved for POM-12. Regions should first execute ERL 4 requirements and then accommodate ERL3 requirements with any remaining funds. (Resubmitted in POM 14) FY12 Update: Funded and contracted with EOY funds.
N32442	POM-12	FY12-17	32442NR212	Soils Verification Study (NASO DNA)	2.2	E, I			Region Originate/Review (NOT APPROVED) (NOT FUNDED-FY12)	Per phone conversation with NAVFAC MidLANT Core (Region) NR representative (18 Sept 2009), they do not think that this project is needed at this time.
N32442	POM-12	FY12-17	32442NR215	Dune and Beach Restoration	3.7	F, H, I	\$44,732.24		CNO FM Review (APPROVED) (FUNDED-FY12)	CESU agreement awarded and some in-house work.

UIC ¹	POM ¹ Cycle	Execution Year(s)	EPR ¹ #	Project Title	INRMP ¹ Section Reference	Prime Legal Driver/ Initiative ²	Estimate of Need	Actual Spent/ Executed	Status	Comments
N32442	POM-12	FY12-17	32442NR216	MA-NSS DAM NECK Establish Prescribed Burning Agreement (NASO DNA) - Establish and Maintain	3.9.2	D, F, M	\$35,386.81		CNO FM Review (NOT APPROVED) (NOT FUNDED-FY12)	DARLENE GAUTHIER has been set NOT APPROVED for project at CNO FM REVIEW for the following reason: During Round 2 of POM-12 SPP, the decision was made to accept additional "manageable risk" within the conservation program. All ERL3 requirements are considered as manageable or acceptable risk and therefore are not approved for POM-12. Regions should first execute ERL4 requirements and then accommodate ERL3 requirements with any remaining funds. (Resubmitted in POM14) Update: Going to request development of a contract SOW or Cooperative Agreement and request FY13 EOY funds.
N32442	POM-12	FY12-17	32442NR218	Invasive Species (NASO DNA) - Inventory, Map, Assess and Control	3.12.3	H, I, M, X	\$18,709.86		CNO FM Review (APPROVED) (FUNDED-FY12)	Contract Awarded.
N32442	POM-12	FY12-17	32442NR219	MA Dam Neck - Emergency Wildlife Calls (NASO DNA) -NR Staff Response	3.12.1	D, E, F	\$1,337.68		CNO FM Review (APPROVED) (FUNDED-FY12)	Completed In-house.
N32442	POM-12	FY12-17	32442NR220	3 MA-NSS DAM NECK- Nuisance Wildlife (NASO DNA) - Inventory, Assess and Remove	3.12.1	D, E, F	\$12,818		CNO FM Review (APPROVED) (FUNDED-FY12)	Contract Awarded.
N32442	POM-12	FY12-17	32442NR221	MA-NSS DAM NECK-Fisheries, Ditches and streams (NASO DNA) - Test, Assess and Stock	3.10.3 and 3.11.3	G, Y	\$5,046.09		CNO FM Review (NOT APPROVED) (NOT FUNDED-FY12)	DARLENE GAUTHIER has been set NOT APPROVED for project at CNO FM REVIEW for the following reason: During Round 2 of POM-12 SPP, the decision was made to accept additional "manageable risk" within the conservation program. All ERL3 requirements are considered as manageable or acceptable risk and therefore are not approved for POM-12. Regions should first execute ERL4 requirements and then accommodate ERL3 requirements with any remaining funds. (Resubmitted in POM14) Update: Going to request development of a contract SOW or Cooperative Agreement and request FY13 EOY funds.

UIC ¹	POM ¹ Cycle	Execution Year(s)	EPR ¹ #	Project Title	INRMP ¹ Section Reference	Prime Legal Driver/ Initiative ²	Estimate of Need	Actual Spent/ Executed	Status	Comments
N32442	POM-12	FY12-17	32442NR222	MA-NSS DAM NECK Outdoor Recreation Program Requirements	3.11	A, E, Y	\$2,313.46		CNO FM Review (NOT APPROVED) (NOT FUNDED-FY12)	DARLENE GAUTHIER has been set NOT APPROVED for project at CNO FM REVIEW for the following reason: During Round 2 of POM-12 SPP, the decision was made to accept additional "manageable risk" within the conservation program. All ERL3 requirements are considered as manageable or acceptable risk and therefore are not approved for POM-12. Regions should first execute ERL4 requirements and then accommodate ERL3 requirements with any remaining funds. (Resubmitted in POM14)
N32442	POM-12	FY12-17	32442NR223	MA Dam Neck - Equipment Storage Structures (NASO DNA) - Construction and Maintenance	1.4.1	E, G, I	\$903.06		CNO FM Review (NOT APPROVED) (NOT FUNDED-FY12) (PARTIAL FUNDING FY12)	DARLENE GAUTHIER has been set NOT APPROVED for project at CNO FM REVIEW for the following reason: During Round 2 of POM-12 SPP, the decision was made to accept additional "manageable risk" within the conservation program. All ERL3 requirements are considered as manageable or acceptable risk and therefore are not approved for POM-12. Regions should first execute ERL4 requirements and then accommodate ERL3 requirements with any remaining funds. (Resubmitted in POM14) Partially funded with funds left over from projects negotiated under GCE ¹ .
N32442	POM-12	FY12-17	32442NR224	MA-NSS DAM NECK-NR Mgt. ¹ Equipment Maintenance and Repair	1.4.1	E, I, M	\$2,601.51		CNO FM Review (NOT APPROVED) (NOT FUNDED-FY12)	DARLENE GAUTHIER has been set NOT APPROVED for project at CNO FM REVIEW for the following reason: During Round 2 of POM-12 SPP, the decision was made to accept additional "manageable risk" within the conservation program. All ERL3 requirements are considered as manageable or acceptable risk and therefore are not approved for POM-12. Regions should first execute ERL4 requirements and then accommodate ERL3 requirements with any remaining funds. (Resubmitted in POM14)
N32442	POM-12	FY12-17	32442NR226	MA Dam Neck - INRMP Updates and Planning	1.14 and 5.0	E, F, G	\$4,232.36		CNO FM Review (APPROVED) (FUNDED-FY12)	Contract Awarded.

UIC ¹	POM ¹ Cycle	Execution Year(s)	EPR ¹ #	Project Title	INRMP ¹ Section Reference	Prime Legal Driver/ Initiative ²	Estimate of Need	Actual Spent/ Executed	Status	Comments
N32442	POM-12	FY12-17	32442NR227	MA Dam Neck - Resource Protection Agreement (NASO DNA) - Establish and Maintain	3.12.1	D, E, F			CNO Review (PENDING APPROVAL) (NOT FUNDED-FY12)	Archived. Moved from NR Chapter 12 to CR ¹ Chapter 14, since the project supports both programs. (Resubmitted in POM14) Awaiting Updated Navy Instructions related to CLEO ¹ support. Develop agreement with either Installation Security, USFWS ¹ , or VDGIF ¹ and request EOY funding. Notes: USFWS LE ¹ in 2009 indicated that they may not be able to provide assistance; initial discussion with VDGIF in FY2009 indicated that they were interested, but FY12 discussions indicated that they are apprehensive about development of such an agreement; and discussions with Base security is pending Naval Instruction Updates. Need to reengage USFWS, and VDGIF after discussions with Base Security. Going to request development of a MOA ¹ or Cooperative Agreement and request FY13 EOY funds.
N32442	POM-12	FY12-17	32442NR228	Natural Resources Staff Certification Requirements	1.12	A, E			CNO FM Review (APPROVED) (FUNDED-FY12)	Completed In-house.
N32442	POM-12	FY12-17	32442NR229	2 Threatened & Endangered Species Survey (NASO DNA) Sea Turtle	3.5	D, E, H	\$6,679,55		CNO FM Review (APPROVED) (FUNDED-FY12)	Completed In-house.
N32442	POM-14	FY15	32442MH103	CHS ¹ and EFH ¹ MA Dam Neck Nearshore Habitat Assessment	3.1 and 3.6	D, E, F, J, T, Y			CNO FM Review (PENDING APPROVAL)	Can be deleted as long as EPRs 32442NR231 and 60191NR231 are funded at original POM 14 requested funding levels.
N32442	POM-14	FY14	32442NR201	1 S MA NASO DNA - Threatened & Endangered Species Inventory	3.5	D, E, F	\$105,840		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY16	32442NR202	MA NASO DNA - Wetland Mapping Inventory	2.3.5 and 3.2	G, H, K	\$9,842		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR204	MBTA ¹ MA NASO DNA - Migratory and Breeding Bird Surveys	3.10.4	D, E, V	\$4,467		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR205	4 SAR ¹ MA NASO DNA - Species and Habitat of Concern Protection	3.5 and 3.7	D, F, G	\$19,329		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR206	MA NASO DNA - Forest Management	3.9	E, I, W	\$13,405.96		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14	32442NR211	MA NASO DNA - Landcover Mapping	1.13 and 2.4	D, E, M	\$88,827		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR215	CHS MA NASO DNA - Dune and Beach Restoration	3.7	F, H, I	\$44,732.24		CNO FM Review (PENDING APPROVAL)	

UIC ¹	POM ¹ Cycle	Execution Year(s)	EPR ¹ #	Project Title	INRMP ¹ Section Reference	Prime Legal Driver/ Initiative ²	Estimate of Need	Actual Spent/ Executed	Status	Comments
N32442	POM-14	FY14-18	32442NR216	MA NASO DNA - Habitat Management_Prescribed Fire	3.9.2	D, F, M	\$35,386.81		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR218	MA NASO DNA - Invasive Species	3.12.3	M, I, X	\$18,709.86		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR219	MA NASO DNA - Wildlife Emergency Response	3.12.1	D, E, F	\$1,337.68		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR220	4 SAR MA NASO DNA - Nuisance Wildlife Inventory, Assess and Remove	3.12.1	D, E, F	\$12,818		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR221	MA NASO DNA - Fisheries, Ditches and Streams	3.10.3 and 3.11.3	G, Y	\$5,046.09		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR222	MA NASO DNA - Outdoor Recreation Program Requirements	3.11	A, E, Y	\$2,313.46		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR223	MA NASO DNA - Equipment Storage Structures	1.4.1	E, G, I	\$903.06		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR224	MA NASO DNA - Equipment Maintenance and Repair	1.4.1	E, I, M	\$2,601.51		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR226	MA NASO DNA - INRMP Updates and Planning	1.14 and 5.0	E, F, G	\$4,232.36		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR227	MA NASO DNA - Resource Protection Agreement	3.12.1	D, E, F			CNO Review (PENDING APPROVAL)	CR Guidebook Submission.
N32442	POM-14	FY14-18	32442NR228	MA NASO DNA - Natural Resources Staff Certification Requirements	1.12	A, E			CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR229	2 BO ¹ MA NASO DNA - Threatened & Endangered Species Survey - Sea Turtle	3.5	D, E, H	\$6,679,55		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR231	MA NASO DNA - Nearshore Environment Assessment and Climate Change Assessments	3.1 and 3.6	D, E, F, J, T, Y	\$190,763.83		CNO FM Review (PENDING APPROVAL)	
N32442	POM-14	FY14-18	32442NR232	MA NASO DNA - Resource Protection Agreement	3.12.1	D, E, F	\$21,032.16		CNO FM Review (PENDING APPROVAL)	NR Guidebook Submission.
N32442	POM-16	FY16-20	32442NR201	1 S MA NASO DNA - Threatened & Endangered Species Inventory	3.5	D, E, F	\$105,840			
N32442	POM-16	FY16-20	32442NR202	CWA ¹ MA NASO DNA - Wetland Mapping Inventory	2.3.5 and 3.2	G, H, K	\$9,842			
N32442	POM-16	FY16-20	32442NR203	CWA MA NASO DNA - Mitigation Site Monitoring	2.3.7, 4.2.2, and 4.2.3	G, H, K	\$2,000			

UIC ¹	POM ¹ Cycle	Execution Year(s)	EPR ¹ #	Project Title	INRMP ¹ Section Reference	Prime Legal Driver/ Initiative ²	Estimate of Need	Actual Spent/ Executed	Status	Comments
N32442	POM-16	FY16-20	32442NR204	MBTA MA NASO DNA – Migratory & Breeding Bird Surveys	3.10.4	D, E, V	\$4,467			
N32442	POM-16	FY16-20	32442NR205	4 SAR MA NASO DNA – Species and Habitat of Concern Protection	3.5 and 3.7	D, F, G	\$19,329.36			
N32442	POM-16	FY16-20	32442NR206	SIKES MA NASO DNA – Forest Management	3.9	E, I, W	\$13,405.96			
N32442	POM-16	FY16-20	32442NR209	CWA MA NASO DNA – Soil & Water Conservation – Erosion Control	3.2.3 and 3.2.5	G, I, K	\$9,736			
N32442	POM-16	FY16-20	32442NR211	CHS MA NASO DNA – Landcover Mapping	1.13 and 2.4	D, E, M	\$88,827			
N32442	POM-16	FY16-20	32442NR215	CHS MA NASO DNA – Dune and Beach Restoration	3.7	F, H, I	\$44,732.24			
N32442	POM-16	FY16-20	32442NR216	EO ¹ 13112 MA NASO DNA – Habitat Management – Prescribed Fire	3.9.2	D, F, M	\$35,386.81			
N32442	POM-16	FY16-20	32442NR218	EO 13112 MA NASO DNA – Invasive Species	3.12.3	I, M, X	\$18,709.86			
N32442	POM-16	FY16-20	32442NR219	SIKES MA NASO DNA – Wildlife Emergency Response	3.12.1	D, E, F	\$1,337.68			
N32442	POM-16	FY16-20	32442NR220	4 SAR MA NASO DNA – Nuisance Wildlife Inventory, Asses & Remove	3.12.1	D, E, F	\$12,818			
N32442	POM-16	FY16-20	32442NR221	EFH MA NASO DNA – Fisheries, Ditches & Streams	3.10.3 and 3.11.3	G, Y	\$5,046.09			
N32442	POM-16	FY16-20	32442NR222	MSFCA ¹ MA NASO DNA – Outdoor Recreation Program Requirements	3.11	A, E, Y	\$2,313.46			
N32442	POM-16	FY16-20	32442NR223	SIKES MA NASO DNA – Equipment Storage Structures	1.4.1	E, G, I	\$903.06			
N32442	POM-16	FY16-20	32442NR224	SIKES MA NASO DNA – Equipment Maintenance & Repair	1.4.1	E, I, M	\$2,601.51			
N32442	POM-16	FY16-20	3244NR225	SIKES MA NASO/NALFF – Conservation Law-enforcement Vehicle	3.11.2	E, F, G	\$5,827.96			
N32442	POM-16	FY16-20	3244NR226	CHS MA NASO DNA – INRMP Updates and Planning	1.14 and 5.0	E, F, G	\$4,232.36			
N32442	POM-16	FY16-20	3244NR229	2 BO MA NASO DNA – Threatened & Endangered Species Survey – Sea Turtle	3.5	E, F, H	\$6,679.55			

UIC ¹	POM ¹ Cycle	Execution Year(s)	EPR ¹ #	Project Title	INRMP ¹ Section Reference	Prime Legal Driver/ Initiative ²	Estimate of Need	Actual Spent/ Executed	Status	Comments
N32442	POM-16	FY16-20	3244NR231	CHS MA NASO DNA – Nearshore Environment Assessment and Climate Change Assessments	3.1 and 3.6	D, E, F, J, T, Y	\$190,763.83			
N32442	POM-16	FY16-20	3244NR232	SIKES MA NASO DNA – Resource Protection Agreement	3.12.1	D, E, F	\$21,032.16			

¹Acronyms and Abbreviations **NAVY TO CONFIRM ACRONYM DEFINITIONS AND DEFINE HIGHLIGHTED ACRONYMS IN THIS LIST**

BO – Biological Opinion
BSO – Budget Submitting Office
CESU – Cooperative Ecosystem Studies Unit
CHS – Critical Habitat Survey
CLEO – Conservation Law Enforcement Officer
CNIC – Chief, Naval Installations Command
CNO – Chief of Naval Operations
CR – Cultural Resources
CWA – Clean Water Act
DNA – Dam Neck Annex
EFH – essential fish habitat
EPR – Environmental Program Requirements
ERL – Environmental Readiness Level
EO – Executive Order

EOY – end of year
FM – financial management
FY – fiscal year
GCE – Government Cost Estimate
HQ - Headquarters
INRMP – Integrated Natural Resources Management Plan
LE – law enforcement
MA – Mid-Atlantic
MBTA – Migratory Bird Treaty Act
MidLANT – Mid-Atlantic
Mgt. - management
ML -
MOA – Memoranda of Agreement
MSFCA – Magnuson-Stevens Fishery Conservation and Management Act



NASO DNA – Naval Air Station Oceana Dam Neck Annex
NAVFAC – Naval Facilities Engineering Command
NPLD – National Public Lands Day
NR – Natural Resources
NSS – Naval Support Station
POM –Program Objective Memorandum
S -
SAR – species at-risk
SPP -
SOW – scope of work
UIC – Unit Identification Code
USFWS – United States Fish and Wildlife Service
VDGIF – Virginia Department of Game and Inland Fisheries

²Legal Divers and Initiatives:

A Chief of Naval Operations Instruction (OPNAVINST) 5090.1C Change Transmittal (Ch-1)
B Department of Defense Instruction (DoDI) 4715.03, Natural Resources Conservation Program
C 32 Code of Federal Regulations (CFR) 190, Natural Resources Management Program
D Migratory Bird Treaty Act
E Sikes Act Amendment Act
F Endangered Species Act
G Clean Water Act
H Coastal Zone Management Act

I Soil and Water Conservation Act
J National Environmental Policy Act
K Executive Order (EO) 11990, Protection of Wetlands
L EO 11988, Floodplain Management
M EO 13112, Invasive Species
N EO 12962, Recreational Fisheries
O EO 11989, Use of Off-Road Vehicles on the Public Lands
P EO 13148, Greening the Government through Leadership in Environmental Management
Q Conservation Plan for the Southern Watershed Area (2001)
R CNO Guidance of Feral Cats and Dogs

S Draft Regional Tree Preservation and Replacement Instruction
T Marine Mammal Protection Act
U National Historic Preservation Act
V Bald and Golden Eagle Protection Act
W Forest and Rangeland Renewable Resources Planning Act
X National Invasive Species Act
Y Magnuson-Stevens Fishery Conservation and Management Act

UIC	POM Cycle	Execution Year(s)	EPR #	 Project Title	INRMP Section Reference	Prime Legal Drive/Initiative ¹	Estimate of Need	Actual Spent/Executed	 Status	Comments
N32442	POM-16	FY16-20	32442NR201	1 S MA NASO DNA - Threatened & Endangered Species Inventory		D, E, F	\$120,299			Non-Annual Recurring
N32442	POM-16	FY16-20	32442NR202	CWA MA NASO DNA - Wetland Mapping Inventory		G, H, K	\$9,842			Non-Annual Recurring
N32442	POM-16	FY16-20	32442NR203	CWA MA NASO DNA - Mitigation Site Monitoring		G, H, K	\$2,000			Annual Recurring
N32442	POM-16	FY16-20	32442NR204	MBTA MA NASO DNA - Migratory & Breeding Bird Surveys		D, E, V	\$4,467 - \$20,804			Non-Annual Recurring (Annual Recurring Surveys are being conducted by NAVFAC LANT).
N32442	POM-16	FY16-20	32442NR205	4 SAR MA NASO DNA - Species and Habitat of Concern Protection		D, F, G	\$19,329			Annual Recurring
N32442	POM-16	FY16-20	32442NR206	SIKES MA NASO DNA - Forest Management		E, I, W	\$13,406 - \$31,027			Non-Annual and Annual Recurring Components
N32442	POM-16	FY16-20	32442NR209	CWA MA NASO DNA - Soil & Water Conservation - Erosion Control		E, I, W	\$7,665 - \$14,651			Non-Annual Recurring, Annual Recurring, and Non-Recurring Components
N32442	POM-16	FY16-20	32442NR211	CHS MA NASO DNA - Landcover Mapping		D, E, M	\$88,827			Non-Annual Recurring
N32442	POM-16	FY16-20	32442NR215	CHS MA NASO DNA - Dune and Beach Restoration		E, G, H	\$44,732			Annual Recurring
N32442	POM-16	FY16-20	32442NR216	EO 13112 MA NASO DNA - Habitat Management - Prescribed Fire		D, F, M	\$35,387			Non-Annual and Annual Recurring Components
N32442	POM-16	FY16-20	32442NR218	EO 13112 MA NASO DNA - Invasive Species		M, I, X	\$18,710 - \$27,605			Non-Annual and Annual Recurring Components
N32442	POM-16	FY16-20	32442NR219	SIKES MA NASO DNA - Wildlife Emergency Response		D, E, F	\$1,338			Annual Recurring
N32442	POM-16	FY16-20	32442NR220	4 SAR MA NASO DNA - Nuisance Wildlife Inventory, Assess & Remove		D, E, F	\$12,818 - \$17,672			Non-Annual and Annual Recurring Components

UIC	POM Cycle	Execution Year(s)	EPR #	Project Title	INRMP Section Reference	Prime Legal Drive/Initiative ¹	Estimate of Need	Actual Spent/Executed	Status	Comments
N32442	POM-16	FY16-20	32442NR221	EFH MA NASO DNA - Fisheries, Ditches & Streams		G, Y	\$5,046 - \$31,017			Non-Annual and Annual Recurring Components
N32442	POM-16	FY16-20	32442NR222	MSFCA MA NASO DNA - Outdoor Recreation Program Requirements		A, E, Y	\$789 - \$2,314			Non-Annual and Annual Recurring Components
N32442	POM-16	FY16-20	32442NR223	SIKES MA NASO DNA - Equipment Storage Structures		E, G, I	\$904			Non-Annual and Annual Recurring Components
N32442	POM-16	FY16-20	32442NR224	SIKES MA NASO DNA - Equipment Maintenance & Repair		E, I, M	\$2,602			Annual Recurring
N32442	POM-16	FY16-20	32442NR226	CHS MA NASO DNA - INRMP Updates and Planning		E, F, G	\$4,232 - \$17,418			Non-Annual and Annual Recurring Components
N32442	POM-16	FY16-20	32442NR229	SIKES MA NASO DNA - Threatened & Endangered Species Survey – Sea Turtle		E, F	\$6,680			Annual Recurring
N32442	POM-16	FY16-20	32442NR231	CHS MA NASO DNA – Nearshore Environment and Climate Change Assessments		D, E, F, J, T, Y	\$190,764			Non-Annual Recurring
N32442	POM-16	FY16-20	32442NR232	SIKES MA NASO DNA - Resource Protection Agreement		D, E, F	\$21,032			Non-Annual and Annual Recurring Components

Legal Divers and Initiatives:

- A Chief of Naval Operations Instruction (OPNAVINST) 5090.1C Change Transmittal (Ch-1)
- B Department of Defense Instruction (DoDI) 4715.03, Natural Resources Conservation Program
- C 32 Code of Federal Regulations (CFR) 190, Natural Resources Management Program
- D Migratory Bird Treaty Act
- E Sikes Act Amendment Act
- F Endangered Species Act
- G Clean Water Act
- H Coastal Zone Management Act
- I Soil and Water Conservation Act

- J National Environmental Policy Act

K Executive Order (EO) 11990, *Protection of Wetlands*

L EO 11988, *Floodplain Management*

M EO 13112, *Invasive Species*

N EO 12962, *Recreational Fisheries*

O EO 11989, *Use of Off-Road Vehicles on the Public Lands*

P EO 13148, *Greening the Government through Leadership in Environmental Management*

Q Conservation Plan for the Southern Watershed Area (2001)

R CNO Guidance of Feral Cats and Dogs

S Draft Regional Tree Preservation and Replacement Instruction

T Marine Mammal Protection Act

U National Historic Preservation Act

V Bald and Golden Eagle Protection Act

W Forest and Rangeland Renewable Resources Planning Act

X National Invasive Species Act

Y Magnuson-Stevens Fishery Conservation and Management Act

Z Federal Insecticide, Fungicide, and Rodenticide Act

UIC	POM Cycle	Execution Year(s)	EPR #	Project Title	INRMP Section Reference	Prime Legal Drive/Initiative ¹	Estimate of Need	Actual Spent/Executed	Status	Comments
N32442	POM-18	FY18-22	32442NR001	1 CR MA NASO DNA Threatened & Endangered Species Survey – Sea Turtle		D, E, F	\$65,015			Non-Annual Recurring
N32442	POM-18	FY18-22	32442NR201	1 S MA NASO DNA - Threatened & Endangered Species Inventory		D, E, F	\$133,384			Non-Annual Recurring
N32442	POM-18	FY18-22	32442NR202	CWA MA NASO DNA - Wetland Mapping Inventory		G, H, K	\$9,633 - \$198,974			Non-Annual Recurring (Every 5-10 Years)
N32442	POM-18	FY18-22	32442NR203	CWA MA NASO DNA - Mitigation Site Monitoring		G, H, K	\$2,080			Annual Recurring
N32442	POM-18	FY18-22	32442NR204	MBTA MA NASO DNA - Migratory & Breeding Bird Surveys		D, E, V	\$44,438			Non-Annual Recurring (Annual Recurring Surveys Pulled Out into Separate EPR). (Every 5 Years)
N32442	POM-18	FY18-22	32442NR205	4 SAR MA NASO DNA - Species and Habitat of Concern Protection		D, F, G	\$10,531 - \$53,216			Non-Annual and Annual Recurring Components
N32442	POM-18	FY18-22	32442NR206	FRC MA NASO DNA - Forest Management		E, I, W	\$35,020			Non-Annual and Annual Recurring Components
N32442	POM-18	FY18-22	32442NR209	CWA MA NASO DNA - Soil & Water Conservation - Erosion Control		E, I, W	\$9,117 - \$30,500			Non-Annual Recurring, Annual Recurring, and Non-Recurring Components
N32442	POM-18	FY18-22	32442NR211	CHS MA NASO DNA - Landcover Mapping		D, E, M	\$61,713			Non-Annual Recurring
N32442	POM-18	FY18-22	32442NR215	CHS MA NASO DNA – Dune and Beach Restoration		E, G, H	\$52,288			Annual Recurring
N32442	POM-18	FY18-22	32442NR216	EO 13112 MA NASO DNA - Habitat Management - Prescribed Fire		D, F, M	\$23,760 - \$44,399			Non-Annual and Annual Recurring Components
N32442	POM-18	FY18-22	32442NR218	EO 13112 MA NASO DNA - Invasive Species		M, I, X	\$21,291 - \$54,508			Non-Annual and Annual Recurring Components
N32442	POM-18	FY18-22	32442NR219	SIKES MA NASO DNA - Wildlife Emergency Response		D, E, F	\$1,392			Annual Recurring
N32442	POM-18	FY18-22	32442NR220	4 SAR MA NASO DNA – Nuisance Wildlife Inventory, Assess & Remove		D, E, F	\$29,820 - \$56,749			Non-Annual and Annual Recurring Components
N32442	POM-18	FY18-22	32442NR221	EFH MA NASO DNA - Fisheries, Ditches & Streams		G, Y	\$3,810 - \$49,389			Non-Annual and Annual Recurring Components

UIC	POM Cycle	Execution Year(s)	EPR #	Project Title	INRMP Section Reference	Prime Legal Drive/Initiative ¹	Estimate of Need	Actual Spent/Executed	Status	Comments
N32442	POM-18	FY18-22	32442NR222	MSFCA MA NASO DNA - Outdoor Recreation Program Requirements		A, E, Y	\$705			Annual Recurring
N32442	POM-18	FY18-22	32442NR223	SIKES MA NASO DNA - Equipment Storage Structures		E, G, I	\$712			Annual Recurring
N32442	POM-18	FY18-22	32442NR224	SIKES MA NASO DNA - Equipment Maintenance & Repair		E, I, M	\$3,559			Annual Recurring
N32442	POM-18	FY18-22	32442NR226	CHS MA NASO DNA - INRMP Updates and Planning		E, F, G	\$8,826 - \$37,057			Non-Annual and Annual Recurring Components
N32442	POM-18	FY18-22	32442NR229	SIKES MA NASO DNA - Threatened & Endangered Species Survey – Sea Turtle		E, F, Z	\$6,957			Annual Recurring
N32442	POM-18	FY18-22	32442NR231	MSFCA MA NASO – Nearshore Environment Assessment		D, E, F, J, T, Y	\$458,779			Non-Annual Recurring (Every 5 Years)
N32442	POM-18	FY18-22	32442NR232	SIKES MA NASO DNA - Resource Protection Agreement		D, E, F	\$48,403			Non-Annual and Annual Recurring Components
N32442	POM-18	FY18-22	32442NR234	BAGEPA MA NASO DNA – Nesting Bald Eagle Surveys and Habitat Suitability Assessment		D, E, V	\$25,621			Annual Recurring
N32442	POM-18	FY18-22	32442NR235	1 S MA NASO DNA - Listed and SAR Bat Species Surveys and Tracking - NLEB		E, F	\$91,062			Non-Annual Recurring (Every 3 Years)
N32442	POM-18	FY18-22	32442NR236	3 S MA NASO DNA - Threatened & Endangered Species Survey – Monarch Butterfly Habitat		A, E, F	\$37,070			Non-Annual and Annual Recurring Components
N32442	POM-18	FY18-22	32442NR237	1 S MA NASO DNA - Threatened & Endangered Species Survey – Red Knot & Piping		A, E, F	\$14,510			Non-Annual and Annual Recurring Components (NAVFAC LANT has been conducting these surveys)
N32442	POM-18	FY18-22	32442NR238	MSFCA MA NASO DNA – Climate Change Assessments		A, B, E, F	\$80,759			Non-Annual and Annual Recurring Components

Legal Divers and Initiatives:

A	Chief of Naval Operations Instruction (OPNAVINST) M-5090.1	J	National Environmental Policy Act	T	Marine Mammal Protection Act
B	Department of Defense Instruction (DoDI) 4715.03,	K	Executive Order (EO) 11990, <i>Protection of Wetlands</i>	U	National Historic Preservation Act
C	Natural Resources Conservation Program 32 Code of Federal Regulations (CFR) 190, Natural Resources Management Program Migratory Bird Treaty Act	L	EO 11988, <i>Floodplain Management</i>	V	Bald and Golden Eagle Protection Act
D	Sikes Act Amendment Act	M	EO 13112, <i>Invasive Species</i>	W	Forest and Rangeland Renewable Resources Planning Act
E	Endangered Species Act	N	EO 12962, Recreational Fisheries	X	National Invasive Species Act
F	Clean Water Act	O	EO 11989, Use of Off-Road Vehicles on the Public Lands	Y	Magnuson-Stevens Fishery Conservation and Management Act
G	Coastal Zone Management Act	P	EO 13148, Greening the Government through Leadership in Environmental Management	Z	Federal Insecticide, Fungicide, and Rodenticide Act
H	Soil and Water Conservation Act	Q	Conservation Plan for the Southern Watershed Area (2001)		
I		R	CNO Guidance of Feral Cats and Dogs		
		S	Tree Preservation and Replacement Guidance		

Environmental Program Requirements Project Updates/Budget Execution Plans (Other Funding):

UIC ¹	POM ¹	Execution Year(s)	EPR ¹ #	Project Title	INRMP ¹ Section Reference	Prime Legal Driver/ Initiative ²	Estimate of Need	Actual Spent/ Executed	Status	Comments
N32442; N60191; N4275A	N/A ¹	FY ¹ 08	Ag ¹ Funds, 3LLSV0	Ag-Equipment Support and Maintenance	N/A	E, I, M			(AWARDED)	Funding not specifically tied to an existing EPR, but was identified in INRMP. Activity Scheduled All Funds Executed
N32442; N60191; N4275A	N/A	FY08	Ag Funds, 3LLSX0	Ag-Wildlife Habitat Enforcement	3.11	D, E, F			(AWARDED)	Activity Scheduled All Funds Executed
N32442; N60191; N4275A	N/A	FY08	Ag Funds	Ag-Travel & Training	1.12	A, E			(AWARDED)	Region Executed
N32442; N60191; N4275A	N/A	FY08	SIKES Act Account	SIKES Act Approved Appropriations Projects	5.3	E			(AVAILABLE)	Activity Scheduled Funds Executed as needed
N32442; N60191; N4275A	POM 08	FY08	Regional Overhead	Misc. ¹	N/A	N/A			(APPROVED)	Activity Scheduled All Funds allotted by the region to be Executed
N32442; N60191; N4275A	POM 08	FY08	61414A9512	Arbor Day Trees	3.11.4	A, E			(APPROVED)	Activity Scheduled All Funds allotted by the region and Executed
N32442	N/A	FY08	Legacy Funds	Dune Restoration NPLD ¹ Event	3.7	F, H, I			(AWARDED)	Activity Scheduled All Funds allotted by the region and Executed
N32442; N60191; N4275A	POM 08	FY09	Regional Overhead	Misc.	N/A	N/A			(APPROVED)	Activity Scheduled All Funds allotted by the region and Executed
N32442; N60191; N4275A	POM 08	FY09	61414A9512	Arbor Day Trees & NWA ¹ Wetland Mitigation.	3.2.1	K, S			(APPROVED)	Activity Scheduled All Funds allotted by the region and Executed
N32442; N60191; N4275A	N/A	FY09	Ag Funds	Nuisance Wildlife Control: Agricultural Fields	3.12.1	D, E, F			(NOT AWARDED)	Applied for but not received.
N32442; N60191; N4275A	N/A	FY09	Ag Funds	Habitat Conservation	3.7	D, F, G			(NOT AWARDED)	Applied for but not received.
N32442; N60191; N4275A	N/A	FY09	Ag Funds	Training & Travel	1.12	A, E			(NOT AWARDED)	Applied for but not received.
N32442; N60191; N4275A	N/A	FY09	Ag Funds	Equipment Support & Maintenance	1.4.1	E, I, M			(NOT AWARDED)	Applied for but not received.
N32442; N60191; N4275A	N/A	FY09	SIKES Act Account	SIKES Act Approved Appropriations Projects	5.3	E			(AVAILABLE)	Activity Scheduled Funds Executed as needed
N32442	N/A	FY09	Legacy Funds	Dune Restoration NPLD Event	3.7	F, H, I			(AWARDED)	Activity Scheduled All Funds Executed
N32442; N60191; N4275A	POM 10	FY10	Regional Overhead	Misc.	N/A	N/A			(APPROVED)	Activity Scheduled All Funds allotted by the region Executed

UIC ¹	POM ¹	Execution Year(s)	EPR ¹ #	Project Title	INRMP ¹ Section Reference	Prime Legal Driver/ Initiative ²	Estimate of Need	Actual Spent/ Executed	Status	Comments
N32442	N/A	FY10	Legacy Funds	Dune Restoration NPLD Event	3.7	F, H, I			(AWARDED)	Activity Scheduled All Funds Executed
N32442; N60191; N4275A	N/A	FY10	SIKES Act Account	SIKES Act Approved Appropriations Projects	5.3	E			(AVAILABLE)	Activity Scheduled Funds Executed as needed
N32442	N/A	FY11	Legacy Funds	Dune Restoration NPLD Event	3.7	F, H, I			(NOT AWARDED)	Applied for but not received.
N32442; N60191; N4275A	POM 10	FY11	Regional Overhead	Misc.	N/A	N/A			(APPROVED)	Activity Scheduled All Funds allotted by the region Executed
N32442; N60191; N4275A	N/A	FY11	SIKES Act Account	SIKES Act Approved Appropriations Projects	5.3	E			(AVAILABLE)	Activity Scheduled Funds Executed as needed
N32442	N/A	FY12	Legacy Funds	Dune Restoration NPLD Event	3.7	F, H, I			(AWARDED)	Planned.
N32442; N60191; N4275A	POM 12	FY12	Regional Overhead	Misc.	N/A	N/A			(APPROVED)	As needed.
N32442; N60191; N4275A	N/A	FY12	SIKES Act Account	SIKES Act Approved Appropriations Projects	5.3	E			(AVAILABLE)	As needed.

¹Acronyms and Abbreviations

Ag – Agriculture
EPR – Environmental Readiness Program
FY – Fiscal Year
INRMP – Integrated Natural Resources Management Plan

Misc. - Miscellaneous
N/A – Not applicable
NPLD – National Public Lands Day
POM –Program Objective Memorandum NSS – Naval Support Station

UIC – Unit Identification Code

²Legal Divers and Initiatives:

A Chief of Naval Operations Instruction (OPNAVINST) 5090.1C Change Transmittal (Ch-1)
B Department of Defense Instruction (DoDI) 4715.03, Natural Resources Conservation Program
C 32 Code of Federal Regulations (CFR) 190, Natural Resources Management Program
D Migratory Bird Treaty Act
E Sikes Act Amendment Act
F Endangered Species Act
G Clean Water Act
H Coastal Zone Management Act
I Soil and Water Conservation Act

J National Environmental Policy Act
K Executive Order (EO) 11990, Protection of Wetlands
L EO 11988, Floodplain Management
M EO 13112, Invasive Species
N EO 12962, Recreational Fisheries
O EO 11989, Use of Off-Road Vehicles on the Public Lands
P EO 13148, Greening the Government through Leadership in Environmental Management
Q Conservation Plan for the Southern Watershed Area (2001)
R CNO Guidance of Feral Cats and Dogs
S Draft Regional Tree Preservation and Replacement Instruction
T Marine Mammal Protection Act

U National Historic Preservation Act
V Bald and Golden Eagle Protection Act
W Forest and Rangeland Renewable Resources Planning Act
X National Invasive Species Act
Y Magnuson-Stevens Fishery Conservation and Management Act

Enclosure 2 Project Justification and Cost Estimate Information

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POM 18 Project Justifications & Cost Estimates

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist
Date Prepared: 02 July 2015

Project Number: 32442NR001
Project Title: 1 CR MA NASO DNA Threatened & Endangered Species Survey – Sea Turtle Lighting Assessments
Guidebook & Chapter: 12104

Legal Drivers:

Primary: Endangered Species Act
Secondary: SIKES Act
Tertiary: CZMA

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Non-Annual Recurring, FY2018, Split Quarters 1st (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana - Dam Neck Annex (NASO DNA)

Project Duration: (Estimated length of time and Start & End Dates) Non-Annual Recurring (Recurring every 5 years). 10 months (01 March 2018 – 31 Dec 2018)...subject to change due to project delays (i.e. weather conditions and mission training precluding scheduled surveys).

Project Description: (What does this project entail?) Conduct lighting assessments associated with the following Threatened and Endangered species: Sea Turtles. Utilize the most current USFWS and VDGIF issued guidance regarding completing these assessments. See 2015 NASO DNA Sea Turtle Lighting Assessment as a reference/example. Assessments should be completed at a minimum every 5 years.

Between 5 year assessments, offending light sources identified during an assessment should be retrofitted, replaced with a more appropriate lighting source, or other management action (timing and frequency of light use altered) taken to minimize the potential negative impacts from artificial lighting to sea turtles. This action is considered replacement, retrofitting, or modification of equipment associated with the operation and/or maintenance of real property. Given this information per CNIC POM-18 Programming Guidance, lighting remediation would not be funded by the Environmental Program.

During an informal consultation in 2014 with USFWS, VDGIF and the NAVY regarding the installation's Sea Turtle Management Program it was determined that as part of the installation's Biological Assessment a Lighting Survey would be required. It was also indicated that lighting Assessments should be routinely completed to determine if there are artificial light sources that could negatively impact sea turtles and to determine if lighting remediation actions have sufficiently addressed previously identified offending light sources.

Compliant INRMP Dated: 9 June 2015.

Comment [MFW1]: Likely to change to 2 BO. Current BO does not require this assessment; however to complete our BA for our programmatic BO it was required and hinted that this would be a recurring requirement. Frequency of recurring survey effort may also change upon issuing of the final programmatic BO.

Project Purpose: *(Why is this project needed?)* Conduct Lighting Assessments to support conservation of and provide guidance to be implemented on how to avoid negative impacts to nesting and hatching sea turtles protected under the Endangered Species Act. In accordance with the INRMP and USFWS and VDGIF Informal Consultations to minimize negative impacts to this T&E species.

Sea Turtles are confirmed to successfully nest and hatch on NASO DNA. Nesting period is typically from May-August. Hatching period is typically from July-October. Current guidance is that some sea turtles utilize instinct associated with natural lighting (the moon) to determine suitable nesting locations and to orient them to the water after hatching. Artificial lighting sources (non-moon lighting sources) have been shown to disorient sea turtles and lead them away from suitable nesting locations and lead them away from water after hatching resulting in death due to increased predator exposure and dehydration.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Maintains compliance with the Endangered Species Act and helps to prevent potential Notices of Violation and associated penalties, thus allowing those authorized military training and Morale and Welfare activities to continue on the beaches of NASO DNA.

Note, if no action is taken on remediation activities identified during assessment this could result in an NOV and be subject to legal penalties.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)*

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW).
2	Contract or Cooperative Agreement Award (CA).
3	Meetings, Monthly Updates, etc.
4	Equipment, Materials, and Supplies.
5	Services/Field Work/Assessments
6	Draft and Final Reports
8	Copies of all completed data sheets, photographs, spreadsheets, etc.
9	Draft and Final GIS Data Layers (In Navy Standard Format, i.e. WGS84) /GEODATABASE

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff/contractors to develop and obtain approvals of SOW and CA. Grantee will provide immediate notification of any nests and/or strandings to the NASO Navy Natural Resources Specialist upon observation. Assessment Grantee will document any offending light sources, provide type of light source/lighting structure/fixture, provide recommended retrofit or replacement solution of the offending light source, provide photographic documentation of the offending light source, and provide GPS information on the offending light source. Lighting Remediation Grantee will implement to the maximum extent practicable the recommendations identified during the lighting assessment(s) and coordinate these efforts with the installation Natural Resources Manager. The Navy will utilize this information to: update the INRMP; update the

GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; report to appropriate regulatory agencies, and to identify potential impacts to the military mission or any other concerns.

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)
 - Cost estimate number for lighting assessment was based off of 2015 Lighting Assessment project Award and requested Inhouse fees with the following applied annual inflation rates and rounded up to the nearest dollar: years prior-2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0% .
 - 2015 Awarded Project:
 - PM = Jessica Bassi
 - EPR Submitter = Jessica Bassi
 - Original EPR Title = Beachfront Lighting Survey and Biological Assessment for Sea Turtle Nest Management
 - Contract Awarded Amount = \$54,001.00
 - Inhouse Requested Fees (Jessica Bassi) = \$5,000.00
 - See Contract Award Documentation and Inhouse Fee Request documentation for details.

Project Requested Funding: (Recurring Funds Project within a given POM Cycle)

FY2018	FY2019	FY2020	FY2021	FY2022
0.00	\$0.00	\$65,014.14	\$0.00	\$0.00

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 02 July 2015

Project Number: 60191NR201; 32442NR201; 4275ANR201

Project Title: 1 S MA NASO/NALFF - Threatened & Endangered Species Inventory; 1 S MA NASO DNA - Threatened & Endangered Species Inventory; 1 S MA NSA NWA - Threatened & Endangered Species Inventory;

Guidebook & Chapter: 12104

Legal Drivers:

Primary: Endangered Species Act

Secondary: Sikes Act

Tertiary: Migratory Bird Treaty Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Non-Annual Recurring, FY2019 and FY2022 Split Quarters 1st (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO)/ Naval Auxiliary Landing Field (NALFF); NASO Dam Neck Annex (DNA); and Naval Support Activity Hampton Roads Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) 1 year, 6 months... subject to change due to project delays (i.e. weather conditions and mission training precluding scheduled surveys).

Project Description: (What does this project entail?) Conduct Presence/Absence Inventory of Federal and State Threatened and Endangered Species, Species At Risk (SAR) and Vegetation Communities of Concern. A complete updated list of known, potential T&E species (under all taxonomic groups), and SAR or watchlist species and vegetation communities will be developed and used to focus inventory surveying efforts. Surveys will be conducted utilizing standard techniques approved by USFWS, State Wildlife Programs, and DoD. Any ground disturbing techniques will have prior coordination with base planning and environmental to ensure no threats to resources, utilities, and surveyor safety.

Surveys will not be conducted for species that are covered by a more frequently conducted surveying effort that has already documented the presence of the species on the installation (e.g., sea turtle nesting surveys). Results from frequently conducted surveying efforts will be summarized and referenced in this report.

Project Purpose: (Why is this project needed?) Federal and State T&E/SAR species and community lists are not static. Species statuses change on those lists. Since most T&E inventories are focused towards looking for the specific species of concern listed at the time of the inventory surveys may not have been conducted which would have picked up species listed after the last inventory. Also, species themselves are generally not static: species move as landuse changes occur (human and wildlife competition for limited resources); weather & land conditions change and become favorable for certain species to “re-appear” (species lay dormant until that special trigger/niche is met); other wildlife bring in and establish a population of species of concern (raptors dropping fish into a water source, animals eating plants and dropping seeds, etc.); etc. Surveys are recommended to be conducted every 5 years. During this time frame, substantial land alterations both natural and man-made as well as species behavior/movement and inhabitation can change, all of which warrant an updated inventory.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Not funding this program would put the Navy at risk for being negligent to properly managing for species of concern on their bases. Not funding increases the

potential for violations of various Federal Laws to occur, including but not limited to the Endangered Species Act and the Sikes Act. Not properly managing for species of concern could: open the Navy and the Base to Lawsuits from the public; result in very costly mitigation and permitting requirements; and could stop or at least restrict military mission operations (resulting in loss of required military training and the associated costs with such a situation).

Funding this project could prevent most of the not-funding concerns. Funding this project would identify which species of concern are located on base and allow the Navy to better assess risks to military mission and allow the military to address the concerns accordingly and stop the need for an issuance of a military mission stopping violation. Also, funding a project which looks for both listed and species of concern for listing species will allow the base to manage on property, and develop off property partnerships to increase stability of species populations in an attempt to get species delisted or keep them from becoming listed (A GREAT Benefit to the Military Mission).

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* NA. Project was last funded in FY2012 for NASO/NALFF and NSA NWA and FY2014 for NASO DNA. Project is Non-Annual Recurring, every 5 years. However, project may be required more frequently if laws change, species are added to the Endangered Species List, or if a catastrophic event causes major change on base or within the ecosystem.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) or Contract & Support Documentation
3	Monthly Project Status Reports
4	Draft Final Report
5	PreFinal Report
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices)
7	Draft and Final GIS Data Layers/Geodatabase (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datasheets, sample collection info., photographs, etc.)
9	Maps
10	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA or conduct contract proposal bidding process. Grantee will provide monthly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports and GIS data will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS geodatabase, photographs, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission. (Grantee will also notify the Navy immediately if a species of concern is identified providing species name, GPS location, installation name, and photograph, if a camera is available and authorized for use.)

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)
 - Estimate was derived from taking the FY2012, FY2013, and FY2014 awarded contract final costs and requested Inhouse fees with the following applied annual inflation rates and rounded up to the nearest dollar: years prior-2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0% .
 - 2012-2014 Awarded Project:
 - PM = Emmett Carawan; Thad McDonald
 - Contract Awarded Amounts:
 - NASO/NALFF = \$249,273.00
 - NASO DNA = \$121,404.00
 - NSA NWA = \$203,499.86
 - Inhouse Requested Fees:
 - NASO/NALFF (Carawan) = \$10,974.00
 - NASO DNA (Carawan) = Details not provided to INRM.
 - NSA NWA (McDonald) = \$5,000.00
 - See Contract Award Documentation and Inhouse Fee Request documentation for details.

“The costs vary widely between Bases due to a number of factors including 1) the number of possible species, 2) the amount of available habitat, and 3) the known diversity of the sites. Our costs are generally lower than most because we can draw on a diverse, experienced staff and we have relatively low overhead. We rarely subcontract work, having a team of botanists, zoologists, and ecologist that regularly conduct inventories for almost all groups of animals and plants.” (VNHP)

Project Requested Funding: (Non-Annual Recurring Funds Project)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$0.00	\$133,383.54	\$0.00	\$0.00	\$0.00
NSA NWA	\$0.00	\$0.00	\$0.00	\$0.00	\$250,860.99
NASO/NALFF	\$0.00	\$0.00	\$0.00	\$0.00	\$313,832.13

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 2 July 2015

Project Number: 60191NR202; 32442NR202; 4275ANR202

Project Title: CWA MA NASO/NALFF - Wetland Mapping Inventory; CWA MA NASO DNA - Wetland Mapping Inventory; CWA MA NSA NWA - Wetland Mapping Inventory

Guidebook & Chapter: 12105

Legal Drivers:

Primary: Clean Water Act

Secondary: Coastal Zone Management Act

Tertiary: EO 11990

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) FY2015 & 2016, Split Quarters 2nd (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO) & Naval Auxiliary Landing Field (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); and Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) ...subject to change due to project delays (i.e. weather conditions and mission training precluding scheduled surveys).

Re-evaluations of Existing Baseline Inventory, every 5 years:

NASO = 6 months. (01 May 2015 – 01 Nov 2015)

NALFF = 6 months. (01 May 2016 – 01 Nov 2016)

NASO DNA = 6 months. (01 May 2016 – 01 Nov 2016)

NSA NWA = 6 months. (01 May 2016 – 01 Nov 2016)

Baseline inventory, every 10 years:

NASO = 6 months. (01 May 2021 – 01 Nov 2021)

NALFF = 6 months. (01 May 2022 – 01 Nov 2022)

NASO DNA = 6 months. (01 May 2022 – 01 Nov 2022)

NSA NWA = 6 months. (01 May 2022 – 01 Nov 2022)

Project Description: (What does this project entail?) Conduct the “5 year” baseline wetland inventory re-evaluation (finalized re-evaluation due 6 months prior to every 5 year baseline or re-evaluation completion date) and new “10 year” baseline wetland delineations. Re-evaluation includes verification of previous inventory boundaries and updating the boundaries as necessary to reflect changes in the wetland property boundaries. Baseline wetland delineations reassess the existing boundaries, identify new wetland areas, and remove new upland areas from within the boundaries of previously delineated wetland areas. Surveyors must map all parcels utilizing updated USACE standard wetland mapping protocols. The people who conduct these surveys should have experience in conducting wetland delineations in Southeastern VA and Northeastern NC as this area is notoriously difficult to survey accurately for wetlands, even for trained professionals conducting wetland delineations in other regions of the US. Any ground disturbing techniques will have prior coordination with base planning and environmental to ensure no threats to resources, utilities, and surveyor safety.

Note: If 5 year re-evaluations are not completed 6 months prior to existing wetland delineation's 5 year USACE expiration date, then a new baseline inventory/wetland delineation may be required, which will substantially increase the costs associated with that 5 year wetland delineation re-evaluation.

Only areas on bases that are not scheduled to be mapped under the baseline wetland mapping efforts, and thus not subject to 5 /10 year re-evaluations, are those properties that fall within agricultural leases. If the property is to be removed from agricultural production the property will then be evaluated for wetlands. Note: Main Base stormwater ditches that run through agricultural fields will be or have been assessed for inclusion in baseline wetlands inventories (shallow agricultural ditches have not been assessed).

Project Purpose: *(Why is this project needed?)* Substantial land alterations both natural and man-made can occur in a 5 and 10 year time spans. These alterations impact land classifications from wetland to upland and vice versa within this 5 year period. The changing classification potential warrants an updated mapping effort. USACE guidance and permitting requirements indicate that wetland inventories should be re-evaluated every 5 years for accuracy and adjusted accordingly.

Updating the data layers will provide the base staff with better information for reporting, protecting, and species of concern modeling purposes. This updated information should also help base staff, Navy HQ staff, DoD staff, etc. to make more informed property management decisions.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Funding this program would allow the base to better plan projects and mission training assignments. Besides construction threats to wetlands and water quality there are also temporary training exercises which threaten the integrity of wetland habitats. Impacts to these habitats could result in Notices of Violation and costly regulatory mitigation requirements.

Providing a better map of known wetland areas will allow planners: to attempt to avoid wetland impacts; to plan for funding and conducting jurisdictional determinations; to plan for funding and processing required permits; to plan for and fund mitigation requirements; and to plan for and fund NEPA documentation and surveying requirements. Being able to better plan around potential wetland concerns will save time and money because there will be fewer unplanned delays and interruptions to contract awarded projects and military training exercises.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* Each installation has conducted an initial basewide wetland inventory between 2011 and 2012 with the exception of the agricultural parcels. Costly delays can occur if evaluations are not conducted 6 months prior to the established USACE Wetland Delineation expiration dates for each installation. POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) or Contract & Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report
5	PreFinal Report
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices)
7	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datasheets, sample collection info., etc.)
9	Maps

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission.

Cost Estimations:

• How was estimate derived? *(Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.)*

- Estimate number one was provided by US Army Corps of Engineers (USACE) for re-evaluating an existing jurisdictionally determined baseline wetland inventory, rounded to the nearest dollar value. USACE is considered the federal technical expert in this field, but is not always available to provide such extensive in-field services. Original cost estimate was provided in accordance with how many man hours USACE thought they would spend on a given base re-evaluating lines. The Cost/acre estimate was derived given the provided man-hours cost estimate.
- Estimate number two was provided by GeoMarine Inc. (GMI) for the re-evaluation of an existing jurisdictionally determined baseline wetland inventory. GMI is a current Navy contracted service provider, and has conducted wetlands mapping on these bases in previous years. This quote is a gross over-estimate of what the cost would be for a typical 5 year re-evaluation. This quote is more directed towards completing a totally new baseline survey, which may be required every 10 years.
- Estimate number three was based off of a quote provide by the NAVFAC MIDLANT Regional Natural Resources office for the re-evaluation of an existing jurisdictionally determined baseline wetland inventory to be conducted by a contracted certified wetlands biologist. Both a 5yr re-evaluation and 10yr baseline estimate was provided.
- POM 18 Estimates were derived utilizing estimate number three and it’s associated FY2007-2012 awarded contract final costs and requested Inhouse fees with the following applied annual inflation rates and rounded up to the nearest dollar: years prior-2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0% .

• Estimate #1 (From POM16):

- **US Army Corps of Engineers Estimate (5yr re-evaluation):**

BASE	ACREAGE	~COST/ACRE	~2011 TOTAL COST	~2015 or 2016 Cost
NASO/NALFF	5732/2601	\$3.00	\$24,999.00	\$27,373.91
NASO DNA	1764	\$3.00	\$5,292.00	\$5,794.74
NSA NWA	3665	\$3.00	\$10,995.00	\$12,039.53

• Estimate #2 (From POM16):

- **Contract Vendor Estimate (~10yr baseline):**

BASE	ACREAGE	~COST/ACRE	~2011 TOTAL COST	~2015 or 2016 Cost
NASO/NALFF	5732/2601	\$87.00	\$724,971.00	\$793,843.25
NASO DNA	1764	\$ 87.00	\$153,468.00	\$168,047.46
NSA NWA	3665	\$ 87.00	\$318,855	\$349,146.23

• **Estimate #3 (From POM16):**

- **NAVFAC MIDLANT Estimate (5yr re-evaluation):**

BASE	ACREAGE	~COST/ACRE	~2011 TOTAL COST	~2015 or 2016 Cost
NASO	5732	\$5.00	\$28,660.00	\$31,383.00
NALFF	2601	\$5.00	\$13,005.00	\$14,511.00
NASO DNA	1764	\$ 5.00	\$8,820.00	\$9,842.00
NSA NWA	3665	\$ 5.00	\$18,325.00	\$20,447.00

- **NAVFAC MIDLANT Estimate (~10yr baseline):**

BASE	ACREAGE	~COST/ACRE	~2011 TOTAL COST	~2020 Cost
NASO/NALFF	5732	\$95.00	\$544,540.00	\$648,002.60
NASO/NALFF	2601	\$95.00	\$247,095.00	\$294,043.05
NASO DNA	1764	\$95.00	\$165,000.00	\$180,675.00
NSA NWA	3665	\$ 95.00	\$348,175.00	\$381,251.63

POM18 Project Requested Funding: (Non-Annual Recurring Funds Project)...note, FY2016 and FY2017 are provided as place holders in the event that funding

BASE	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022
NASO/NALFF	\$30,146.65	\$13,925.83	\$0.00	\$0.00	\$0.00	\$0.00	\$643,785.64	\$297,972.12
NASO DNA	\$0.00	\$9,633.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$198,973.67
NSA NWA	\$0.00	\$20,014.96	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$419,864.59

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist
Date Prepared: 2 July 2015

Project Number: 60191NR203; 32442NR203; 475ANR209
Project Title: CWA MA NASO/NALFF - Mitigation Site Monitoring; CWA MA NASO DNA - Mitigation Site Monitoring; CWA MA NSA NWA - Mitigation Site Monitoring

Guidebook & Chapter: 12105

Legal Drivers:

Primary: Clean Water Act
Secondary: Coastal Zone Management Act
Tertiary: EO 11990

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) FY2016-2020, Split Quarters 2nd (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field (NALFF); NASO Dam Neck Annex (DNA); and Naval Support Activity Hampton Roads Northwest Annex (NSA NWA).

Project Duration: (Estimated length of time and Start & End Dates) Annual.

Project Description: (What does this project entail?) Conduct wetland mitigation site and project site wetland monitoring in accordance with issued legally mandated permit requirements. Surveys include but are not limited to: flora and fauna density, diversity and abundance assessments; hydrology assessments; etc. Any ground disturbing techniques will have prior coordination with base planning and environmental to ensure no threats to resources, utilities, and surveyor safety.

Project Purpose: (Why is this project needed?)

There have been several areas on base that have resulted in mitigation monitoring requirements due to Notices of Violations (NOVs) and new Construction permit requirements. The permits associated with the NOVs and Construction required wetland mitigation projects to be established.

There are several mitigation sites on NASO and NALFF; however currently, there is only 1 outstanding project (Aeropines), funded by the Navy, which has not completed the monitoring requirements established under its permit. Required to evaluate hydrology and vegetation at 1- (2006), 2- (2007), 3- (2008), 5- (2010), 7-(2012), and 10- (2015) years. Aeropines is slated to meet its permitted requirements in FY 2016.

There is one additional project (Wherry Housing) which has met its monitoring requirement, but has not yet received concurrence of completion by the state regulatory office.

There are several wetland mitigation sites at NASO DNA. We have not yet received a letter of concurrence by the state or USACE regulatory offices indicating that the Lovett's Marsh Mitigation

site has met its mitigation requirements; however monitoring of the site has been completed in accordance with permit requirements.

There are several mitigation sites on NSA NWA. One site, MOUS-P-131, has not received a letter of concurrence that the site has met the mitigation criteria. Quarterly photos of the site are taken and reporting continues until notice of compliance is received.

Annually, each installation has projects that require wetland site monitoring, remarking of wetland boundaries, and many time coordination with regulatory agencies regarding permits and mitigation requirements. The wetlands media manager at NAVFAC MIDLANT CORE who handles wetland permitting and mitigation is reimbursable and requires funding annually for these services.

Also, existing mitigation sites that have met there permitted requirements, need to be revisited to ensure that the sites are functioning as planned. If they are not functioning as planned conservation recommendations should be developed to make the sites functioning wetlands. (Unless it is specified directly as permit requirement, successional changes will not be considered a functioning wetland concern that would warrant additional conservation recommendation development, such as conversion of forested wetland to emergent wetland.)

Additional funding may be requested in future POM cycles as additional mitigation site monitoring becomes required. The Navy will first pursue obtaining mitigation banking credits or creating wetland off base in lieu of further restricting training property by constructing new wetlands on base. In some cases this is not possible and mitigation will be required on base. It is anticipated that there may be some wetland mitigation monitoring requirements established due to implementing the Clear Zone Management Plan (CZMP). The CZMP is in draft form and has an EA in development. Wetland impacts and mitigation requirements have not yet been finalized.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Not funding this exhibit may result in the issuance of another Notice of Violation and additional mitigation requirements may be issued. Additional funds may have to be redirected from some other mission requirement to fund this project. Additionally, additional land may have to be encumbered and removed from being utilized for military training.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

Itemized list below is for a standard mitigation site monitoring project. For general wetland monitoring and coordination with regulatory agencies, that effort will be documented via multiple avenues such as consultation coordination documentation, permits, emails, etc.

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) or Contract & Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report
5	PreFinal Report
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices)

7	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datasheets, sample collection info., etc.)
9	Maps
10	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission. Final report will be submitted to the permit issuing regulatory agency in accordance with the wetland mitigation agreement.

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)
 - Estimate was derived based on previous site mitigation monitoring conducted by GeoMarine Inc. (GMI) contracted and NAVFAC MIDLANT CORE Wetlands Media Manager inhouse support with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0% .
 - Estimate does not include unknown/potential site mitigation requirements.
- **Estimate #1 (From POM16):**
 - **Contract Vendor & Inhouse Support Estimate (Previous Similar Project):**

BASE	~2012 TOTAL COST	~2015 COST (1.7% annual inflation est.)	~2016 COST (1.9% annual inflation est.)
NASO/NALFF	\$9,411.00	\$9,957.91	\$2000.00
NASO DNA	\$0.00	\$0.00	\$2000.00
NSA NWA	\$0.00	\$0.00	\$2000.00

POM 18 Project Requested Funding: (Annual Recurring Funds Project)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO/NALFF	\$2,080.80	\$2,122.42	\$2,164.86	\$2,208.16	\$2,252.32
NASO DNA	\$2,080.80	\$2,122.42	\$2,164.86	\$2,208.16	\$2,252.32
NSA NWA	\$2,080.80	\$2,122.42	\$2,164.86	\$2,208.16	\$2,252.32
TOTAL:	\$6000.00	\$6,114.00	\$6,230.16	\$6,348.54	\$6,469.17

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 2 July 2015

Project Number: 32442NR204

Project Title: MBTA MA NASO DNA - Migratory & Breeding Bird Surveys

Guidebook & Chapter: 12101

Legal Drivers:

Primary: Migratory Bird Treaty Act

Secondary: Bald and Golden Eagle Protection Act

Tertiary: Sikes Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) FY2018-FY2020, Split Quarters 2nd (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana - Dam Neck Annex (NASO DNA)

Project Duration: (Estimated length of time and Start & End Dates) 1 year, 5 months for each 5th year more detailed reporting cycle. Time estimates are subject to change due to project delays (i.e. weather conditions and mission training precluding scheduled surveys) and will be handled on a case by case basis.

Annual recurring shorebird assessments have been reclassified under a new EPR Number for Better Tracking purposes since the surveys are tied to 2 specific threatened and endangered species (Piping plover and Red knot).

Project originally requested to conduct the detailed reporting cycle every 3 years after further coordination with NAVFAC MIDLANT CORE Conservation Division staff the frequency was changed to every 5 years unless something occurs that would warrant an evaluation sooner, such as major landuse changes, major ecosystem impacts from storm damage, new/updated species survey requirements, etc.

Project Description: (What does this project entail?) Conduct migratory and breeding bird surveys to establish bird population, activity (Feeding, Breeding, Stop-over, Flight Pattern, etc.), frequency and habitat utilization data.

Conduct seasonal (Winter, Spring, Summer, and Fall) bird surveys to determine use by migrating, breeding, and wintering birds in each habitat type (open grasslands, upland hardwood forest, pine forest, bottomland hardwood forest, dune & swales, ocean front, etc.). Migratory and breeding bird surveys should be repeated in 5 year intervals to show bird utilization trends and impacts to bird populations from land use impacts by the military. Project should consist of day and night time surveys. In addition to traditional surveys data collection (population size estimates, species ID, habitat location, etc.) should included assessment of flight patterns (types of flocking/migrating species, numbers in flocks, flight directions, etc.).

Project may identify additional survey need requirements particularly if species with additional warranted protection requirements are identified (including: Federally Listed Species under various acts; and non-Federal T&E listed species that are federally and State recognized Species of Concern,

which pose a mission threat or are in danger of potentially becoming a candidate for listing under the Endangered Species Act). If these needs are identified, then additional Projects will be requested at that time.

Project Survey Methodologies will be developed in coordination with the Installation Natural Resources Manager, DoD Coordinated Bird Monitoring Program, and INRMP signatory partners (USFWS and appropriate VA State Wildlife Agency).

Project Purpose: *(Why is this project needed?)* Currently, this base does not have sufficient biological information to determine if they are negatively impacting bird species of concern. This lack of information puts the Navy at risk for violating several federal and state laws. In addition to federally mandated requirements, Navy and State Policies and Plans dictate that we should have a working knowledge of our impacts to wildlife. This EPR exhibit works to get the Navy in compliance with these requirements.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Surveys of bird utilization on the base are necessary to understand how mission requirements will affect bird species of concern. MBTA, ESA, and BAGEPA listed species all utilize these bases and have the potential to have negative impacts on the mission. Not knowing the potential impacts to the species by military mission projects and training could cause a violation of any one of these federal laws and result in a NOV, which would be costly and put additional restrictions on military training property. Knowing in advance what potential concerns there are would allow the command to plan around avoiding potential impacts and to plan for permitting and mitigation requirements, which may be needed to meet military training requirements.

Though the primary mission of NASO DNA is more classroom oriented there are still helicopter, drone launch and approach and departure corridors for NASO, NALFF, and Chambers Field which utilize the air space over and on NASO DNA. As such there is still a BASH component associated with this base. Understanding usage and annual migration patterns in the various habitat types, including the airfield clear zones, aircraft flight paths and landing zones is a vital step to reducing BASH hazard on the bases. Data to quantify and qualify potential take are required for obtaining and maintaining a bird depredation permit for clear zone management (BASH reduction efforts). Permits are managed through the Natural Resources program.

In addition, with the increase for renewable energy resources there is a strong push to place wind-turbines on NASO DNA since it is located on the ocean front. At this time there is not sufficient scientific data for this area to prove negative impacts associated with this potential upcoming mission. The biologists for the base through antidotal data and personal knowledge draw personal conclusions to the negative impacts but have no scientific data for the base to prove their case.

This is not just a Natural Resources wildlife concern this is a Safety Concern.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) or Contract & Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report
5	PreFinal Report
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices)
7	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datasheets, sample collection info., etc.)
9	Maps
10	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission. In general the data will be utilized to identify any trends in impact to bird species of concern given the various military missions, it will be used to identify potential habitat modification requirements to minimize bird strikes, it will be used to update Bird Depredation Permits where required, and it will be used to help in conducting planning level reviews of proposed projects and activities with consideration for impacts to wildlife and the mission.

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)
 - Cost estimation was derived from the FY2012 contracted previous surveys of a similar nature for each installation with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0% .
 - 2012 Contract Award = \$39,139.70
 - 2012 Inhouse Fee = \$1,546.00
 - See Execution documents for details.

Project Requested Funding: (Non-Annual Recurring Funds Project)

BASE	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$44,438.00	\$0.00	\$0.00	\$0.00	\$0.00	\$49,063.00

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 06 July 2015

Project Numbers: 60191NR205; 32442NR205; 4275ANR205

Project Title: 4 SAR MA NASO/NALFF - Species and Habitat of Concern Protection; 4 SAR MA NASO DNA - Species and Habitat of Concern Protection; 4 SAR MA NSA NWA - Species and Habitat of Concern Protection

Guidebook & Chapter: 12104

Legal Drivers:

Primary: Endangered Species Act

Secondary: Clean Water Act

Tertiary: Migratory Bird Treaty Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual, Split Quarters 2nd (85%) and 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) Annual as needed.

Project Description: (What does this project entail?)

Implement various habitat enhancement and restoration projects in support of Species of Concern and Habitats of Concern in accordance with the resource's management plan. Obtain appropriate surveys and assessments and monitoring of project areas.

Develop plans that benefit multiple species of concern.

(See project justification and cost estimate documents current proposed project details).

Project Purpose & Impact/Benefit to Military Mission: (Why is this project needed? How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Projects allows the base to maintain compliance with the: Endangered Species Act; Migratory Bird Treaty Act; Sustainable Fisheries Act Amendment to the Magnuson-Stevens Fishery Conservation and Management Act in 1996; the Chesapeake Bay Preservation Act; the Clean Water Act; Essential Fish Habitat protection; OPNAVINST M-5090.1; base INRMPs; Sikes Act; and numerous other plans including but not limited to the: Southern Watershed Area Management Plan (SWAMP); Lynnhaven River Watershed Restoration Plan (sub of Chesapeake); and Back Bay Watershed Restoration Plan (sub of southern).

The waterways of NASO, NALFF, NASO DNA, and NSA NWA connect to several watersheds which all have the potential to influence Essential Fish Habitat (EFH) within the Atlantic Ocean, and Chesapeake Bay.

These projects support wetland enhancement & protection, T&E species & habitat protection, soil and water protection, and recreational opportunity enhancement and protection.

Installations provide a unique mix of urban, suburban, and rural interfaces that provide both beneficial and detrimental habitat conditions to various species. For example, the installation’s utility infrastructure provides nesting, perching, and roosting structures ideal to some species. This same infrastructure creates obstacles that kill some species (fires that burn nests, electrocution, “clothes-ligning”/direct impacts, etc.). Typically, when there is a negative encounter such as a fire there is a resulting loss of utility service. The loss in service negatively impacts the military mission by interrupting training and readiness activities, daily business, and security measures. Measures can be put into place to minimize negative wildlife interactions with utility infrastructure and minimize and avoid power outages.

Maintaining compliance with Federal and State Laws, Regs, and Conservation Goals, helps to ensure that DoD Lands will not be further restricted from military utilization, and helps to ease permitting requirements when new military actions are proposed.

Project Delay: *(Project was POM’d for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)*

Proposed Deliverables: (Also see cost estimate section.)

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) Contract, Purchase Order, and/or Work Order & Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report
5	PreFinal Report
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices)
7	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datasheets, sample collection info., etc.)
9	Maps
10	Ground-truthing
11	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission. Navy staff will implement those portions of this EPR exhibit inhouse as identified (see cost estimate).

Cost Estimations:

• **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)

- Estimates have been based off of contract vendor supplied quotes provided during the revision of the NASO/NALFF INRMP in 2008 and FY2012 - FY2015 funded projects with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%.

Project:	2015 Est Cost:	Comments:
SIAAs (NASO, NALFF, NASO DNA & NSA NWA)	0.00	Internal assessment, other projects will provide necessary information for management (invasives, erosion, nuisance, etc.)
Continue protection of potential Dismal Swamp southeastern shrew habitat. (NALFF & NSA NWA)	0.00	Internal assessment, other projects will provide necessary information for management (invasives, erosion, nuisance, etc.)
Control pine, sweetgum, and other competing species around the South out parcel Long-leaf pine area (NASO DNA and NASO)	0.00	Internal assessment, other projects will provide necessary information for management (invasives, erosion, nuisance, prescribed burn, etc.)
OC Pond Access Rd Repairs 5 year rotation with gravel (consult with regulators to see if we should just pave)...protect wetlands and other habitats and resources. (NASO)	0.00	Requested under separate EPR under erosion control. Actual Road Repairs are now FMD responsibility, CN worked to get funding for initial repairs in 2006/2007, once that was completed FMD was to take on maintenance requirements.
Evaluate restoring Mill Stream to restore floodplain function by installation of a water control structure above the Wilderness Road bridge. (NSA NWA)	0.00	On hold. Need to wait until after the Correctional facility is completed to identify structure placement and potential effects. Also, in the process of re-evaluating this as the most beneficial option...2012 and 2013 field work results from Erosion Control and Stream Assessments are being compared with the prior control structure finding to determine the most appropriate and beneficial restoration to be completed.
Landscape Parking lot on Regulus Ave. across from Build. 127 (NASO DNA)	0.00	After discussions with planning there are some future plans for this area to include a potential parking garage. Will coordinate to make this a "green structure."
Signs (Canebrakes, Dunes Wetland Mitigation, Interpretive Signs, Nesting Keep Out, etc.) (NASO, NALFF, NASO DNA, & NSA NWA)	10,000.00	As needed.
Posts (NASO, NALFF, NASO DNA, & NSA NWA)	3,500.00	As needed. Metal and Wood varying sizes.
Nuts & Bolts (NASO, NALFF, NASO DNA, & NSA NWA)	250.00	As needed. Varying sizes and types.
Shelving (NASO, NALFF, NASO DNA, & NSA NWA)	5,000.00	For storage of Signs and equipment associated with these projects.
Post hole pounder (NASO, NALFF, NASO DNA, & NSA NWA)	2,000.00	Custom Made, anticipate Shops or Brig to construct. Market research did not produce the size pounder required.

Project:	2015 Est Cost:	Comments:
Canebrake Study Habitat Enhancement.	10,000.00	Survey work and habitat enhancement projects. Survey work has been relocated under another EPR for NALFF due to State Listing tracking for ESA purposes. NWA surveys are no longer being funded, project has run its course. Habitat Enhancement still falls under this EPR due to mult. Species benefit.
Atlantic White cedar, Control pine, sweetgum, and other competing species at: the Coast Guard complex stand (NSA NWA); and the south runway stand. (NALFF)	2,000.00	Internal assessment, other projects will provide necessary information for management (invasives, erosion, nuisance, etc.). Planting is the only funding requirement
Brochures (Wetland Habitat, Dune Habitat, Fishing, Hunting, Trapping, Archery, Snakes, Bears, Feral Cats, Birding Checklists, Nature Trails, Invasive Species, etc.)	1,500.00	Printing & shipping costs.
Convert Mowed areas to "Natural Areas" (Warm season grass plots, wildflower plots, Bobwhite Quail Habitat, etc.)	8,000.00	Seed and equipment rental. Mngt covered under other EPRs and inhouse work.
Golf Course Ponds	8,000.00	Habitat alterations pending results from FY13 assessment. FY13 Project has been realigned under NR221 series EPRs. This EPR will address implementation of habitat alterations due to multi-species benefits.
Fish habitat enhancement (Lunker Lake, Sadler ponds, OC pond, Redwing Lake)	15,000.00	Assessment handled under separate EPR. This EPR is for implementation.
Maintain Access ways and protection corridors for Species of Concern and Habitat Restoration Sites.	2,000.00	
Develop Avian/Flying Mammal Protection Plans	141,400.00	NASO, NALFF, NASO DNA , and NSAHR NWA Contract ~\$35,000ea; Inhouse ~\$3,500ea. Every 5 years. Will work with Utility Departments to develop plans for Utilities to Implement. Request first year to fund 2018, if not sooner. Utilize USFWS and State Wildlife Agency(ies) guidance for development. Also, utilize other DOD plans for reference.
Conduct Dune Delineations	35,000	DNA Only. Every 5 years. Next years to funded 2017 and 2022.
Write in Rain Paper	100.00	Annual Recurring
Write in Rain Notebook	30.00	Annual Recurring
Write in Rain Pens	40.00	Annual Recurring
Camera Photo Download Docking Station	500.00	As needed.
Flagging	100.00	As needed, Possibly Annual Recurring.
Flags	400.00	As needed, Possibly Annual Recurring.
Unplanned Species and/or Habitat Projects that support the INRMP and that have INRM, and appropriate other signatory Agency(ies) concurrence as such...typically discussed during INRMP metrics annual reviews.	Unk.	Funding for this EPR can be utilized to fund other Species or Habitat Projects for NASO, NASO DNA, NALFF and/or NSA NWA that have been deemed to take precedence over the scheduled funding plan.

Project Requested Funding: (Recurring Funds Project within a given POM Cycle)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO/NALFF	\$130,922.38	\$46,567.31	\$47,598.66	\$48,448.63	\$49,417.60
NASO DNA	\$53,215.60	\$10,530.57	\$10,741.19	\$10,956.01	\$52,175.72
NSA NWA	\$62,890.28	\$20,651.01	\$21,064.03	\$21,485.31	\$21,915.02

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 06 July 2015

Project Numbers: 60191NR206; 32442NR206; 4275ANR206

Project Title: FRC MA NASO/NALFF - Forest Management; FRC MA NASO DNA - Forest Management; FRC MA NSA NWA - Forest Management

Guidebook & Chapter: 12108

Legal Drivers:

Primary: USC1215:32 U.S.C 1251 et seq (forestry) Forest and Rangeland Renewable Resources Planning Act

Secondary: FRCSRA620 Forest Resources Conservation and Shortage Relief Act

Tertiary: Endangered Species Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) FY2018-2022, Split Quarters 2nd (85%) and 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) 15 months for baseline forest inventories (once every 5 years for baseline inventories or as deemed necessary due to major land or mission changes); annually/seasonally for disease and storm damage inspections and general forest management requirements.

Project Description: (What does this project entail?) Conduct an inventory and assessment of urban, natural, and timber harvest forest conditions every 5 - 10 years or sooner as deemed necessary due to major land or mission changes. Conduct annual inspections and assessments of forest habitats to identify potential disease and insect outbreaks, and storm damage concerns. Utilize the inventories and assessments and inspections as guides to: establish and conduct routine pre-commercial thinning and maintenance; provide guidance to appropriate commands for hazard tree removal; and implement arboricultural treatments as recommended and appropriate.

Project Purpose & Impact/Benefit to Military Mission: (Why is this project needed? How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Proper management of forest resources aides the military mission in multiple ways, to include but not limited to: creating realistic conditions for in field military training; creating noise buffers around ranges; creating visual and access buffers around sensitive training facilities; reducing/removing height obstructions associated with various mission requirements; reducing the potential for species of concern to become listed under the Endangered Species Act; etc.

Land changes include: timber harvests; building construction; severe weather conditions (drought, lightening fires, ice storms, hurricanes, tornadoes, etc.); disease outbreaks; etc. Stand condition analyses are needed to determine hazardous conditions, commercial value, and value to species of concern.

SIKES ACT, 10 USC 2665, DoDINST 7310.5 AND OPNAVINST M-5090.1 requires that Naval bases manage appropriate forested areas for multiple use and optimum sustainable yield of forest products consistent with other Natural Resources programs. Forest stand improvement methods are required at NASO, NALFF, NASO DNA, and NSA NWA to maintain existing forested stands. If project is not funded the bases will be out of compliance with one or more of the following: DoD and Navy policies, the 1990 Forest Suppression Memorandum of Agreement between Dept. of Agriculture and DoD, the Chesapeake Bay 2000 Agreement, the Clean Water Act phase II program, the Sikes Act, the Soil and Water Conservation Act, the Forest Resource Conservation and Shortage Relief Act, and/or the Forest and Rangeland Renewable Resources Planning Act of 1974 (or RPA).

Preservation of existing urban resources and proper management of natural and commercial forest stands is important to meeting the nutrient reduction and non-point source pollution control objectives of the Chesapeake Bay Agreement, the Clean Water Act and other Federal and State plans, and policies. Proper management also promotes thermal protection of waterways, and benefits to morale and welfare.

Trees are natural energy efficiency promoters/increasers. Trees provide shading/cooling and insulating benefits to structures and people working outside. Properly managing trees and landscaping in the Urban areas of the bases additionally supports the Navy’s Policy and Goals towards energy efficiency and the 26 Apr 1994 Presidential Memorandum regarding “environmentally economically beneficial practices on Federal landscaped grounds,” which also requires use of native plants for federally landscaped grounds.

Additionally, protection of urban forest environments is a continuing requirement that is exacerbated by hurricanes and coastal storms. Urban forest management involves the removal and trimming of trees that pose safety threats, property damage, and disease outbreak. An update of the Urban forest hazard trees will allow the base to address these threats to human safety and property assets.

Proper natural and commercial forest management is: beneficial to a variety of species by providing various phases of vegetation succession; and improves the value of the timber, thus making them commercially more profitable. Timber harvesting activities promote these changes in succession, which mimics natural events that caused succession changes. Wildfires are an example of these natural events, which would clear areas of vegetation and create open areas. A variety of species require these conditions to survive, including species of concern (i.e., Endangered Species Act and Migratory Bird Treaty Act listed species). On many Military base, due to threat to human health, safety, equipment, and training, wildfires are typically suppressed and not allowed to create open areas. Urban development around and training missions on NASO, NALFF, NASO DNA, and NSA NWA require such suppression. Conducting timber harvests in addition to prescribed fire (where authorized...under separate EPR) allows these bases to provide this habitat conversion in support of species of concern initiatives.

In order to identify annual forest health conditions (disease outbreak, weather damage, unreported fire damage, etc.) field work is needed by qualified forestry technicians to visit the various stands and determine if there are potential forest health threats that require immediate or future management actions. In ability to conduct these surveys could result in a lack of proper forest management that could negatively impact legally protected or other species of concern on the installation.

Project Delay: *(Project was POM’d for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* Funding for projects of this nature has typically been funded through the Forestry Reserve and other Forestry Program budgets. Unfortunately, due to current economic situations the funds available to the forestry program from commercial timber harvest and firewood salvage efforts has decreased and it is predicted that funds may not be available to fund these projects via these forestry programs. A baseline commercial forest inventory was completed in 2013/2014 for all 4 sites and urban forest inventories are anticipated to be completed 2015/2016. Despite requests, no forestry technicians or certified professional forester have been hired to directly support the installation’s annual Forestry Program Management. POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA), Contract, Project Order, Work Order & Support Documentation
3	Quarterly Project Status Reports
4	Emergency/Immediate Action Notifications
5	Draft Final Report and Geodatabase
6	PreFinal Report and Geodatabase
7	Final Report and Geodatabase (Introduction, Study Area, Methods, Results, Conclusion,

	Recommendations, Literature Cited/References, Appendices)
8	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
9	Copies of All Associated Data Collected (Datasheets, sample collection info., photographs, etc.)
10	Maps
11	Ground-truthing
12	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA or other work requirement documentation. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission.

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)
 - Estimates have been based off of FY2012-2015 awarded projects and 2015 OPM Salary/Location Pay Charts with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%.
 - POM18 does not have a requirement for the 10 year Non-Urban Forest Inventory baseline. This is not required until 2023. Costs for the year will increase by approximately 67% in 2023 to support contracting this baseline inventory, assuming there is no inhouse Navy support that can accomplish this requirement.
 - If technicians and certified forester support are not hired to annually conduct forestry program efforts, there is an additional requirement in 2021 for the POM 18 cycle to fund the 5yr, re-evaluation of the Urban Forest Inventory. If acceptable risk is determined for the EPR, it is requested that at a minimum year 2021 be funded.

Item:	~2015 Cost Est. NASO & NALFF	~2015 Cost Est. NASO DNA	~2015 Cost Est. NSA NWA	Comments:
Forest Program Mngt.*	61,557.68	13,920.45	27,298.73	NAVFAC ML Core or LANT support for program management (contract mngt., applying for Forestry Reserve Funding, conducting as needed assessments, etc.). Also, could be used to hire certified professional forester to support the installation's forestry program management. Estimated at a GS11 Step 10 level. Funds split amongst the 3 INRMPs by installation size.
Arboricultural Treatments	13,310.39	3,957.14	7,200.06	Primarily focused on Urban Trees and Urban-Non-Urban Forest interface tree maintenance needs, to maintain healthy trees. Estimate derived from previous similar work.
Hazard Tree Removal	0.00	0.00	0.00	It has been recommended that the ENV program no longer fund Hazard Tree Removal in the Urban Areas of the base. It has been recommended that this cost should be provided by a combination of funds from Safety and Public Works. 2012 Original estimated cost was \$113,704.00, but fluctuates annually. The EV program will fund the inventory of urban trees which would identify hazard trees. Hazard Tree Removals and Costs should be included in the Annual Urban Forest Inventory Assessment Updates.

Item:	~2015 Cost Est. NASO & NALFF	~2015 Cost Est. NASO DNA	~2015 Cost Est. NSA NWA	Comments:
Forest Quality-Health Surveys/Inspections*	67,160.30	15,187.40	29,783.30	Disease, pest, and storm damage inspections. Fund 2 equivalent GS-5 Forestry Technicians (Forestry Technician Series, 0462). Technicians will conduct field work determining health conditions of both non-urban and urban forest resources throughout the year. Technician will update the Urban Forest Inventories annually after initial 2015 awarded baseline is completed. Amount based on OPM Forestry Technician funding at the GS 5 level. Funds split amongst the 3 INRMPs by installation size.
Non-Urban Forest Inventory	100,040.04	22,622.72	44,364.34	Occurs every 10 years or more frequently depending on mission changes and extent of storm damage, as a total forest baseline inventory and verification of Annual Forest Quality Surveys/Inspections. 2013 Baseline Awarded: Initial Contract Award \$151,655.54; DN/FN UXO Mod. of \$8,409.70; \$5,000.00 Inhouse costs. Total Costs were, extrapolated out to each INRMP by acreage. Note, next required inventory not required until 2023.
Urban Forest Inventory	58,899.63	13,319.36	26,119.97	If technicians are not hired to conduct annual forest quality/health assessments, after initial baseline urban forest inventory a 5 year re-evaluation and consolidation of actions that have occurred over the 5 years (new construction, arbor day celebration planting, hazard tree removals, etc.) should be completed. 2015 Baseline GCE \$97,088.97. 2015 Inhouse Fee \$1,250. Total Costs were, extrapolated out to each INRMP by acreage.
TOTAL:	92,160.00	27,395.43	49,850.10	

*Forestry Program Navy Manpower Requests have been denied. Since these requests have been denied, a decision was made to reflect these costs in the EPR exhibit. If Navy billets are not established the intent is to contract or create a CA to implement these requirements. Past POM cycle amounts were more attributed to equipment/supply needs for the program and the amount of reach-back support that NAVFAC ML Core might be able to supply to the program. Given this information the POM 18 EPR funding levels are higher than past POMing funding requests.

Project Requested Funding: (Recurring Funds Project with Non-Annual Recurring components within a given POM Cycle)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$35,020.03	\$35,720.43	\$36,434.84	\$37,163.54	\$37,906.81
NSA NWA	\$68,082.91	\$69,444.57	\$70,833.46	\$72,250.13	\$73,695.13
NASO & NALFF	\$150,426.11	\$153,434.63	\$156,503.32	\$159,633.39	\$162,826.06

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 6 July 2015

Project Numbers: 60191NR209; 32442NR209; 4275ANR209

Project Title: CWA MA NASO/NALFF - Soil & Water Conservation - Erosion Control; CWA MA NASO DNA - Soil & Water Conservation - Erosion Control; CWA MA NSA NWA - Soil & Water Conservation - Erosion Control

Guidebook & Chapter: 12107

Legal Drivers:

Primary: Clean Water Act

Secondary: EO Wetlands Protection

Tertiary: Soil & Water Conservation Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual, Split Quarters 2nd (85%) and 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); NASO Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) Assessments every 5 years, repairs as needed.

Project Description: (What does this project entail?) Conduct base wide erosion and sediment control assessment every 5 years as deemed necessary due to major land or mission changes. Identify areas in need of repair due to erosion. Identify causes for the erosion. Stop and repair the erosion problems.

Project Purpose & Impact/Benefit to Military Mission: (Why is this project needed? How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Projects allows the base to maintain compliance with the: Clean Water Act, the Chesapeake Bay Preservation Act; Essential Fish Habitat protection; OPNAVINST M-5090.1; base INRMPs; Sikes Act; and numerous other plans and policies.

Erosion can lead to Notices of Violation associated with water quality testing. Erosion can damage wetland habitats, essential fish habitats, and other species of concern habitats. Erosion can create ideal habitat suitable for invasive species to grow. Erosion can also cause security and safety concerns. All of these concerns pose negative impacts to military training, which could lead to loss of land on which the military can train.

Project Delay: (Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?) POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables: (Also see cost estimate section.)

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) & Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report
5	PreFinal Report
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices)
7	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datashets, sample collection info., etc.)
9	Maps
10	Ground-truthing
11	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission. Navy staff will implement those portions of this EPR exhibit inhouse as identified (see cost estimate).

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)
 - Estimates have been based off of contract vendor supplied quotes, and past costs of similar work. Basewide Assessments are planned to be completed every 5 years with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0% . Next Scheduled Assessment Due 2018.
 - 2012 Awarded Project (Field Work & Final Assessment 2013)
 - Award + Inhouse Fee (~\$1K/base)
 - NASO DNA = \$27,377.19
 - NSA NWA = \$15,589.07
 - NASO/NALFF = \$64,000.00
 - The FY12 funded Erosion Control Plan for these installations identified several erosion issues to repair at each site. Due to the costs of repair a ranking system will be used to identify which project to Fund each year. A summary table of erosion control repair projects and estimated cost is below. The detailed cost estimates may be obtained from viewing the Final Erosion Control Plan completed in 2013. Since Erosion Control Repair Projects associated with this plan have not been funded to date and have received POM16/17 acceptable risk approved status the results from the 2012 Awarded project were utilized to estimate projected costs from 2019-2022. An estimated \$1K/installation has been added for potential inhouse fees associated with contract oversight.

- Basewide Assessments are scheduled to occur every 5-10 years to identify new erosion sources.
- Warranties and Monitoring should be factored into any erosion repair action/project's SOW. In the event that the repair work fails, the entity hired to fix the issue (unless completed inhouse), should have to rectify the situation at no additional cost to the government.

Site	2013 Cost Estimate
NALFF Site 1	\$116,225.00
NALFF Site 2	\$30,627.00
NALFF Site 3	\$267,068.00
NASO DNA Site 1	(2019) \$9,211.00
NASO DNA Site 2	(2021) \$950-7,500.00
NASO DNA Site 3	(2020) \$7,000.00
NASO Site 1	\$21,000.00
NASO Site 2	\$950-7,500.00
NASO Site 3	\$950-7,500.00
NASO Site 4	\$17,000.00
NASO Site 5	\$8,100.00
NASO Site 6	(2020) \$74,000.00
NASO Site 7	\$11,000.00
NASO Site 8	\$28,000.00
NASO Site 9	\$4,000.00
NASO Site 10	(2021) \$63,000.00
NASO Site 11	\$950-7,500.00
NASO Site 12	\$950-7,500.00
NASO Site 13	\$4,000.00
NASO Site 14	\$950-7,500.00
NASO Site 15	\$950-7,500.00
NASO Site 16	\$16,000.00
NASO Site 17	(2019) \$390,182.00
NASO Site 18	\$950-7,500.00
NASO Site 19	\$950-7,500.00
NASO Site 20	(2022) \$33,662.00
NSA NWA Site 1	(2022) \$7,067.00
NSA NWA Site 2	(2021) \$6,000.00
NSA NWA Site 3	(2019) \$91,000.00
NSA NWA Site 4	(2020) \$4,100.00
NSA NWA Site 5	\$9,300.00
NSA NWA Site 6	\$4,100.00

- Comment [MFW1]:** Agriculture, will see if can be funded under agricultural outlease.
- Comment [MFW2]:** Agriculture, will see if can be funded under agricultural outlease.
- Comment [MFW3]:** City Easement Ditch...City Should Repair.
- Comment [MFW4]:** Roadside/Fenceline
- Comment [MFW5]:** Lake Christine
- Comment [MFW6]:** Roadway (RedWing Lake)
- Comment [MFW7]:** Agriculture, will see if can be funded under agricultural outlease.
- Comment [MFW8]:** Flightline Ditch
- Comment [MFW9]:** Golf Course
- Comment [MFW10]:** Aeropines Mitigation Site
- Comment [MFW11]:** Golf Course
- Comment [MFW12]:** Golf Course
- Comment [MFW13]:** Golf Course
- Comment [MFW14]:** Golf Course
- Comment [MFW15]:** Weapons Ditch
- Comment [MFW16]:** Weapons Ditch
- Comment [MFW17]:** Runway Ditch
- Comment [MFW18]:** Runway Ditch
- Comment [MFW19]:** Fenceline, London Bridge Rd.
- Comment [MFW20]:** Owls Creek
- Comment [MFW21]:** Near VACAPES/VDOT Mit.
- Comment [MFW22]:** Near VACAPES/VDOT Mit.
- Comment [MFW23]:** Runway Ditch
- Comment [MFW24]:** Runway Ditch
- Comment [MFW25]:** Runway Ditch
- Comment [MFW26]:** Potters Road Fenceline/Roadway
- Comment [MFW27]:** Log Cabin Ditch
- Comment [MFW28]:** Mill Stream – UpStream
- Comment [MFW29]:** Mill Stream – UpStream
- Comment [MFW30]:** Mill Stream Interseccion – Downstream
- Comment [MFW31]:** Eastern Boundary Ditch
- Comment [MFW32]:** Eastern Boundary Ditch

Project Requested Funding: (Non-Annual Recurring Funds Project)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$30,500.00	\$11,409.29	\$9,117.60	\$9,881.19	\$0.00
NSA NWA	\$17,367.26	\$102,796.43	\$5,812.47	\$8,137.45	\$9,565.39
NASO/NALFF	\$71,300.23	\$447,144.35	\$85,477.47	\$74,399.59	\$41,100.24

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 6 July 2015

Project Numbers: 60191NR211; 32442NR211; 4275ANR211

Project Title: CHS MA NASO/NALFF - Landcover Mapping; CHS MA NASO DNA - Landcover Mapping; CHS MA NSA NWA - Landcover Mapping

Guidebook & Chapter: 12101

Legal Drivers:

Primary: Endangered Species Act

Secondary: Migratory Bird Treaty Act

Tertiary: EO_ (Invasive Species or Pest Control)

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) FY2018, Split Quarters 2nd (85%) and 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) 15 months, once every 5 years or as deemed necessary due to major land or mission changes.

Project Description: (What does this project entail?) Produce an updated Vegetation Community Classification Raster Landcover Layer. Acquire updated high resolution satellite imagery in an effort to produce a raster landcover layer of vegetative community types; analyze imagery; conduct ground-truthing surveys; and provide maps, data, and final report. Utilize existing leaf-on and leaf-off Navy Imagery and Acquire Newer Imagery as necessary to meet project's 85% or greater accuracy level.

Project at a minimum should be equivalent to work completed for the FY2012 Awarded Vegetation Community Classification project; however, this project was not funded to allow for 85% or greater accuracy levels. Project should create layers that can be properly analyzed with and compared to the FY2012 Awarded project.

The intent of the project is to create scientifically suitable layers that can be used to analyze change over time, for which the data can be utilized to support a wide variety of INRMP goals and objectives.

Final products will include complete geodatabase, with linked datasheets, tables, photos, and metadata. Final products will include 2 maps of each installation (NASO, NALFF, NASO DNA, and NSA NWA) on photo-quality paper that have been laminated with dry-erase marker utilization quality laminate.

Project Purpose: (Why is this project needed?) Vegetation community layers are needed to identify specific community types on base which may be important to species of concern and thus warrant protection and possibly enhancement. Landcover vegetation community level layers should be updated at least every 5 years to identify changes in communities and to capture landcover changes

due to military training, development, forestry actions, natural vegetation successional changes, other ecosystem changes due to environmental factors such as disease outbreaks, storm damage, forestry actions, etc.

Utilizing GIS and satellite imagery to create landcover layers are time and funding efficient. These layers allow biologists to obtain a better understanding of their base's resources, by providing a view/analysis of areas of the base that are not easily accessible on foot. The other option to mapping these communities is to conduct a 100% on the ground physical mapping of the entire base, which requires a 10 fold field work effort and still some GIS data processing in the office.

Data created from this project will help the installation answer annual INRMP metrics questions related to ecosystems as well as maintaining INRMPs sufficient enough to obtain concurrence from regulatory partners during reviews for Operation and Effect.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Funding this project promotes protection of wildlife species and vegetation communities of concern. There is a number of Federal and State listed species of concern that either live or seasonally visit bases in the Hampton Roads Area. As such this project allows the Navy to maintain compliance with various Federal and State laws, regulations, policies, and conservation agreements (ESA, MBTA, MMPA, NMFA, Invasive and Pest Control, Sikes Act, INRMP, OPNAVINST M-5090.1, State Wildlife Action Plan, USFWS Strategic Plan, etc.).

Funding this project not only helps to keep the base from receiving NOV's related to species of concern, it also provides a better understanding of the layout of the base, which can prove beneficial for military planners designing field training requirements and for development and placement of potential construction sites.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)*

Projects received funding in FY2012, but were only funded to utilize existing imagery and not the desired new imagery. Also, not enough funding was provided for ground truthing efforts to obtain an 85% or greater accuracy level. POM16 request was not promoted as originally requested.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA), Contract, Purchase Order, &/or Work Order and Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report and Geodatabase
5	PreFinal Report and Geodatabase
6	Final Report and Geodatabase (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices)
7	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datasheets, sample collection info., photographs etc.)
9	Maps, Photo Quality Paper, Heavy Duty Laminate (for use with Dry Erase Markers)
10	Ground-truthing
11	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; to identify potential impacts to the military mission; and to reduce errors in existing and future natural resources predictive modeling efforts.

Cost Estimations:

• How was estimate derived? *(Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.)*

- Cost estimate was derived from utilizing the FY2012 funded similar projects, plus contractor quote adjustment for new imagery acquisition, plus anticipated inhouse fees with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0% .
- There is the potential to develop a cooperative agreement with other adjacent land owners (i.e., USFWS, VDGIF, Local GOV, etc.). The cost of acquiring imagery is typically cheaper for one large solid landmass, vs. conduct smaller individual imagery acquisitions.
- This estimate has been split between each of the Oceana NR AOR bases, which cover 3 INRMPs (NASO/NALFF, NASO DNA, and NSA NWA) because the equipment services all 4 sites.
- Due to equipment activation, imagery acquisition, field work, and computer analysis requirement, it is most cost effective to conduct the work for these bases at the same time.

Item	~2012 Cost Estimate
FY12 Contract Award (Equipment, Analyst, Field Crews, overhead, etc.)	\$260,586.00
Inhouse Fees	\$5,000.00
Estimated Unfunded Field-work to meet >85% Accuracy	\$26,059.00
Imagery to meet >85% Accuracy	\$104,025.00
TOTAL:	\$395,670.00

Project Requested Funding: (Non-Recurring Funds Project within a given POM Cycle), *highlighted fund request is for the POM18 desired funding date, if not funded the out years are to provide an estimate of cost if to be funded at a later date.*

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$61,712.36	\$62,946.60	\$64,205.54	\$65,489.65	\$66,799.44
NSA NWA	\$119,016.69	\$121,397.02	\$123,824.96	\$126,301.46	\$128,827.49
NASO/NALFF	\$264,481.53	\$269,771.16	\$275,166.59	\$280,669.92	\$286,283.32

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 06 July 2015

Project Number: 32442NR215

Project Title: CHS MA NASO DNA - Dune and Beach Restoration

Guidebook & Chapter: 12107

Legal Drivers:

Primary: Endangered Species Act

Secondary: Coastal Zone Management Act

Tertiary: Soil & Water Conservation Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual, Split Quarters 2nd (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana - Dam Neck Annex (NASO DNA)

Project Duration: (Estimated length of time and Start & End Dates) Annual. 2 day event in Spring and 2 day event in Fall.

Project Description: (What does this project entail?) Conduct conservation program dune habitat: assessments; mapping; stabilization; and restoration.

Project Purpose & Impact/Benefit to Military Mission: (Why is this project needed? How would not funding this project affect the mission? What benefits does funding this project have to the mission?)

This project supports Endangered Species Act, Soil & Water Conservation Act; Coastal Zone Management Act; Magnuson-Stevens Fishery Conservation and Management Act; State Wildlife Action Plans; INRMPs; Clean Water Act; and other Federal and State Regulatory and Plan guidance/goals/objectives.

This project supports Commander, Navy Region Mid Atlantic Natural Resource managers with the implementation of shoreline and dune stabilization and conservation/habitat restoration along the coastal region of NASO Dam Neck Annex (DNA).

Federal regulations require sound management in support of the mission. NASO DNA's mission is tied to the stability of beach and dune lands. The beach and dunes at this site are in danger of erosion due to wave and wind action associated with storm and general weather conditions. Beach stability has already been compromised due to such storms as Hurricane Isabel. This storm resulted in buffer, training sites, and sensitive ecological habitat areas being degraded. Currently, there are several severely eroded dune areas along the NASO DNA beaches. In order to sustain the most valuable conservation resources and training areas, protective measures and stabilization is required.

The dune habitats have been identified as Special Interest Areas in the INRMP through coordination with the State Natural Heritage Program and Marine Resources Commission. These dunes and beaches are essential habitat for a number of species of concern included federally and State listed

T&E species. Erosion and degradation of the dunes and beach also threatens the Mid-Atlantic essential fish habitat (EFH) by potentially allowing harmful chemicals and objects to enter the ocean.

If the dunes were not maintained the base would be more susceptible to oceanic water breeches which would flood the base and facilities and stop the military missions on NASO DNA.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* This project has always been approved, but has not received the requested amounts of funding. In order to make up for this gap in funding the base has typically applied for and obtain agricultural (Ag) program funds, and legacy funds (National Public Lands Day). It is suspected that due to the state of the Ag program funds, it appears that funding will not be available through this program, until further notice. Legacy funds are not always awarded. POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) or Contract & Support Documentation (CESU)
3	Quarterly Project Status Reports
4	Dune Planting & Fencing Event Organization and Implementaiton
5	Draft Final Report
6	PreFinal Report (as needed)
7	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices)
8	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
9	Copies of All Associated Data Collected (Datasheets, sample collection info., photographs, etc.)
10	Organize and process volunteer paperwork
11	Monitor/Evaluate Success of Restoration Activities
12	Make recommendations for future need requirements
13	Assessment of existing conditions and cause of degradation, if applicable
14	Maps
15	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission.

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)
 - Cost estimation was derived from ongoing work conducted under a current CESU agreement with the National Aquarium in Baltimore (NAIB). Statements of Work and D&F support documentation will be vary similar to the 2013 and current CESU agreement paperwork. 2015 CESU agreement was not utilized as the primary baseline as only partial funding was obtained in a given FY.
 - It is recommend that this project be maintained under a CESU agreement, preferably with NAIB since they: are already knowledgeable about our needs and the habitat; are knowledgeable about security and access requirement; and provide the Navy with the ability to utilize volunteers to support this project (cost effective and good community outreach).
 - The following annual inflation rates were applied and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%

- **Estimate #1:**
 - 2013 CESU agreement expenses, see SOW for details:

ITEM:	COST:	COMMENTS:
Salary	\$13,500.00	Salary for Project Manager, Conservation Biologist and Field Specialist (for preliminary site investigation, project planning, data collection/site visits and plan development)
Materials	\$26,000.00	60,000 native dune grasses (the majority of this item will be paid for by other funds; 5 40lb bags of fertilizer; Gloves for planting volunteers; fencing, posts, wire, etc.
Travel	\$2,620.00	Mileage, Lodging, Meals
Inhouse Fees	\$5,000	
TOTAL:	\$47,320.00	

Project Requested Funding: (Recurring Funds Project within a given POM Cycle)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$52,287.98	\$53,333.74	\$54,400.41	\$55,488.42	\$56,598.19

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 6 July 2015

Project Numbers: 60191NR216; 32442NR216; 4275ANR216

Project Title: EO 13112 MA NASO/NALFF - Habitat Management - Prescribed Fire; EO 13112 MA NASO DNA - Habitat Management - Prescribed Fire; EO 13112 MA NSA NWA - Habitat Management - Prescribed Fire

Guidebook & Chapter: 12101

Legal Drivers:

Primary: EO 13112 Invasive Species

Secondary: Migratory Bird Treaty Act

Tertiary: Endangered Species Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual, Split Quarters 1st (85%), & 2nd (15%)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) Annual.

Project Description: (What does this project entail?) Develop an updated Prescribed Burning, Wildfire and Smoke Management Plan for each installation. The following should be utilized to develop the plans: existing INRMP data, site visits, and coordination with appropriate Navy, USFWS, and State Agency Prescribed-burn/Wildfire, Natural Resources, and Safety experts.

Create and implement a cooperative agreement with appropriate agencies to supply Prescribed Burning and Wildfire Control for NASO, NALFF, NASO DNA, and NSA NWA. If a cooperative agreement cannot be developed to implement the plans, then a contract should be pursued. Current Navy staffing and training levels do not allow for inhouse support of prescribed burning and wildfire control.

Project Purpose: (Why is this project needed?)

Prescribed burning is utilized for habitat management/restoration and invasive species control. This management and control technique is designed to address species of concern needs and requirements.

Existing prescribed burning, wildfire and smoke management plans need to be re-assessed for current validity and updated accordingly to meet current INRMP habitat and species management goals and objectives. Plans need to include appropriate pre-application evaluations, control prescriptions and techniques, goals & objectives, firebreak installation requirements and locations, burn area boundaries, post application monitoring, etc.

Current Navy staffing and training levels in the NAVFAC MIDLANT Hampton Roads area are inadequate to SAFELY accomplish desired prescribed burning and wildfire control. The last NASO,

NALFF, NASO DNA, and NSA NWA Prescribed Burning and Smoke Management Plans were prepared in 2010. In recent years 0% of the desired and planned burn areas have been treated due to weather conditions, inadequate staffing levels, and needed baseline habitat and species data-collection.

Project would adequately staff the Prescribed Fire program to implement the updated Prescribed Burning, Wildfire and Smoke Management Plans. Implementation would include site preparation, pre and post monitoring and reporting requirements, in addition to the physical prescribed burning and/or wildfire control actions.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Funding this project aides the Navy in maintaining compliance with Federal and State laws, regs., and policies and reduces the potential for incurring Notices of Violations (NOV). Improper management of known threats to species of concern, such as habitat degradation, can lead to potential NOV situations.

The prescribed burning program provides multiple benefits to species, the ecosystem and the military. In addition to the aforementioned species of concern benefits, prescribed burning: is considered to be more ecologically friendly particularly for nutrient recycling and plant regeneration; supports the reduction of Bird-Animal Aircraft Strike Hazards (BASH) concerns by altering vegetation structure to reduce site desirability for species that would or have posed BASH threats; reduces height obstructions associated with various military equipment requirements (i.e., Antenna arrays, Flight Ops, etc.); and reduces the risk of facilities being overrun by uncontrollable “wildfires.”

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* A contract to develop these plans is expected to be awarded in FY2015. 2 Different Cooperative Agreements with State and USFWS experts were pursued from 2013 to 2015, but were unable to be executed. POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA), Contract, Project Order, Work Order, & Support Documentation
3	Quarterly/Monthly Project Status Reports
4	Draft Prescribed Burning, Wildfire, and Smoke Management Plan and Geodatabase
5	PreFinal Draft Prescribed Burning, Wildfire, and Smoke Management Plan and Geodatabase
6	Final Draft Prescribed Burning, Wildfire, and Smoke Management Plan and Geodatabase
7	Draft Final Implementation Reports and Geodatabases
8	Final Implementation Reports (Breakdown of burning accomplished, summary of monitoring results, etc.) and Geodatabases
9	GPS Mapping of burn units and areas burned (In Navy Standard Format, i.e. WGS84)
10	Frequent correspondence with base Natural Resources Manager
11	Pre-burn site preparation and unit assessments
12	Conduct Prescribed Burns & Respond to Wildfire Concerns
13	Conduct after burn site evaluations and monitoring.
14	Permit Acquisitions (as required)
15	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee(s) staff to develop and obtain approvals of SOW and CA or Contract. Navy staff will work with grantee Partners and the prescribed burners to identify and report problems. The submittal of draft reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a document that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: track frequencies of burns; track habitat conditions pre and post burns; update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission.

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)
 - Cost estimate was derived from NAVFAC LANT FY2015 GCE, known need requirements, historic equipment purchases costs, and the 2015 OPM pay-scale for personnel.
 - Pending the outcome of the final Cooperative Agreement/Contract results, there may be an increase in the amount of funding required to come to a resolution regarding training, equipment, benefits, etc.
 - It is recommended that a cooperative agreement with USFWS, VA Department of Forestry, NC Forestry Commission and/or contractors supplying such services, which have obtained adequate National and State training, be developed as these agencies have established prescribed burning teams and are considered experts in the field of Prescribed Burning and Wildfire Control. Navy personnel that have obtained appropriate training and equipment will be available to support burning efforts. The base natural resources specialist has the lead with regards to prescribed burning objectives and the overall program on Navy lands.
 - This estimate has been split between each of the Oceana NR AOR bases, which cover 3 INRMPs (NASO/NALFF, NASO DNA, and NSA NWA), because the Prescribed Burning Fire Fighters would service all 4 sites.
 - The following inflation rates were applied and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%

Personnel:	Qty:	Mths:	# wks:	Hrs/ week:	\$/hr:	\$OT/ hr:	Total:	Comments
Prescribed Burning, Wildfire, and Smoke Management Plan	4	15	--	--	--	NA	\$121,925.04	Programmatic Re-evaluation Every 5 years, based off of NAVFAC LANT FY15 GCE. Utilized 60% NASO/NALFF, 14% NASO DNA, 27% NSA NWA Allocations.
Incident Commander (GS 11)	1	6	24	24.00	36.48	38.31	\$21,012.48	Adjusted for Hazard pay estimates. OT is the responsibility of the Partnering Agency.
Burn Boss (GS 9)	2	6	24	24.00	30.15	38.31	\$34,732.80	Adjusted for Hazard pay estimates. OT is the responsibility of the Partnering Agency.
Burn Technician (GS 7)	7	6	24	24.00	24.65	36.98	\$99,388.80	Adjusted for Hazard pay estimates. OT is the responsibility of the Partnering Agency.

Benefits								To be supplied by CA partner.
Training								To be supplied by CA partner. Training for Navy staff is included in a separate EPR for training.
Non-Navy Staff Equipment								To be supplied by CA partner.
Inhouse Fees							3,000.00	Contract Management
Navy Staff Equipment							2,103.74	See base INRMP for detailed equipment list.

Project Requested Funding: (Recurring Funds Project with Non-Annual Recurring component within a given POM Cycle)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$23,759.71	\$24,234.91	\$24,719.61	\$44,399.34	\$25,718.28
NSA NWA	\$45,822.30	\$46,738.75	\$47,673.52	\$85,627.30	\$49,599.53
NASO/NALFF	\$101,827.34	\$103,863.89	\$105,941.16	\$190,282.89	\$110,221.19

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 6 July 2015

Project Numbers: 60191NR218; 32442NR218; 4275ANR218

Project Title: EO 13112 MA NASO/NALFF - Invasive Species; EO 13112 MA NASO DNA - Invasive Species; EO 13112 MA NSA NWA - Invasive Species

Guidebook & Chapter: 12106

Legal Drivers:

Primary: EO 13112 Invasive Species

Secondary: National Invasive Species Act or Plant Protect Act (sup. Fed Nox. Weed Act)

Tertiary: Soil and Water Conservation Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual, Split Quarters 2nd (85%), & 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) Annual monitoring with a more detailed baseline assessment every 5 years (Jan-Dec). Annual control application of herbicide (Sept-Nov, unless otherwise stipulated).

Project Description: (What does this project entail?) Develop an invasive species assessment and management plan (to be updated every 5 years); remove/control invasive species (as plan recommends upon approval), and conduct pre, during and post invasive species control monitoring (annually).

Assessment plans at a minimum will include: surveying for invasive species (flora and fauna); providing a prioritized list of invasive species on base for removal; developing population estimates; mapping extent of species on base; providing management techniques and plan for the control/removal of the invasive species from the base; production of GIS layers associated with species distribution and management.

Annual Monitoring will be an assessment of implemented control techniques. This may include water quality testing; vegetation sampling or surveying; mapping of control area application boundaries prior to treatment; mapping of control area after treatment; etc.

Implemented control/removal techniques may involve pesticides, prescribed burning, mechanical removal, biological controls (for uncontrolled biologics, only native species are authorized) or other habitat alterations (e.g., managing for vegetation height to shade out the non-native).

A Non-native Flora Inventory was Awarded in 2012 that Identified 38 targeted species. Of those species 5 are currently being controlled utilizing a combination of herbicide and manual treatment: kudzu, phragmites, alligator weed, golden bamboo and parrotfeather milfoil.

A Non-native Fauna Inventory has not been awarded for these installations; however several non-native faunal species have been identified on the installations that pose a potential threat to native species.

Project Purpose: *(Why is this project needed?)*

To obtain compliance with and contribute to the goals of the: National Invasive Species Act, EO 13112 Invasive Species, Soil and Water Conservation Act, Clean Water Act, OPNAVINST M-5090.1, Integrated Natural Resources Management Plan, Integrated Pest Management Plan, Endangered Species Act, Migratory Bird Treaty Act, Essential Fish Habitat, etc.

Neither NR Staffing Levels nor training/certifications are adequate to handle the severity of the invasive species problem on these 4 bases. NASO, NALFF, NASO DNA, and NSA NWA all have known invasive species issues that are or could potentially kill species of concern, damage habitats of concern, damage ditch and stream banks (promoting erosion and sediment control problems), and threaten base and military mission security. This project is needed to maintain compliance with a variety of Federal, State, and Navy laws, regulations, and policies.

Between the 4 bases: 38 invasive plant species have been identified to occur on base (prior to 2013 only 23 invasive plant species had been confirmed); and 7 known vertebrate/invertebrate invasive species are known to occur with an additional 2 suspected to occur (no formal inventory for invasive fauna has been completed). There is undoubtedly additional species that should be added to the list of invasive species.

The 2006 EA associated with this EPR for the control of phragmites and kudzu indicates that in addition to the aerial herbicide application that manual ground herbicide treatments will be used for treatment of stands that are not accessible by aircraft and prescribed burning will be used as a follow-up treatment for the control of this species. Unfortunately, adequately trained staffing levels and weather conditions have made it almost impossible to both conduct the manual spraying or conduct prescribed burns (prescribed fire is covered under a different EPR) on the frequency needed to control these species.

Due to security requirements along fence and building perimeters there is an annual mowing contract which cuts the vegetation away from the fence line out to 30ft. This mowing stops some invasive species. Unfortunately, this mowing is also spreading and increasing the threat of other invasive species such as Phragmites. Phragmites grows quickly and forms dense tall stands which: block the view of the security perimeter; chokes out the native plant and animal species; and clogs ditches vital to keep the base from flooding during storm events.

NR staff is observing similar levels of destruction occurring due to other species such as Kudzu, Wisteria, Tree-of-Heaven, Bamboo, and Sericea lespedeza.

Several of these species have invaded wetland mitigation sites and are threatening the integrity and the success of the wetland. If adequate control can not be maintained the site may fail to be approved by the permit/mitigation regulating agencies and may require renegotiations and additional mitigation to be conducted elsewhere.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Funding this project aides the Navy in maintaining compliance with laws, regs., and policies reduces the potential for incurring Notices of Violations. NOV's could be issued for a number of reasons to include, but not limited to: knowingly allowing invasive species to negatively impact species of concern; and failing water quality testing, due to lack of proper erosion and sediment control. Internal to the navy additional NOV's can be issued for fire and security hazards.

Proper management of invasive species provides multiple benefits to species, the ecosystem and the military. This project: supports the reduction of Bird-Animal Aircraft Strike Hazards (BASH) concerns by altering vegetation structure to reduce site desirability for species that would or have posed BASH threats; reduces height obstructions associated with various military equipment requirements (i.e., Antenna arrays, Flight Ops, etc.); reduces the risk of facilities being overrun by uncontrollable "wildfires" or flooding; and reduces disease outbreaks.

Allowing invasive species to damage ditches and streams also poses health and safety threats to the base in that the damage by these species can clog vital storm water run-off structures. Damage of these water structures

could cause flood and damage to the base, waste water treatment facilities, training facilities, homes, etc. Such devastation could make the base or portions of the base unusable for military training and displace people who live on or adjacent to the base. In addition pooling water creates ideal breeding habitats for a variety of mosquito species (some of which are classified as invasive species), which increase the threat of wildlife borne disease which can spread to humans and other wildlife.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* POM 16/17 Partially approved, only approved survey/inventory funds, did not approve control/management funds. Invasive fauna surveys have not been funded.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA), Contract, Project Order, Work Order & Support Documentation
3	Quarterly/Monthly Project Status Reports
4	Draft Flora Inventory Final Report and Geodatabase
5	PreFinal Flora Inventory Report and Geodatabase
6	Final Flora Inventory Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices) and Geodatabase
7	Draft Fauna Inventory Final Report and Geodatabase
8	PreFinal Fauna Inventory Report and Geodatabase
9	Final Fauna Inventory Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices) and Geodatabase
10	Draft Control/Monitoring Final Report and Geodatabase
11	PreFinal Control/Monitoring Report and Geodatabase
12	Final Control/Monitoring Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices) and Geodatabase
13	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
14	Copies of All Associated Data Collected (Datashets, sample collection info., photographs etc.)
15	Maps
16	Invasive Species Removal/Control
17	Permit Acquisitions (as required)
18	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA/Contract. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission.

Cost Estimations:

- **How was estimate derived?** *(Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.)*
 - Cost estimate was derived from FY2012 contracted invasive species inventory project costs and FY2008-2015 invasive species control project costs with the following applied annual inflation rates

and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%.

- Due to the nature of this project it is likely that the cost will fluctuate up or down due to removal success, new species, changes in species population levels, etc.
- There is the potential to develop a cooperative agreement with USFWS regarding this project, because there are 2 US National Wildlife Refuges adjacent or within the same regional management unit as these 4 Navy bases, which are also working similar invasive species concerns. It is typically cheaper to group projects into a single larger project than to conduct smaller individual projects. USFWS has written the majority of the invasive species best management practices. USFWS is also one of the signatories on our INRMPs.

• **Estimate #1:**

- **Contract Vendor and Previous History Estimates:**

Base	FY2012 Cost for Plan, Inventory & Map (Flora)	FY12 Inhouse Fee Inventory (Flora)	FY2014-2015 Cost Monitor & Control (Flora)	FY14-15 Inhouse Fee Control (Flora)	~FY15 Cost for Plan, Inventory & Map (Fauna)	~FY15 Inhouse Fee Plan (Fauna)	~FY15 Cost Monitor & Control (Fauna)	~FY15 Inhouse Fee Control (Fauna)
NASO/NALFF	\$113,990.21	\$3,000.00	\$17,706.76	2500	\$119,903.10	\$3,155.62	\$17,706.76	2500
NASO DNA	\$26,597.72	\$3,000.00	\$34,148.75	1250	\$27,977.39	\$3,155.62	\$34,148.75	1250
NSA NWA	\$51,295.59	\$3,000.00	\$75,886.12	1250	\$53,956.39	\$3,155.62	\$75,886.12	1250

Project Requested Funding: (Recurring Funds Project with Non-Annual Recurring Component within a given POM Cycle)...*highlighted are the years with both control and inventory requirements.*

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$53,438.93	\$54,507.70	\$21,291.90	\$21,717.74	\$22,152.09
NSA NWA	\$98,664.19	\$100,637.47	\$39,717.59	\$40,511.95	\$41,322.19
NASO/NALFF	\$214,859.40	\$219,156.58	\$87,939.36	\$89,698.15	\$91,492.11

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 5 July 2015

Project Numbers: 60191NR219; 32442NR219; 4275ANR219

Project Title: SIKES MA NASO/NALFF - Wildlife Emergency Response; SIKES MA NASO DNA - Wildlife Emergency Response; SIKES MA NSA NWA - Wildlife Emergency Response

Guidebook & Chapter: 12999

Legal Drivers:

Primary: SIKES Act

Secondary: Endangered Species Act

Tertiary: Migratory Bird Treaty Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual, Split Quarters 1st, 2nd, 3rd, & 4th

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) Annual (on call: 24 hours, 7 days a week).

Project Description: (What does this project entail?)

Purchase of wildlife control equipment and supplies to support emergency wildlife calls supported by the Base and Region Natural Resources Program Staff. Refresher training/cert. for NR staff in support of Emergency Wildlife control calls is covered under a separate training EPR.

Project Purpose: (Why is this project needed?) NASO, NALFF, NASO DNA, and NSA NWA are all located within the Hampton Roads Region of VA. Hampton Roads is a mix of urban, rural, and natural areas. This land fragmentation, coupled with urban sprawl, puts wildlife and humans in direct competition for the same limited resources and results in human-wildlife conflicts. In an attempt to minimize impacts to humans and wildlife the base Natural Resources staff, in coordination with USFWS and State & Local Wildlife Agencies, respond to emergency wildlife calls.

People who respond to these calls need to be supplied with appropriate equipment to safely and efficiently address these concerns.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission?

What benefits does funding this project have to the mission?) Funding this project promotes safety of NR personnel, military, civilians, and wildlife. This project minimizes impacts to military training in two primary manners by: 1. expeditiously and safely addressing wildlife concerns; and 2. protecting species of concern, preventing potential Notices of Violation and mitigation costs/requirements. There is a number of Federal and State listed species of concern that either live or seasonally visit bases in the Hampton Roads Area. As such this project allows the Navy to maintain compliance with various Federal and State laws, regulations, policies, and conservation agreements (ESA, MBTA, MMPA, NMFA, Invasive and Pest Control, Sikes Act, INRMP, OPNAVINST M-5090.1, State Wildlife Action Plan, USFWS Strategic Plan, etc.).

Any call that can not be safely and efficiently handled by base NR staff will be turned over to State Wildlife Agency officials to address.

Project Delay: (Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?) POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

Equipment list with 2009 cost estimates.

Item	Qty.	Unit	Cost/ unit	Subtotal	Shipping	Total Cost	Status
Tow Straps	8	ea	17.00	136.00	34.00	170.00	Non-recurring
Weapon (12 Gauge Pump Remington 870)...Process through Navy Safety Center	1	ea	400.00	400.00	100.00	500.00	Non-recurring
Weapon (.270 Rifle Remington)...Process through Navy Safety Center	1	ea	500.00	500.00	125.00	625.00	Non-recurring
Weapon (.22 Rifle Remington)...Process through Navy Safety Center	1	ea	550.00	550.00	137.50	687.50	Non-recurring
Weapon Scope (12 Gauge)	1	ea	60.00	60.00	30.00	90.00	Non-recurring
Weapon Scope (Air Rifle)	1	ea	60.00	60.00	30.00	90.00	Non-recurring
Weapon Scope (.270 Rifle)	1	ea	60.00	60.00	30.00	90.00	Non-recurring
TOTAL Non-Recurring:	14	ea	\$1,647.00	\$1,766.00	\$486.50	\$2,252.50	Non-recurring
Nitrile Gloves (sm), 50/box	2	box	9.00	18.00	4.50	22.50	Recurring
Nitrile Gloves (med), 50/box	2	box	9.00	18.00	4.50	22.50	Recurring
Nitrile Gloves (Lrg), 50/box	2	box	9.00	18.00	4.50	22.50	Recurring
Mosquito Caps	6	ea	20.00	120.00	30.00	150.00	Recurring
Bleach (4/case)	1	case	20.00	20.00	5.00	25.00	Recurring
Hand Sanitizer (4oz)	16	ea	2.75	44.00	11.00	55.00	Recurring
Duct Tape	10	ea	10.00	100.00	25.00	125.00	Recurring
Deep Woods Off	24	ea	8.75	210.00	52.50	262.50	Recurring
Safety Glasses (12)	1	case	2.80	2.80	0.70	3.50	Recurring
Ammunition (12 GAUGE SHELL CRACKERS)	20	box	34.83	696.60	174.15	870.75	Recurring
Ammunition (12 GAUGE BIRDFRITE SCARE CARTRIDGES)	10	box	75.00	750.00	187.50	937.50	Recurring
Ammunition (12 Gauge Nitro-Steel High Velocity Magnum Load Shotshell, 3" Shell, #1 Zinc-Plated Shot, 1-1/4 oz.)	30	box	21.42	642.60	160.65	803.25	Recurring
Ammunition (12 Gauge Remington Sportsman Hi-Speed Steel, 2-3/4", #6 Steel Shot, 1 oz.)	30	box	10.05	301.50	75.38	376.88	Recurring
Ammunition (.22 beebes pellets)	1	ea	10.00	10.00	2.50	12.50	Recurring
Weapon Cleaning Kit	1	ea	100.00	100.00	25.00	125.00	Recurring

Item	Qty.	Unit	Cost/ unit	Subtotal	Shipping	Total Cost	Status
TOTAL Recurring:	156	*	\$342.60	\$3,051.50	\$762.88	\$3,814.38	Recurring
TOTAL:	170	*	\$1,989.60	\$4,817.50	\$1,249.38	\$6,066.88	Non & Recurring

Navy Utilization of Deliverables:

Navy staff will utilize this equipment to safely and expeditiously resolve the majority of the emergency wildlife calls/concerns to which their assistance is requested.

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*) See Proposed deliverables section for a detailed purchase list.
 - 2009 Cost estimates were derived via an internet search and vendor supplied quotes of items and shipping costs.
 - Equipment need was based off of a 2008 and 2012 internal equipment inventory and assessment of types of response calls to which staff typically respond.
 - Equipment list status and cost estimates per item are provided under proposed deliverables.
 - This estimate has been split between each of the Oceana NR AOR bases, which cover 3 INRMPs (NASO/NALFF, NASO DNA, and NSA NWA) because the equipment services all 4 sites.
 - The following inflation rates were applied and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%

Project Requested Funding: (Recurring Funds Project within a given POM Cycle)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$1,391.72	\$1,419.56	\$1,447.95	\$1,476.91	\$1,506.44
NSA NWA	\$1,391.72	\$1,419.56	\$1,447.95	\$1,476.91	\$1,506.44
NASO/NALFF	\$2,783.43	\$2,839.10	\$2,895.88	\$2,953.80	\$3,012.88

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 5 July 2015

Project Numbers: 60191NR220; 32442NR220; 4275ANR220

Project Title: 4 SAR MA NASO/NALFF – Nuisance Wildlife Inventory, Assess & Remove; 4 SAR MA NASO DNA – Nuisance Wildlife Inventory, Assess & Remove; 4 SAR MA NSA NWA – Nuisance Wildlife Inventory, Assess & Remove

Guidebook & Chapter: 12101

Legal Drivers:

Primary: Sikes Act

Secondary: Endangered Species Act

Tertiary: Migratory Bird Treaty Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual (as needed), Split Quarters 2nd, 3rd, & 4th

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) Annual (as needed) for control and monitoring. 15 Months for baseline inventory and assessment (to be repeated every 5 years).

Project Description: (What does this project entail?) Develop a nuisance wildlife assessment and management plan (revised every 5 years); remove nuisance wildlife, and conduct pre, during and post nuisance wildlife removal effort monitoring (annually).

Project Purpose: (Why is this project needed?) NASO, NALFF, NASO DNA, and NSA NWA all have nuisance wildlife issues that are killing species of concern, damaging habitat of species of concern, and damaging ditch and stream banks (promoting erosion and sediment control problems).

This project is needed to maintain compliance with a variety of Federal, State, and Navy laws, regs., and policies.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Funding this project aides the Navy in maintaining compliance with laws, regs., and policies reduces the potential for incurring Notices of Violations. NOVs could be issued for a number of reasons to include, but not limited to: knowingly allowing nuisance wildlife to negatively impact species of concern; and failing water quality testing, due to lack of proper erosion and sediment control.

Allowing nuisance wildlife to damage ditches and streams also poses health and safety threats to the base in that the damage by nuisance wildlife can collapse and clog vital storm water run-off structures. Damage of these water structures could cause flood and damage to the base, waste water treatment facilities, training facilities, homes, etc. Such devastation could make the base or portions of the base unusable for military training and displace people who live on or adjacent to the base. In addition pooling water creates ideal breeding habitats for a variety of mosquito species (some of which are classified as invasive species), which increase the threat of wildlife borne disease which can spread to humans and other wildlife.

In addition controlling wildlife species in support of species of concern, water quality, human health & safety, and training land functionality there are also some residual beneficial side effect. Such benefits may include: increasing agricultural crop yields; reduction of emergency wildlife calls; and reduction of potential BASH concerns.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) & Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report
5	PreFinal Report
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices)
7	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datasheets, sample collection info., etc.)
9	Maps
10	Nuisance Wildlife Removal
11	Permit Acquisitions (if required, typically Navy acquires)
12	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission.

Cost Estimations:

- **How was estimate derived?** *(Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.)*
 - Cost estimate was derived from: discussions with USDA personnel in the VA regional field office; similar work conducted on installations in VA and the known nuisance wildlife concerns and acreages of the bases (NASO, NALFF, NASO DNA, & NSA NWA); and final cost estimates obtained from the FY2012 nuisance wildlife inventory.
 - Due to the nature of this project it is likely that the cost will fluctuate up or down due to removal success, new species, changes in species population levels, etc.
 - It is recommended that an interagency cooperative agreement with USDA Wildlife Services (WS) for nuisance wildlife control is developed. USDA WS is specialized in this area of work. As a sister agency overhead cost are lower than many outside contractors. Previous MIPR agreements have been made with USDA for similar services. USDA currently works on other installations across DoD and has conducted some previous work on Hampton Roads, VA bases.
 - Funds requested are for WS support only. Navy support is in-house. WS will be responsible for: the development of existing conditions assessment, complete listing of onsite nuisance wildlife, and

management plans; some monitoring; and take and removal of designated nuisance wildlife species. Navy personnel will: acquire and maintain appropriate depredation permits; will assist where needed to conduct wildlife surveys for monitoring efforts; and will coordinate USDA access for project completion.

- The following inflation rates were applied and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%.

Estimate #1:

BASE	FY2012 Actual Cost Inventory	FY2012 Inhouse Fee (Inventory)	FY12 Unfunded Est. Control	FY2012 Unfunded Inhouse Fee (Control)
NASO DNA	\$24,696.74	\$1,545.45	\$49,393.48	\$1,545.45
NSA NWA	\$23,179.36	\$1,545.45	\$46,358.72	\$1,545.45
NASO/NALFF	\$37,816.05	\$1,545.45	\$75,632.10	\$1,545.45

Project Requested Funding: (Recurring Funds Project with Non-Annual Recurring Component within a given POM Cycle)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$56,749.34	\$29,820.25	\$30,416.65	\$31,024.98	\$31,645.48
NSA NWA	\$53,368.41	\$28,095.98	\$28,657.89	\$29,231.05	\$29,815.67
NASO/NALFF	\$85,980.90	\$44,728.34	\$45,622.91	\$46,535.37	\$47,466.07

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 6 July 2015

Project Numbers: 60191NR221; 32442NR221; 4275ANR221

Project Title: EFH MA NASO/NALFF - Fisheries, Ditches & Streams; EFH MA NASO DNA - Fisheries, Ditches & Streams; EFH MA NSA NWA - Fisheries, Ditches & Streams

Guidebook & Chapter: 12101

Legal Drivers:

Primary: Magnuson-Stevens Fishery Conservation and Management Act

Secondary: Clean Water Act

Tertiary: EFH

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual Split Quarters 2nd (85%) and 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); NASO Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) 15 months for baseline inventories/assessments/management plan (every 5 years or as deemed necessary due to major land or mission changes); annual implementation and monitoring of implemented management plan requirements.

Project Description: (What does this project entail?) Conduct an inventory and assessment of ditch, stream, pond, and lake functions (this includes wildlife that live in and contribute to the functionality of the water resource, i.e. fish population assessments) and hydrology. Develop a Habitat enhancement plan for these water resources. Purchase equipment, supplies, fish, plants, etc. to assist with this project.

Project Purpose & Impact/Benefit to Military Mission: (Why is this project needed? How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Project allows the base to maintain compliance with: the Sustainable Fisheries Act Amendment to the Magnuson-Stevens Fishery Conservation and Management Act in 1996; the Chesapeake Bay Preservation Act; the Clean Water Act; Coastal Zone Management Act; Essential Fish Habitat protection; OPNAVINST M-5090.1; base INRMPs; Sikes Act; and numerous other plans Southern Watershed Area Management Plan (SWAMP); Lynnhaven River Watershed Restoration Plan (sub of Chesapeake); Back Bay Watershed Restoration Plan (sub of southern).

The waterways of NASO, NALFF, NASO DNA, and NSA NWA connect to several watersheds which all have the potential to influence Essential Fish Habitat (EFH) within the Atlantic Ocean, and/or Chesapeake Bay.

The fish stocking is intended to produce breeding populations of native fish to increase water resources and functionality (as appropriate). Since several of the water resources where fish are anticipated to need to be stocked are areas where recreational fishing is allowed this project also

benefits the military community by allowing additional outdoor recreation opportunities, thus potentially increasing Morale and Welfare.

In addition the data is utilized to make more informed NEPA property management decisions in associated with DoD/military mission changes.

Project Delay: (Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?) POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) & Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report
5	PreFinal Report
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices)
7	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datasheets, sample collection info., etc.)
9	Maps
10	Ground-truthing
11	Purchase, stocking, planting, installation, etc. of fish, plants, equipment etc.
12	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission.

Cost Estimations:

- **How was estimate derived?** (Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.)

- Estimates have been derived from the contracted FY2012-2014 funded projects with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%

	Inhouse	Contracted
Golf Course	\$10,000.00	\$0.00
NW-Stell	\$5,000.00	\$39,942.54
OC & DN TT	\$5,000.00	\$171,804.83
FN	\$5,000.00	\$70,276.83

- Partial Funding may be available via Sikes Act, Agricultural, or Forestry Funds. It is unlikely Ag or Forestry Funds will be available. Sikes Act funds will be minimal at best.

Base	FY12-14 Baseline Inventory Costs	~FY2015 Costs (monitoring, stocking, etc.)	~FY2015 Costs (monitoring, stocking, etc.)
NASO/NALFF	\$217,880.45	\$4,952.00	\$4,952.00
NASO DNA	\$44,201.21	\$3,597.00	\$3,597.00
NSA NWA	\$44,942.54	\$8,439.00	\$8,439.00

Project Requested Funding: (Recurring Funds Project within a given POM Cycle)...highlighted funds include assessment and annual recurring fee. Note for NASO and NALFF their assessment fall on different years from one another.

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$3,809.68	\$49,388.33	\$3,963.59	\$4,042.86	\$4,123.72
NSA NWA	\$50,068.96	\$5,349.69	\$5,456.69	\$5,565.82	\$5,677.14
NASO/NALFF	\$8,937.97	\$159,338.51	\$84,358.87	\$9,485.05	\$9,674.75

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist
Date Prepared: 7 July 2014

Project Numbers: 60191NR222; 32442NR222; 4275ANR222
Project Title: MSFCA MA NASO/NALFF - Outdoor Recreation Program Requirements; MSFCA MA NASO DNA - Outdoor Recreation Program Requirements; MSFCA MA NSA NWA - Outdoor Recreation Program Requirements
Guidebook & Chapter: 12109
Legal Drivers:

Primary: Sikes Act
Secondary: MSFCA (originally planned to be Primary; however EPRweb does not provide that option)
Tertiary: M-5090.1

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual, Split Quarters 1st, 2nd, 3rd, & 4th

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) Annual, as needed

Project Description: (What does this project entail?) Maintain hunting, fishing, and nature: trails; boardwalks; fishing stations picnic shelters; ranges; elevated shooting stands/platforms; check-station; walk-in cooler; freezer; and brochures (i.e. mass production of rules & regulations pamphlets, maps, archery training materials, permits, etc.).

Project Purpose: (Why is this project needed?) Maintenance of these items is required: to allow people to safely recreate on these bases; to allow people with physical disabilities to recreate; to ensure people have written documentation or rules/regs./procedures; to promote education opportunities; and to allow proper processing and checking of wildlife taken during recreational activities. Implementation of this project is conducted under the guides of the Sike's Act and in accordance with Navy, USFWS and State mandated policies regarding wildlife population management. The outdoor recreation program also supports objectives linked to the Endangered Species Act, Migratory Bird Treaty Act, Americans with Disabilities Act, NAVFAC OPNAVINST M-5090.1, and numerous other laws and policies linked to invasive species, water quality, and nuisance wildlife control.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Funding this project maintains upkeep of the arteries of the Natural Resources (NR) Outdoor Recreation program (ORP). The NR ORP supports a number of wildlife population management objectives, including but not limited to: deer herd population reduction; nuisance wildlife removal; invasive species removal; and bird aircraft strike hazard (BASH) reduction.

Comment [MF1]:

Section 504 of /Rehabilitation Act of 1973 and Implementing Regulations
<http://www.dol.gov/oasam/regs/statutes/sec504.htm>

Americans with Disabilities Act of 1990 (ADA) and Implementing Regulations
<http://www.adagreatlakes.org/ADA/>

U.S. Access Board, Accessible Boating Facilities Accessible Fishing Piers & Platforms
<http://www.access-board.gov/outdoor/outdoor-rec-rpt.htm>

Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines, United States Access Board
<http://www.access-board.gov/ada-aba/final.htm>

Americans with Disabilities Act Accessibility Guidelines of 2002 (ADAAG)
<http://www.access-board.gov/adaag/html/adaag.htm>

ADA Accessibility Guidelines for Play Areas 2001, Outdoor Developed Areas, 1999 Final Report; Recommendations for Accessibility Guidelines
<http://www.access-board.gov/outdoor/outdoor-rec-rpt.htm>

Accessible Temporary Events A Planning Guide, from NC State University, The Center of Universal Design

USDA Forest Service Draft Guidelines 2004

Outdoor Recreation Accessibility Guidelines, Outdoor Recreation

Accessibility Guidelines Draft 2004
USDA Forest Service Trail Accessibility Guidelines,
<http://www.fs.fed.us/recreation/programs/accessibility/>

This program supports the military mission in 3 primary ways: 1. increasing Morale and Welfare by allowing outdoor recreation; 2. educating military regarding NR concerns and how they contribute; and 3. ensuring safety to allow military training to continue (BASH reduction).

Project Delay: (Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?) POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

ITEM:	STATUS:	~2015 COST:
Printer (For Recreation Program)	Non-Recurring	\$2,000.00
Chain Saw and Weed-whacker Parts	Recurring	\$400.00
Lumber	Recurring	\$1,000.00
Nuts & Bolts	Recurring	\$250.00
water Hose	Non-Recurring	\$50.00
Weighing station supplies	Non-Recurring	\$500.00
POWER STOP ARCHERY TARGET	Recurring	\$1,600.00
Spray Paint	Recurring	\$200.00
Brochures	Non-Recurring	\$1,500.00
Misc.	Recurring	\$1,300.00
TOTAL RECURRING:	Recurring	\$4,750.00
TOTAL NON-RECURRING:	Non-Recurring	\$4,050.00

Navy Utilization of Deliverables:

Navy staff will utilize purchased items to maintain ORP as indicated above.

Cost Estimations:

- **How was estimate derived?** (Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.)
 - Cost estimate was derived from known need requirements, 2015 executed purchase requests, and a 2015 internet search of cost estimates from online vendors.
 - This estimate has been split between each of the Oceana NR AOR bases, which cover 3 INRMPs (NASO/NALFF, NASO DNA, and NSA NWA because the Natural Resources staff service all 4 sites.
 - The following inflation rates were applied and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%
 -

Project Requested Funding: (Recurring Funds required within the POM Cycle)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$704.32	\$718.41	\$732.77	\$747.43	\$762.38
NSA NWA	\$1,358.33	\$1,385.50	\$1,413.21	\$1,441.47	\$1,470.30
NASO/NALFF	\$5,018.51	\$3,078.88	\$3,140.46	\$3,203.27	\$3,267.34

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 7 July 2015

Project Numbers: 60191NR223; 32442NR223; 4275ANR223

Project Title: SIKES MA NASO/NALFF - Equipment Storage Structures; SIKES MA NASO DNA - Equipment Storage Structures; SIKES MA NSA NWA - Equipment Storage Structures

Guidebook & Chapter: 12999

Legal Drivers:

Primary: Sikes Act

Secondary: CWA

Tertiary: SWCA

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) FY2014-19, Split Quarters 2nd (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads – Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) Annual as needed.

Project Description: (What does this project entail?)

- Demolish metal temporary storage structure that is rusting and collapsing at the Natural Resources Center on NASO. Replace storage structure. (2019)
- Construct new equipment storage shed capable of housing tractors and associated equipment parts at NASO. (2020)
- Repair storm damaged tractor storage shed at NASO. (2018)
- Repair storm damaged tractor storage shed at NSA NWA. (2018)
- Maintain equipment storage structures. (annually)

Project Purpose: (Why is this project needed?) Existing storage structures are in disrepair and are not being utilized for their intended purposes. One structure is a safety hazard and needs to be demolished (needs to be replaced with a secure locking concrete storage shelter, vandals have been known to steal items from the Natural Resources Center). One structure is leaking during storm events and damaging equipment. One structure lost its doors during a storm event and now items can not be securely stored (due to location of this structure with out doors nothing can be stored in this structure). Even with the repair and replacement of these structures there is still not enough storage to properly store equipment from elemental damage. As such a new structure must be constructed to protect hundreds of thousands of dollars of equipment and extend the life cycle of this equipment.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) The equipment needing to be properly stored is utilized for various projects that support requirements under federal and state law and Navy policy. This equipment performs functions in support of Endangered Species work, Migratory Bird work, invasive species work, nuisance wildlife work, erosion control work, habitat enhancement work, the Sikes Act, etc.

Maintaining this equipment enables the Navy to continue supporting these efforts and help to keep the bases in compliance with these laws and regulations; as such, reducing the potential for NOV's to be issued. This helps to save time and money enabling the military to continue training without interruption.

Protecting the equipment extends the life of the equipment and delays the need for costly repairs or even new equipment purchasing.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* Project scheduled in 2012 and 2013, but unfunded. POM 14 only annual maintenance funding received, no construction \$ received. POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Storage Structure Demolition
2	Storage Structure Repairs
3	Storage Structure Purchasing
4	Storage Structure Construction
5	Quarterly Reports of Project Status
6	Copies of Operation Manuals
7	Placement of Qualifying Structures on the Base Facility Inventory List
8	Itemized Receipts for all work completed and items purchased

Navy Utilization of Deliverables:

Navy staff will utilize these structures to store equipment out of the elements to extend the life expectancy of vital programmatic equipment. Placement of qualifying equipment on the base facility inventory list will allow those structures to receive maintenance from the Public Works maintenance funding, instead of through the ENV program. Please note that many of these structures will not qualify for designation on the facilities list and will continue to require EV funds for maintenance as needed.

Cost Estimations:

- **How was estimate derived?** *(Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.)*
 - Cost estimates were derived via an internet search and vendor supplied quotes of items and shipping costs, and known labor costs for Navy support construction and demolition work. Structure repair, maintenance, and construction needs were established based off of equipment and storage structure inventories.
 - This estimate has been split between each of the Oceana NR AOR bases, which cover 3 INRMPs (NASO/NALFF, NASO DNA, and NSA NWA) because the equipment services all 4 sites.
 - The following inflation rates were applied and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%

- **Estimate #1:**

- **Internet Costs & Labor Research & Vendor Quotes:**

Storage Structure Needs:

Items:	Year	2015 Unit Cost:	2015 Labor Rate:	2015 Total Cost:
Pre-fabricated Storage Shed (Concrete structure), NASO	2019	\$16,000.00	20%	\$19,200.00
Facility Demo (metal shed), NASO	2019	\$4,000.00	20%	\$4,800.00
Fabric Tractor Shed (with foundation), NASO	2020	\$45,000.00	20%	\$54,000.00
Tractor Shed Door Installation	2018	\$30,000.00	20%	\$36,000.00
Structure Maintenance, NASO-DNA-NWA	Annual	\$4,000.00	20%	\$4,800.00

Project Requested Funding: (Recurring Funds Projects with Non-Recurring Components within a given POM Cycle)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$711.73	\$725.97	\$740.49	\$755.30	\$770.40
NSA NWA	\$1,372.63	\$1,400.08	\$1,428.08	\$1,456.64	\$1,485.78
NASO/NALFF	\$38,128.58	\$25,927.43	\$59,503.46	\$3,236.99	\$3,301.73

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 7 July 2015

Project Numbers: 60191NR224; 32442NR224; 4275ANR224

Project Title: SIKES MA NASO/NALFF - Equipment Maintenance & Repair; SIKES MA NASO DNA - Equipment Maintenance & Repair; SIKES MA NSA NWA - Equipment Maintenance & Repair

Guidebook & Chapter: 12999

Legal Drivers:

Primary: EO_Invasive Species

Secondary: Sikes Act

Tertiary: SWCA

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual, Split Quarters 1st, 2nd, 3rd & 4th

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); and Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) Annual, as needed.

Project Description: (What does this project entail?)

Maintain and repair equipment to keep them in working order to complete projects required under the Integrated Natural Resources Management Plan (INRMP). INRMP projects support Species and Habitats of Concern management, invasive species management, outdoor recreation, etc.

Project Purpose: (Why is this project needed?) Some equipment requires annual maintenance checks and repairs as needed. Other equipment may break while in use and will need repairs. This equipment is needed to support INRMP identified projects and maintain compliance with Federal, State, and Navy laws, regulations, and policies. Without working equipment the Navy cannot accomplish their INRMP and Permit requirements, and will be labeled non-compliant and possibly be issued Notices of Violation.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?)

Equipment repairs and maintenance are needed to maintain compliance with the: Sikes Act; Endangered Species Act; EO_Invasive Species; Migratory Bird Treaty Act; OPNAVINT M-5090.1; Clean Water Act; Soil & Water Conservation Act; American with Disabilities Act; etc.

The equipment needing to be properly maintained and repaired is utilized for various projects that support requirements under federal and state law and Navy policy. This equipment performs functions in support of Endangered Species work (issued biological opinion), Migratory Bird work, invasive species work, nuisance wildlife work, erosion control work, habitat enhancement work, the Sikes Act, outdoor recreation, environmental compliance inspection access, etc.

Maintaining this equipment enables the Navy to continue supporting these efforts and help to keep the bases in compliance with these laws and regulations; as such, reducing the potential for NOV's to be issued. This helps to save time and money enabling the military to continue training without interruption.

Proper maintenance and repair of the equipment extends the life of the equipment and delays the need for more costly repairs or even new equipment purchasing.

Without equipment the Natural Resources managed outdoor recreation program would likely have to shut down due to access and safety issues, thus reducing military morale and welfare.

Without this equipment the Military will have to pay additional funding to maintain areas (at a much greater cost) they utilize for training purposes because Natural Resources will not be able to maintain their dual purpose land management objectives.

Without this equipment the facilities will be endangered of wildfire intrusion because the Natural Resources program will not be able to maintain their firebreaks.

Without this equipment the facilities will be more likely to flood because invasive plant species management, which block the ditches and create security breaches, will have to be stopped until funding can be obtained.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* If equipment does not get repaired, projects do not get completed, and the Navy becomes non-compliant with established requirements. POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Equipment Annual Maintenance Checks
2	Equipment Repair
3	Work estimates for repair and maintenance activities
4	Itemized Work Receipts

Navy Utilization of Deliverables:

Navy staff will continue to utilize equipment to maintain INRMP identified requirements, and new regulatory permit requirements.

Cost Estimations:

- **How was estimate derived?** *(Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.)*
 - Cost estimates were derived via an internet search and vendor supplied quotes of items and shipping costs, and known labor costs from prior Navy support equipment maintenance and repair and FY15 PWD Inhouse Fees. Estimate 1 is a worst case scenario, were all equipment requires repair and maintenance.
 - This estimate has been split between each of the Oceana NR AOR bases, which cover 3 INRMPs (NASO/NALFF, NASO DNA, and NSA NWA) because the equipment services all 4 sites.
 - The following inflation rates were applied and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%

Estimate #1:

- Internet Costs & Labor Research & Vendor Quotes & Previous Cost History:

2015 Equipment Maintenance & Repairs Needs:

Items:	Year	Total Cost:
Tractor (4)	Annual	12,000.00
ATV (2)	Annual	2,000.00
Gator (1)	As Needed	1,000.00
Chainsaw (3)	As Needed	1,500.00
Weapons (6)	As Needed	3,000.00
Vehicle Tow Hitches (2)	As Needed	2,000.00
Vehicle Wench (2)	As Needed	6,000.00
Vehicle Lift-Gate (2)	As Needed	2,000.00
Vehicle Accessory Lights (3)	As Needed	500.00
Lawn Mower (1)	As Needed	500.00
Hedge Trimmers (2)	As Needed	500.00
Weed whackers (3)	As Needed	500.00
Augers (5)	As Needed	1,500.00
Sprayer (4)	As Needed	3,000.00
Tow Trailer (2)	As Needed	2,000.00
Fire Trailer (1)	As Needed	1,000.00
Walk-in Cooler (1)	As Needed	3,000.00
Hand Held Radios (6)	As Needed	2,400.00
Digital Cameras (5)	As Needed	1,000.00
Truck Radios (2)	As Needed	2,000.00
Trimble GPS (3)	As Needed	3,000.00
Garmin GPS (5)	As Needed	1,000.00
Annual Requirement	Annual	14,000.00
Non-Annual Potential Emergency Repair Funds	As Needed	37,000.00
Annual Requested Emergency Repair Funds	Annual	11,000.00
Total Annual Request		24,000.00

Project Requested Funding: (Recurring Funds Project within a given POM Cycle)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$3,558.67	\$3,629.84	\$3,702.44	\$3,776.49	\$3,852.02
NSA NWA	\$6,863.14	\$7,000.41	\$7,140.42	\$7,283.22	\$7,428.89
NASO/NALFF	\$15,251.43	\$15,556.46	\$15,867.59	\$16,184.94	\$16,508.64

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 7 July 2015

Project Numbers: 60191NR226; 32442NR226; 4275ANR226

Project Title: CHS MA NASO/NALFF - INRMP Updates and Planning; CHS MA NASO DNA - INRMP Updates and Planning; CHS MA NSA NWA - INRMP Updates and Planning

Guidebook & Chapter: 12103

Legal Drivers:

Primary: ESA

Secondary: Sikes Act

Tertiary: CWA

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual, Split Quarters 2nd (85%) and 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) Annual.

Project Description: (What does this project entail?) Acquire equipment and support necessary to keep INRMPs updated. Each INRMP requires annual updating to reflect project needs, survey/inventory results, species status changes, metrics updates, site boundary mapping, map updates, statistical modeling/analysis updates, etc. If staffing levels are insufficient to allow for incorporation of annual updates (pen and ink changes) to be added to the physical document, if significant mission changes occur, if significant property alterations occur, if it is determined that existing INRMP NEPA is insufficient, etc. additional support may be needed every 4 years to ensure INRMPs are compliant with Federal, State, and Navy Policies, prior to their 5 year Sike's Act required review for Operation & Effect Concurrence. If the significance level is high enough to warrant an INRMP Revision vice an Update, additional funding will be required to conduct appropriate survey/inventory baseline data needs/analyses, consultations, and NEPA updates. At this time, no Revisions are anticipated for the POM 18 planning effort.

NASO/NALFF INRMP: Compliant INRMP dated 9 June 2015.

NASO DNA INRMP: Compliant INRMP dated 9 June 2015.

NSA NWA INRMP: Compliant INRMP dated 18 June 2015.

Project Purpose: (Why is this project needed?) Existing equipment does not allow the functionality to properly update and produce planning level analyses for the INRMP. As such, equipment is needed that does not connect to the network; therefore not requiring some of the restrictions that interrupt and prevent completion of detailed analyses and mapping efforts. Additionally, the equipment that is issued does not possess the speed and storage capabilities necessary for data processing and storage.

Support to maintain and utilize the equipment and keep INRMP data updated in accordance with various Navy and INRMP identified requirements (e.g., Geographic Information System collection and metadata requirements, map updates, data updates, analyses, modeling, etc.).

Update physical and digital versions of INRMPs to ensure all agreed upon metrics items and annual update needs have been appropriately addressed/placed into the INRMP in order to obtain 5 year Operation and Effect Concurrences to maintain a legally compliant document.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Funding this project will aide in making sure the bases are keeping in compliance with various Federal and State laws, regulations, policies, and conservation agreements (ESA, MBTA, MMPA, NMFA, Invasive and Pest Control, Sikes Act, INRMP, OPNAVINST M-5090.1, ADA, State Wildlife Action Plan, USFWS Strategic Plan, etc.).

INRMPs have a number of updates that are listed and approved by the annual INRMP metrics review teams (Navy, USFWS, and State Wildlife Agency representatives) as needed to be made to the INRMP plan, but current staffing levels and equipment are insufficient to accomplish the required updates. Many updates require research, analysis, and data modeling to accomplish the completed desired results for the official INRMP document.

Funding this project ensure the installation has accurate planning level data to make educated decisions related to military training and readiness activities. A fully compliant and implemented INRMP helps to ensure that Natural Resources are managed appropriately ensuring both conservation objectives and realistic training opportunities exist for our active duty and civilian workforce. A fully compliant and implemented INRMP also helps to ensure that natural resources and associated activities (nature trails, hunting, fishing, etc.) are maintained that support the Morale and Welfare of our active duty and civilian workforces, in addition to and as authorized retired, veteran, disabled, contractors and general public individuals.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)*

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Purchase Computer
2	Purchase ESRI and Trimble Software Maintenance/Update Packages
3	Purchase SPSS
4	Acquire FRAGSTATS
5	Purchase External Hard-drive
6	Purchase Surge protectors (2)
7	Maintenance (as needed)
8	Itemized Purchase Receipts
9	Analysis, GIS support, data management, GPS work, and document update support
10	Annually Updated INRMP document (Pen & Ink Changes, minimum)
11	Every 4 Years, if needed, Consolidated Pen & Ink Changes or Major Update Requirement to Digital and Hardcopy INRMP and/or Initiate INRMP NEPA Update.

**Pathfinder and Active Sync Acquisition Requirements have been completed.*

Navy Utilization of Deliverables:

Navy staff will utilize this equipment to more efficiently and expeditiously perform updates and analyses associated with maintaining current INRMPs.

Cost Estimations:

• **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)

- Cost estimate was derived from FY2012 and FY2015 funded projects associated with this EPR with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%.
- Note: As INRMP Compliance was obtained later than originally planned during the POM16 cycle, the 2017 POM'd funds should be utilized to reassess/obtain new NEPA documentation or provide an overhaul to the Migratory Bird and Endangered Species sections of the INRMPs.

Base	FY2012 4-5 year Consolidated Plan Updates (Includes an Inhouse Fee of \$1,545.45 ea)	FY2015 GIS and GPS Support for Annual Plan Updates (Inhouse Support)
NASO DNA	\$24,687.89	\$8,333.00
NSA NWA	\$24,687.89	\$8,333.00
NASO/NALFF	\$24,687.89*	\$8,333.00

*This Estimate was adjusted to match estimates for other INRMPs. The cost was artificially lower in 2012 due to age of INRMP. There were actually more updates needed to the document than were made during the contracted update.

Project Requested Funding: (Recurring funds project with Non-Annual Recurring component within a given POM Cycle)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$8,825.71	\$37,056.24	\$9,182.63	\$9,366.28	\$9,553.61
NSA NWA	\$8,825.71	\$37,056.24	\$9,182.63	\$9,366.28	\$9,553.61
NASO/NALFF	\$8,825.71	\$37,056.24	\$9,182.63	\$9,366.28	\$9,553.61

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 7 July 2015

Project Number: 32442NR229

Project Title: 2 BO MA NASO DNA - Threatened & Endangered Species Survey – Sea Turtle

Guidebook & Chapter: 12104

Legal Drivers:

Primary: Endangered Species Act

Secondary: SIKES Act

Tertiary: CZMA

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual, Split Quarters 1st (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana - Dam Neck Annex (NASO DNA)

Project Duration: (Estimated length of time and Start & End Dates) Annual.

Project Description: (What does this project entail?) Conduct annual Threatened and Endangered species surveys for Nesting Sea Turtles and Stranded Sea Turtles or Marine Mammals along the 4 mile Ocean Front of NASO Dam Neck Annex.

Current biological opinion for the Logger Head Sea Turtle was issued in 2012, in support of the NASO Dam Neck Annex Beach Replenishment project. Conducting the beach patrols has both a term and condition requirement under the BO issued incidental take statement and a recommended conservation measure. Annual Sea-Turtle Beach Patrol Surveys are identified in the INRMP as a requirement per USFWS guidance.

The installation is preparing a 2015 Programmatic Biological Assessment of the installation's Sea Turtle Management Program. A new programmatic BO will be forthcoming, which may identify additional conservation actions to be implemented, which could require additional funding resources.

Project Purpose: (Why is this project needed?) Conduct Nesting and Stranded Sea Turtle Surveys/Patrols. In accordance with the INRMP and the Biological Opinion nesting Sea-turtle surveys are required to minimize negative impacts to this T&E species.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Maintains compliance with the Endangered Species Act and helps to prevent potential Notices of Violation and associated penalties, thus allowing those authorized military training and Morale and Welfare activities to continue on the beaches of NASO DNA.

Project Delay: (Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW).
2	Cooperative Agreement (CA), Purchase Requests, Project Orders, Work Orders & Support Documentation.
3	Copies of all completed data sheets (patrols, strandings, nests, etc.)
4	GIS Data Layers (In Navy Standard Format, i.e. WGS84) associated with finds

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA. Grantee will provide immediate notification of any nests and/or strandings to the NASO Navy Natural Resources Specialist, and will submit copies of associated datasheets and GIS information. The Navy will utilize this information to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission or any other concerns.

Cost Estimations:

- **How was estimate derived?** (Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.)
 - Cost estimate number was based off of historic project funding requests with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%
 - An existing agreement with USFWS allows a combination of Navy staff and summer hires to conduct the daily surveys, and when and if a crawl is found the Navy contacts USFWS to come and collect the data and as necessary relocated the nest. An attempt was made in 2010 to create a Cooperative Agreement, which would allow USFWS to conduct these surveys; however, USFWS had concerns regarding the Privacy Act and the Navy's strict requirements for base access. 2015 State and USFWS Reg 5 Ecological Services Offices are now requesting the Navy to obtain their own permits and training regarding nest biological data collection, identification, and potential relocation vice having to rely on USFWS Back Bay National Wildlife Refuge employees and their associated permits.

Project Requested Funding: (Recurring Funds Project within a given POM Cycle)

FY2018	FY2019	FY2020	FY2021	FY2022
\$6,956.23	\$7,095.35	\$7,237.26	\$7,382.01	\$7,529.65

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 15 July 2015

Project Number: 60191NR231; 32442NR231; 4275ANR231

Project Title: MSFCA MA NASO – Nearshore Environment Assessment; MSFCA MA NASO DNA – Nearshore Environment Assessment; MSFCA MA NSA NWA – Nearshore Environment Assessment

Guidebook & Chapter: 12101

Legal Drivers:

Primary: MSFCM

Secondary: ESA

Tertiary: SIKES

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) FY2018-FY2022, Split Quarters 2nd (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana – Dam Neck Annex (NASO DNA); and Naval Support Activity Hampton Roads – Northwest Annex (NSA NWA).

Project Duration: (Estimated length of time and Start & End Dates) ~1 year, 5 months for each 5 year assessment. Time estimates are subject to change due to project delays (i.e. weather conditions and mission training precluding scheduled surveys) and will be handled on a case by case basis. Frequency of assessments may be increased due to mission changes or major landscape changes (man-made or natural).

Project Description: (What does this project entail?) Conduct research and analyses to produce a report to be incorporated into the INRMP on the detailed analysis/assessment of near shore environment associated with shore installations for inclusion in the INRMP. Identify and map (providing GIS layers and metadata) boundary of near shore environment. Provide property ownership information on the near shore environment lands and agreements between the property owner and the Navy. Provide species and habitat data information within the near shore environment. Provide near shore environment topography and tidal fluctuation information. Identify military training that currently impacts the near shore environment and how the environment is impacted. Identify potential conflicts with the military mission and the near shore environment. Identify potential habitat conservation initiatives the Navy can support associated with the near shore environment. Due to natural weather events the nearshore environment is dynamic and like dune systems can change drastically in a relatively short amount of time. In addition at these installations man-made actions also impact the nearshore environment such as military training, pile driving, dredging, beach replenishment operations, and general recreation (fishing, swimming, boating, etc.). Given the dynamic nature of this environment Nearshore Assessments should recur every 5 years, sooner if a major land alteration or climatic condition change occurs.

Project Purpose: (Why is this project needed?)

Project need was identified in 2010 via the INRMP metrics annual review, indicating that the INRMP does not sufficiently address nearshore environments. INRMP update list and project lists were updated to include this need.

Currently, these bases do not have sufficient biological information to determine if they are negatively impacting species and habitats within the nearshore environment. This lack of information puts the Navy at risk for violating several federal and state laws. In addition to federally mandated requirements, Navy and

State Policies and Plans dictate that we should have a working knowledge of our impacts to wildlife. This EPR exhibit works to get the Navy in compliance with these requirements.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Assessments of nearshore environments associated with bases are necessary to understand how mission requirements will affect species and habitats of concern and vice versa (how impact to species, habitats, and landscapes will impact the military mission). Various laws and regulations will be impacted by climate change (endangered species act, soil conservation act, clean water act, marine mammal protection act, essential fish habitat, etc.). The Sikes Act, National Environmental Policy Act, and Navy & DoD Policy (OPNAVINS M-5090.1, 4715.03, etc.) requires installations with INRMPs to have a working knowledge of climate change and near shore environments, which are to be included in the INRMPs. Knowing in advance what potential concerns there are would allow the command to plan around avoiding potential impacts and to plan for permitting and mitigation requirements, which may be needed to meet military training requirements.

Not having sufficient biological information related to Nearshore environments leaves the Navy vulnerable to lawsuits when this insufficient information is produced in NEPA documentation associated with military action projects. Obtaining sufficient information will help to avoid these situations or at least help the Navy to win or have such accusations overturned in a court of law.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* Project need was identified in 2010 via the INRMP metrics annual review, indicating that the INRMP does not sufficiently address nearshore environments. INRMP update list and project lists were updated to include this need. Exhibit was approved without funding for FYs 2014 & 2015. Partial funding was received for Nearshore Assessments in 2015 under a separate EPR (32442MH103) that covered NASO and NASO DNA. POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) or Contract & Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report and Geodatabase
5	PreFinal Report and Geodatabase
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices) and Geodatabase
7	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datashets, sample collection info., photographs, etc.)
9	Maps
10	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA/Contract. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission. In general the data will be utilized to identify any trends in impact to bird species of concern given the various military missions, it will

be used to identify potential habitat modification requirements to minimize bird strikes, it will be used to update Bird Depredation Permits where required, and it will be used to help in conducting planning level reviews of proposed projects and activities with consideration for impacts to wildlife and the mission.

Cost Estimations:

• How was estimate derived? *(Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.)*

- Cost estimation was derived utilizing the FY2015 Negotiated Nearshore Assessment Projects with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%. Due to how contract execution funding documentation was prepared EV22 Marine Resources SME recommended utilizing \$65,000.00 as the FY15 GCE for the Oceana nearshore assessment cost (a.k.a., Owls Creek).
- If projects the following projects 60191NR231, 32442NR231, and 4274ANR231 are not funded at the same time the overall cost will likely be more expensive due to additional coordination, inhouse fees, and equipment mobilization requirements.

BASE	2015 Near Shore Contract Award	2015 Near Shore Inhouse Fees
NASO DNA	\$404,904.84	3,277.71
NSA NWA	\$0.00	0.00
NASO/NALFF	\$65,000.00	0.00

Project Requested Funding: (Non-Annual Recurring Funds Project within a given POM Cycle)

- FY21 is for the Recurring Nearshore Environment Assessment following the Baseline Assessment (Recurring assessment due every 5 years after initial baseline).

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$0.00	\$0.00	\$0.00	\$458,778.51	\$0.00
NSA NWA	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
NASO/NALFF	\$0.00	\$0.00	\$0.00	\$73,057.03	\$0.00

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 7 July 2015

Project Numbers: 60191NR232; 32442NR232; 4275ANR232

Project Title: SIKES MA NASO/NALFF - Resource Protection Agreement; SIKES MA NASO DNA - Resource Protection Agreement; SIKES MA NSA NWA - Resource Protection Agreement

Guidebook & Chapter: 12101

Legal Drivers:

Primary: Sikes Act

Secondary: Endangered Species Act

Tertiary: Migratory Bird Treaty Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Annual, Split Quarters 1st, 2nd, 3rd, & 4th (or all at the 1st quarter, as funds are to be MIPR'd to another agency for a full year's service)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) Annual.

Project Description: (What does this project entail?) Create and maintain a cooperative agreement with the US Fish & Wildlife Service, the VA Department of Game & Inland Fisheries, and/or installation Security to supply Conservation Law-enforcement protection over the natural resources on Navy Property.

Project Purpose: (Why is this project needed?) Protection of Natural Resources via adequately staffed and trained Conservation Law-enforcement Officers (CLEOs) is required under the Sikes Act. The CLEO's would enforce a wide number of legal and policy requirements at these installations: CWA; CZMA; EO 11990 (Protection of Wetlands); ESA (e.g., enforcing/executing existing Biological Opinions for such species as the Federally Threatened Loggerhead Sea Turtle); MBTA (e.g., ensuring Migratory Bird depredation work is being carried out in accordance with permit requirements); SWCA; 32 CFR 190 (Natural Resources Management Program); DoDI 4715.03 (Environmental Conservation Program); OPNAVINST M-5090.1; EO 13112 (Invasive Species); Chesapeake Bay Preservation Act and Federal Agreement; DoD Instruction 4150.7 (Pest Management); EO 13112 (Invasive Species); EO 11987 (Exotic Organisms); and various other Federal and State laws (particularly related to hunting and fishing regulations, and state T&E listed species), regulations, policies, and conservation agreements (MMPA, NMFA, EFH, State Wildlife Action Plan, USFWS Strategic Plan, etc.).

Neither NR staff nor military police currently have the staffing and training levels too sufficiently and legally process and investigate natural resources legal actions. NASO, NALFF, NASO DNA, and NSA NWA all require conservation law-enforcement officer (CLEO) support. Each of these facilities is located within a highly urbanized area and receives a high amount of authorized and unauthorized human access (bases are not 100% fenced in, majority of natural areas are found outside of "secured" compounds). Each of these bases support species of concern, habitats of concern, and hunting &

fishing programs. There have been known and suspected negative impacts to natural resources on each of these bases (i.e., vandalism, killing, filling wetlands, planting of non-native invasive species, harassment of Endangered Species and Migratory Birds, poaching, etc.).

Conservation Law-enforcement is a dangerous job (diseased animals, aggressive animals, hunters with loaded weapons, etc.) and should be done in such a manner that when an officer responds to an emergency situation or a situation where they think they may need to use force (i.e., weapons) they should have adequately trained back-up or someone to attend/investigate with them for safety purposes. Also, staffing should be at a level in order to avoid a situation where a single person is working or on call 24 hours 7 days a week. It is recommended that at a minimum the cooperative agreement or Navy staffing levels provide for 3 adequately trained individuals to provide conservation law-enforcement support to NASO/NALFF, NASO DNA, and NSA-NWA. This way there is the ability to safely work emergency situations and to allow for at least one CLEO to have official time-off on a rotational basis.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Funding this project aides the Navy in maintaining compliance with laws, regs., and policies and reduces the potential for incurring Notices of Violations. NOV's could be issued for knowingly and unknowingly allowing the occurrence of negative impacts to resources. It has been identified that current staffing levels and training/cert. levels are not adequate for implementing conservation law-enforcement actions, across all four bases, regarding natural resources. In effect one may draw the conclusion the Navy is knowingly allowing negative impacts to occur to resources based on the lack of providing enough adequately trained conservation law-enforcement professionals.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* Projects has been requested for funding since 2012. Funding was received in 2015 to complete a programmatic assessment. POM 16/17 Acceptable Risk, approved without funding.

Proposed Deliverables:

Conservation Law-enforcement Support: Federal, State, and Navy Regulation Enforcement, Patrols, Investigation, Ticketing, other Law-enforcement Legal Support, Nuisance Wildlife Response, Emergency Wildlife Response, Hunting Program Support, Fishing Program Support, etc.

Costs are based off of 2015 OPM Payscale for Law-enforcement:

- 2015 Awarded Assessment may identify a need for additional manpower support; since the assessment has not been completed a minimum number of officers required was estimated. The assessment will also identify training, certification, and equipment support in the event that a Cooperative Agreement Cannot be established that would provide training and equipment.
- Utilized Step 10 for each pay series
- Anticipate a 1st 40 work schedule
- Estimate Night-time Differential and Hazardous Duty Pay May Also Apply and are factory as an overhead % estimate.
- Estimated 8 Hours of Overtime/Week/Person as CLEO work is subject to on Call Services and OT.

Personnel	Qty	Mths	# wks	Hrs/ week	\$/hr	\$OT/ hr	45% Overhead	Total:	Comments
CLEO (GS 7)	2	12	52	40	\$24.65	\$36.98	\$59,990.11	\$193,301.47	
CLEO Team Lead (GS 11)	1	12	52	40	\$36.48	\$38.31	\$41,316.91	\$133,132.27	
CLEO Supervisor									To be supplied by CA partner.
Training									To be supplied by CA partner.
Equipment									To be supplied by CA partner.
Benefits									To be supplied by CA partner.

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) & Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report
5	Final Report (Breakdown of types of investigations, locations, results, hours spent on each case, etc.)
6	GPS location of infraction concerns (In Navy Standard Format, i.e. WGS84)
7	Frequent correspondence with base Natural Resources Manager
8	Permit Acquisitions (as required)
9	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee(s) staff to develop and obtain approvals of SOW and CA. Navy staff will work with grantee Partners and the CLEOs to identify and report problems. CLEOs will also be available to support other NR related missions if time allows such as prescribed burning, nuisance wildlife and emergency wildlife calls. The submittal of draft a final report will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a document that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: track what types and frequencies of conservation legal infractions are occurring on the bases; update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission.

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)
 - Cost estimate was derived from minimum estimated need requirements and the 2015 OPM pay-scale for Law-enforcement with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%
 - Pending the outcome of the final Cooperative Agreement results, there may be an increase in the amount of funding required to come to a resolution regarding training, equipment, benefits, etc.

- It is recommended that an interagency cooperative agreement with USFWS, VA Department of Game and Inland Fisheries and/or NC Wildlife Commission, or installation Security be developed as these agencies have trained Conservation Law-enforcement Officers and have established programs specifically for conservation law enforcement. USFWS would be the primary choice as they are Federal Government and can cross state jurisdictional boundaries without conflict in regards to conservation law-enforcement actions.
- This estimate has been split between each of the Oceana NR AOR bases, which cover 3 INRMPs (NASO/NALFF, NASO DNA, and NSA NWA), because the CLEOs would service all 4 sites.

Project Requested Funding: (Recurring Funds Project within a given POM Cycle),

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$48,402.88	\$49,370.94	\$50,358.36	\$51,365.52	\$52,392.83
NSA NWA	\$93,348.41	\$95,215.38	\$97,119.69	\$99,062.08	\$101,043.32
NASO/NALFF	\$207,440.91	\$211,589.73	\$215,821.53	\$220,137.96	\$224,540.72

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 7 July 2015

Project Number: 32442NR234; 60191NR233; 427ANR233

Project Title: BAGEPA MA NASO DNA – Nesting Bald Eagle Surveys and Habitat Suitability Assessment; BAGEPA MA NSA NWA – Nesting Bald Eagle Surveys and Habitat Suitability Assessment; and BAGEPA MA NASO/NALFF – Nesting Bald Eagle Surveys and Habitat Suitability Assessment

Guidebook & Chapter: 12101

Legal Drivers:

Primary: Bald and Golden Eagle Protection Act

Secondary: Migratory Bird Treaty Act

Tertiary: Sikes Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) FY2018-FY2022, Split Quarters 2nd (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana - Dam Neck Annex (NASO DNA)

Project Duration: (Estimated length of time and Start & End Dates) 1 year, 5 months for each 5th year more detailed reporting cycle. Time estimates are subject to change due to project delays (i.e. weather conditions and mission training precluding scheduled surveys) and will be handled on a case by case basis.

Project Description, Purpose, and Utilization: (What does this project entail?) With the confirmation of an active eagle nest on NAS Oceana and nests that are relatively close to each of the 4 installations (within <5 miles), coupled with the fact that the state no longer surveys all suitable eagle nesting habitat, a CESU package to conduct Winter Eagle Nest Surveys and Fledgling Eagle Tracking associated with the nests located these Navy properties is recommended. This is particularly critical installations with an aviation mission (especially, for identifying problematic nests for potential removal).

NAS Oceana (NASO) has one confirmed eagle nest, as of fall 2014, along the Owl's Creek waterway, that may have gone unidentified in the previous year. Eagles have been observed on the NASO Airfield and flying over the NASO Golf Course. NASO maintains an USFWS eagle depredation permit, which allows us to harass eagles off of the airfield. NASO is located within several watersheds and is less than a mile from multiple water sources (Atlantic Ocean, Lynnhaven River Tributaries, Golf Course Ponds, etc.) within Virginia Beach, VA. No formal basewide eagle nest surveys have been completed since the VDGIF & CCB stopped surveying all suitable nesting habitat in VA.

NASO Dam Neck Annex (DNA) has confirmed eagle nests located less than 600ft away from its border, but has not confirmed an active nest on property. It is rumored that there may be a

nest or even a possible roost site on the southwest corner of the installation off of Lake Tecumseh. NASO DNA is also located within Virginia Beach, VA and is less than a mile from multiple water sources (Lake Tecumseh, Redwing Lake, Atlantic Oceana, Golf Course Ponds, etc.). No formal basewide eagle nest surveys have been completed since the VDGIF & CCB stopped surveying all suitable nesting habitat in VA.

NALF Fentress (NALFF) has confirmed eagle nests located within 1.25 kilometers of the installation border. Eagles have been documented on the airfield. NALFF is located between branches of the North Landing River and Pocatay Creek in Chesapeake, VA. No formal basewide eagle nest surveys have been completed since the VDGIF & CCB stopped surveying all suitable nesting habitat in VA.

NSAHR Northwest Annex (NWA) has confirmed eagle nests located within 3 kilometers of the installation border. Eagles have been documented loafing and flying over the property but not nesting on site. NSAHR NWA is located in close proximity to the Northwest River and has an open body of water on the property referred to as Luncker Lake . 2/3rds of NASHR NWA is located in Chesapeake, VA. The remaining 1/3rd of the installation is located in Currituck Co., NC. No formal basewide eagle nest surveys have been completed since the VDGIF & CCB stopped surveying all suitable nesting habitat in VA.

Task one of this agreement is to develop a GIS layer depicting suitable nesting habitat polygons for the 4 installations and within 2,640ft of each installation's boundary. The total acreages (~14,000acres) of owned Navy property (does not include the referenced buffer) considered under this agreement are: NASO =5846; NASO DNA =1900; NALFF =2556; and NSAHR NWA =3661. Partner will conduct a desktop analysis utilizing Navy supplied GIS data (boundary layers, vegetation classification data, water source/wetland data, etc.) and available other data (Public Domain/Google Images/Etc., State, Partner, USFWS, USGS, etc. data/imagery) to identify suitable habitat on the installation and within the 2,640ft installation boundary buffer. This suitable habitat layer will be utilized to establish the survey location/paths/routes (this layer should be developed prior to 01 Oct 2015) to be utilized in association with task two of this agreement.

Task two of the agreement is to complete annual winter Eagle Nest and Roost Surveys of all suitable eagle nesting habitat for all 4 installations and if possible suitable habitat within 2,640ft on the installation borders. We suspect the best and most time efficient way to accomplish this task is via aerial survey methodologies. Survey routes/locations should be tracked and delivered utilizing GIS/GPS technologies (point, line, and or polygon geometry). Nest and roost locations will be collected via GPS as point geometry.

Task three of the agreement is to observe identified nests to determine status (active, failed, abandoned, etc.) . This should be recorded as part of the GIS attributes of the nest locations identified in task 3. Access will be granted on Navy property to access nest locations for ground based survey efforts.

Task four of the agreement is for active successful nests to track eaglets associated with tasks 2 and 3's findings. Because food is abundant it is possible to have more than one eagle nest on each of these installations. At this time we are only budgeting for 6 eagle nests with 2 chicks per

nest. For a total of 12 tracking devices. (This budget can be altered depending on available funds.)

GIS Deliverables would need to be compliant with NAVFAC ML Geodatabase SDFIE Environmental Module Requirements. We expect this project's Geodatabase to populate the follow 3 EV Model Feature Types: "NaturalResourceSurvey;" "SpecialStatusSpeciesHabitat;" "LandManagementZone ;" and "SpecialStatusSpeciesObs." The "NaturalResourcesSurvey" layer will include polygon, line, or point data of the actual areas/locations surveyed within the installation and buffered distance of the installation's boundary. The "SpecialStatusSpeciesHabitat" layer will include polygons of the extent of the suitable eagle nesting habitat within the installation and buffered distance of the installation's boundary. The "LandMangementZone" layer will include the USFWS specified distance buffers from known nest specified distances (330', 660', 1000', and 2640'). The "SpecialStatusSpeciesObs" layer will include point locations of identified eagle nests, roosts and eagles. The established EV Model Layers possess the Navy required attribution, this does not mean that all attribution required for this project is prepopulated in the established Geodatabase layer. The established EV Model attribution must be populated; however, if data to be collected does not fit into the pre-established attributions additional attribution can be added into the geodatabase or joinable tables can be created to link to the appropriate GIS files.

All data will be collected and reported to the installation Natural Resources Manager (iNRM). All access requests will be coordinated through the iNRM.

This is a data collection effort and we currently only anticipate receiving the data within a Geodatabase, within either an Access Database or Excel Spreadsheet, and via digital copies of any datasheets. The submittal of the Access Database or Excel Spreadsheet is to ensure we have two different ways to obtain and view pertinent data (nest, roost, and eagle locations) . As we all know, sometime our GIS systems and our Microsoft office systems, are not always available when needed, so it is best to have both media available. The Access or Excel deliverable should include the GIS feature identifier, a point location Lat/Long or UTM, and any attribution/data collected. In addition a copy of any hardcopy and/or electronic datasheets and photographs should be provided to the iNRM. Hardcopies can be scanned and provided digitally. All Final deliverables should be submitted on either a DVD or CDR, as appropriate. Draft deliverables can be submitted via the AMRDEC SAFE system.

This data can be utilized to aide with eagle nest research; however, it's inclusion in publications, presentations, and other media should be coordinated with the associated iNRM to obtain appropriate Navy authorizations for release. Prior to nests being added to public viewable sites, such as the State Eagle NestLocator website, Navy authorization should be obtained. At this time we do not want the tracked eagle locations to be available for public viewing, unless we can provide a public accessible location for people to view the nest. We cannot encourage people to want to come onto certain areas of the installation to view these animals as many areas of the installation are closed to unauthorized individuals (safety/military mission issues). The data not authorized by the Navy to be posted on publicly viewable sites can be made available upon request for official business, but not for recreational/personal use.

This data will be utilized to update 3 Installation Natural Resources Management Plans, associated with identified survey properties. Data will also be utilized by the iNRM and

installation planners to advise appropriate parties regarding changes to the installation's landscape and military operations (e.g., project planning, master planning, NEPA, etc.).

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Eagle nest locations are needed to ensure that we are adequately protecting these species in accordance with the Bald and Golden Eagle Protection Act (BAGEPA) and the Migratory Bird Treaty Act. This species is a former Endangered Species Act listed species. Not knowing the locations of nesting eagles could result in unintended take, and Notice of Violation, and law-enforcement actions/penalties, which could put a stop, and/or delay military mission projects. Knowing in advance what potential concerns there are would allow the command to plan around avoiding potential impacts and to plan for permitting and mitigation requirements, which may be needed to meet military training requirements.

Installation Aviation, Firing Range, Boat-launch and other military training and construction activities can be considered take of an eagle if an eagle abandon's a nest due to these actions; however, if these actions were routinely occurring on the installation prior to the bird nesting within the recommended USFWS nest buffer distance for the type of activity a pre-existing conditions argument can be applied which has the potential to exempt the actions from further restrictions or violations.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)*

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) or Contract & Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report
5	PreFinal Report
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices)
7	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datasheets, sample collection info., etc.)
9	Maps
10	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission. In general the data will be utilized to identify any trends in impact to bird species of concern given the various military missions, it will be used to identify potential habitat modification requirements to minimize bird strikes, it will be used to update Bird Depredation Permits where required, and it will be used to help in conducting planning level reviews of proposed projects and activities with consideration for impacts to wildlife and the mission.

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)
 - Cost estimation was derived from the FY2015 GCE for the development of a CESU with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%
 - Annual recurring eagle habitat assessments and nesting activity surveys have been reclassified under a this new EPR Number for Better Tracking purposes since the surveys are tied to a specific Federal Law (BAGEPA). Project was funded in 2015 in association with funding from EPRs 32442NR205, 60191NR205, and 4275ANR205. Project could also have been tied to EPRS 32442NR204, 60191NR204, and 4275ANR204.

• **Estimate #1:**

BASE	2015 CESU GCE	2015 CESU Inhouse Fee	~2015 CESU Total
NASO DNA	\$22,940.00	\$1,250.00	\$24,190.00
NSA NWA	\$10,194.00	\$1,250.00	\$11,444.00
NASO/NALFF	\$32,523.00	\$2,500.00	\$35,023.00

Project Requested Funding: (Recurring Funds Project)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$25,620.29	\$26,132.69	\$26,655.35	\$27,188.45	\$27,732.22
NSA NWA	\$12,120.65	\$12,363.06	\$12,610.33	\$12,862.53	\$13,119.78
NASO/NALFF	\$37,093.81	\$37,835.69	\$38,592.40	\$39,364.25	\$40,151.53

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 07 July 2015

Project Number: 60191NR234; 32442NR235; 4275ANR234

Project Title: 1 S MA NASO/NALFF - Listed and SAR Bat Species Surveys and Tracking - NLEB; 1 S MA NASO DNA - Listed and SAR Bat Species Surveys and Tracking - NLEB t; 1 S MA NSA NWA - Listed and SAR Bat Species Surveys and Tracking - NLEB;

Guidebook & Chapter: 12104

Legal Drivers:

Primary: Endangered Species Act

Secondary: Sikes Act

Tertiary: Fish & Wildlife Conservation Act, 16 USC 2901-2911

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Non-Annual Recurring, FY2019 and FY2022 Split Quarters 1st (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO)/ Naval Auxiliary Landing Field (NALFF); NASO Dam Neck Annex (DNA); and Naval Support Activity Hampton Roads Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) 1 year, 6 months... subject to change due to project delays (i.e. weather conditions and mission training precluding scheduled surveys).

Project Description: (What does this project entail?) Conduct basewide monitoring/roost/hibernacula tracking/identification surveys for the Northern long-eared bat. Conduct mist-netting, radio tracking, and acoustic monitoring efforts in accordance with current USFWS and State Guidance every 3 years from the baseline survey effort. Radio track 5-10 female bats (reproductively active, preferred) at each installation. Identify known roosting sites/habitat, and hibernacula on the installation. Establish the extant of use by this species on the installation (what habitats does the species utilize, where, when, and for what purpose). As the species is a short distance migrant species establish anticipated species arrival and departure dates for the installation (if applicable).

If tracking is scheduled and targeted species (NLEB) is not captured, the use of purchased radio tags on other SAR bat species is acceptable, as long as proper State/Federal permitting is obtained and coordination/approvals with/from both Navy CTR and ITR has completed/obtained.

Project Purpose Project Impact/Benefit to Military Mission: (Why is this project needed?) The Northern long-eared bat was listed in 2015 under the Endangered Species Act. Little is known about this species in Southeastern VA/Northeastern NC. The species was 1st document in SE VA/NE NC in 2013 on a Naval Installation located both in Chesapeake VA and Currituck Co. NC (NSA NWA) while conducting surveys for a State Listed Bat species. No prior bat survey work at Naval Installations in this area had previously documented this species. Additional bat work conduct in 2014 and 2015 identified the species on additional Naval properties further north along the east coast (NALFF and NWSYT). At 2 installations, NSA NWA and NALFF maternity colonies have been identified roosting on the installation and on adjacent landowner property.

Information on bat utilization of the installation will help in developing or enhancing existing INRMP goals and objectives that support this species, aiding the installation in avoiding potential future critical habitat designation on the installation.

There are several other bat species of concern that are currently not listed, but are anticipated to be proposed for listing under the ESA and are highly likely to become listed, in addition to State Listed Species. This project will also capture information on many of these species, which will help support future datacall tasks related to the listing of these other species.

Not funding this program would put the Navy at risk for being negligent to properly managing for ESA species of concern on their bases. Not funding increases the potential for violations of various Federal Laws to occur, including but not limited to the Endangered Species Act and the Sikes Act. Not properly managing for species of concern could: open the Navy and the Base to Lawsuits from the public; result in very costly mitigation and permitting requirements; and could stop or at least restrict military mission operations (resulting in loss of required military training and the associated costs with such a situation).

Funding this project would allow the Navy to better assess risks to military mission and allow the military to address the concerns accordingly and stop the need for an issuance of a military mission stopping violation. Also, funding a project will allow the base to manage on property, and develop off property partnerships to increase stability of species populations in an attempt to get species delisted or keep them from becoming listed (A GREAT Benefit to the Military Mission).

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)*

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) or Contract & Support Documentation
3	Monthly Project Status Reports
4	Draft Final Report and Geodatabase
5	PreFinal Report and Geodatabase
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices) and Geodatabase.
7	Draft and Final GIS Data Layers/Geodatabase (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datasheets, sample collection info., photographs, permits, etc.)
9	Maps
10	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA or conduct contract proposal bidding process. Grantee will provide monthly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports and GIS data will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS geodatabase, photographs, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission. (Grantee will also notify the Navy immediately if a species of concern is identified providing species name, GPS location, installation name, and photograph, if a camera is available and authorized for use.)

Cost Estimations:

Project was initially funded via EPRs 32442NR205, 60191NR205, and 4275ANR205 as the bat had not been officially listed when 1st confirmed to be present in SE VA. POM18 is the 1st POM cycle to occur in the 3 year survey timeline since baseline survey work was initiated.

• How was estimate derived? (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)

- Estimate was derived from taking the FY2014 awarded contract final costs and requested Inhouse fees with the following applied annual inflation rates and rounded up to the nearest dollar: years prior-2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0% .
 - FY14 Awarded Contract N62470-13-D-8016-WE07 NLEB Survey:
 - PMs = Emmett Carawan; Thad McDonald
 - Task 3 NSA NWA presence/absence survey \$61,574.00
 - Option 2 NSA NWA presence/absence survey \$44,886.45
 - Option 4 NASO presence/absence survey \$44,886.45
 - Option 5 NALFF presence/absence survey \$44,886.45
 - Option 6 NSA NWA baseline acoustic/netting \$36,091.25
 - Option 8 NASO DNA baseline acoustic/netting \$36,091.25

BASE	~2015 Baseline (Acoustic Monitoring/Netting)	~2015 Presence/Absence Roosting Locations (Netting/Tracking)	~2015 Inhouse Fees	Total:
NASO DNA	\$44,886.45	\$36,091.25	\$5,000.00	\$85,977.70
NSA NWA	\$106,460.45	\$36,091.25	\$5,000.00	\$147,551.70
NASO/NALFF	\$89,772.90	\$72,182.50	\$5,000.00	\$166,955.40

Project Requested Funding: (Non-Annual Recurring Funds Project)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$91,061.32	\$0.00	\$0.00	\$96,635.00	\$0.00
NSA NWA	\$156,276.02	\$0.00	\$0.00	\$165,841.36	\$0.00
NASO/NALFF	\$0.00	\$180,363.55	\$0.00	\$0.00	\$191,403.24

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 07 July 2015

Project Number: 60191NR235; 32442NR236; 4275ANR235

Project Title: 3 S MA NASO/NALFF - Threatened & Endangered Species Survey – Monarch Butterfly Habitat; 3 S MA NASO DNA - Threatened & Endangered Species Survey – Monarch Butterfly Habitat; 3 S MA NSA NWA - Threatened & Endangered Species Survey – Monarch Butterfly Habitat;

Guidebook & Chapter: 12104

Legal Drivers:

Primary: Endangered Species Act

Secondary: Sikes Act

Tertiary: Fish & Wildlife Conservation Act, 16 USC 2901-2911

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) Non-Annual Recurring, FY2018-2022 Split Quarters 1st (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO)/ Naval Auxiliary Landing Field (NALFF); NASO Dam Neck Annex (DNA); and Naval Support Activity Hampton Roads Northwest Annex (NSA NWA)

Project Duration: (Estimated length of time and Start & End Dates) 1 year, 6 months... subject to change due to project delays (i.e. weather conditions and mission training precluding scheduled surveys).

Project Description: (What does this project entail?) Conduct a mapping effort of stands of milkweed, a plant directly linked to the livelihood of Monarch Butterflies, on the installation. In 2015, a petition was submitted to USFW to list Monarch butterflies under the Endangered Species Act. USFWS has not yet made a determination if the petition is warranted. Monarch butterflies and milkweed are known to occur on the installation. Of the mapped milkweed locations, identify potentially significant stands of the plant for proper management to support the conservation of the butterfly. Survey effort will utilize a combination of desktop analysis to focus efforts based off of existing installation GIS data and meandering in-field surveys. Once a milkweed stand is identified the stand is to be mapped utilizing GPS technology that meets or exceeds Navy GIS EV-Model established requirements. Mapped stands will be characterized and ranked based on potential significance to local/migrant monarch butterfly populations. Enhancement/restoration recommendations will be provided for stands of milkweed that would provide an elevated benefit to the local/migrant monarch butterfly populations.

Project Purpose, Project Impact/Benefit to Military Mission: (Why is this project needed?)

Monarch butterflies are known to migrate through SE VA/NE NC. Migrating butterfly swarms have been documented at NALF Fentress (a Naval Facility in Chesapeake, VA) through the use of radar and field observation (Natural Resources Staff assisting with the operation of radar for BASH survey work confirmed the observation). Monarch butterflies have been observed on most Naval installations in SE VA/NE NC, as has milkweed. Literature research indicates that there is a direct tie to monarch survival and milkweed populations. Research also indicates that pesticide utilization is killing milkweed, which in turn is negatively impacting the reproductive success of Monarch butterflies.

Funding of this project would show a proactive effort to conserving habitat for the monarch butterfly and could be utilized to avoid receiving a critical habitat designation on the installation. Not properly managing for species of concern could: open the Navy and the Base to Lawsuits from the public; result in very costly mitigation and permitting requirements; and could stop or at least restrict military mission operations (resulting in loss of required military training and the associated costs with such a situation).

Ensuring that critical habitat designation does not occur on the installation helps to reduce potential restrictions and regulatory oversight that could be placed on the installation which could greatly reduce military mission and training activities, and increase costs to general operations on the installation.

Also, Data from this project can be utilized to support listing comment period datacall taskers. It is recommended that this project receive funding in either 2016 or 2017 and not wait until 2018 in order to help with such datacall requests.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* NA. Project is Non-Annual Recurring, every 5 years. However, project may be required more frequently if laws change, species are added to the Endangered Species List, or if a catastrophic event causes major change on base or within the habitat.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) or Contract & Support Documentation
3	Monthly Project Status Reports
4	Draft Final Report and Geodatabase
5	PreFinal Report and Geodatabase
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices) and Geodatabase
7	Draft and Final GIS Data Layers/Geodatabase (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datasheets, sample collection info., photographs, etc.)
9	Maps
10	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA or conduct contract proposal bidding process. Grantee will provide monthly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports and GIS data will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS geodatabase, photographs, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission. (Grantee will also notify the Navy immediately if a species of concern is identified providing species name, GPS location, installation name, and photograph, if a camera is available and authorized for use.)

Cost Estimations:

- **How was estimate derived?** *(Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.)*
 - Estimate was derived from other habitat mapping efforts awarded in 2012 for installations in SE VA/NE NC and their requested Inhouse fees with the following applied annual inflation rates and rounded up to the nearest dollar: years prior-2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0% .

Project Requested Funding: (Non-Annual Recurring Funds Project)...highlighted column is the requested funding year for POM18, out years are shown in the event that project is funded earlier or later than scheduled.

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$37,069.45	\$37,810.84	\$38,567.06	\$39,338.40	\$40,125.17
NSA NWA	\$47,078.20	\$48,019.77	\$48,980.16	\$49,959.77	\$50,958.96
NASO/NALFF	\$59,311.12	\$60,497.35	\$61,707.29	\$62,941.44	\$64,200.27

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 7 July 2015

Project Number: 32442NR237

Project Title: 1 S MA NASO DNA - Threatened & Endangered Species Survey – Red Knot & Piping Plover

Guidebook & Chapter: 12104

Legal Drivers:

Primary: Endangered Species Act

Secondary: Migratory Bird Treaty Act

Tertiary: Sikes Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) FY2018-FY2022, Split Quarters 2nd (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana - Dam Neck Annex (NASO DNA)

Project Duration: (Estimated length of time and Start & End Dates)

Annual recurring shorebird assessments have been reclassified under this new EPR Number for Better Tracking purposes since the surveys are tied to 2 specific threatened and endangered species (Piping plover and Red knot).

Project Description: (What does this project entail?)

Conduct breeding and migrating shorebird surveys targeted for potentially occurring federally listed species (current known targeted species Piping plover and Red knot). Conduct shorebird surveys documenting all shorebirds observed along the 4 miles of NASO DNA's beach property. Close attention must be given to federally listed species in breeding plumage. If pairs of birds in breeding plumage are located, these birds should be tracked for multiple consecutive days to determine if they have nested on the installation. Federally listed species and nest observations must be reported to the installation natural resources manager immediately. Locations of Federally listed species and nesting locations are to be GPS's and depicted within the annual survey results report. There should be photo-documentation of each listed species and nest observation.

Neither current targeted species are known to breed on the installation. This data will be utilized to address potential impacts to these species from military land use and to ensure that their status has not changed to breeding. This data will also be utilized in the creation of any required Biological Opinions (BO) for the management of these species.

Project may identify additional survey need requirements particularly if species with additional warranted protection requirements are identified (including: Federally Listed Species under various acts; and non-Federal T&E listed species that are federally and State recognized Species of Concern, which pose a mission threat or are in danger of potentially becoming a candidate for listing under the Endangered Species Act). If these needs are identified, then additional Projects will be requested at that time.

Project Survey Methodologies will be developed in coordination with the Installation Natural Resources Manager, DoD Coordinated Bird Monitoring Program, and INRMP signatory partners (USFWS and appropriate VA State Wildlife Agency).

Project Purpose, Project Impact/Benefit to Military Mission: *(Why is this project needed?)* Annual surveys are required to ensure current Navy utilization for both military mission and conservation program requirements do not negatively impact federally, or listed shorebird species. Not obtaining this data would put the Navy at risk for violating several federal and state laws. In addition to federally mandated requirements, Navy and State Policies and Plans dictate that we should have a working knowledge of our impacts to wildlife. This EPR exhibit works to get the Navy in compliance with these requirements.

Surveys of bird utilization on the base are necessary to understand how mission requirements will affect bird species of concern. MBTA, ESA, and BAGEPA listed species all utilize this base’s shoreline and have the potential to have negative impacts on the mission. Not knowing the potential impacts to the species by military mission projects and training could cause a violation of any one of these federal laws and result in a NOV, which would be costly and put additional restrictions on military training property. Knowing in advance what potential concerns there are would allow the command to plan around avoiding potential impacts and to plan for permitting and mitigation requirements, which may be needed to meet military training requirements.

Though the primary mission of NASO DNA is more classroom oriented there are still helicopter, drone launch and approach and departure corridors for NASO DNA, NASO, NALFF, and Chambers Field which utilize the air space over and on NASO DNA’s coastline. As such there is still a BASH component associated with this base. Understanding usage and annual migration patterns in the various habitat types, including the airfield clear zones, aircraft flight paths and landing zones is a vital step to reducing BASH hazard on the bases. Data to quantify and qualify potential take are required for obtaining and maintaining a bird depredation permit for clear zone management (BASH reduction efforts). Permits are managed through the Natural Resources program.

In addition, with the increase for renewable energy resources there is a strong push to place wind-turbines on NASO DNA since it is located on the ocean front. At this time there is not sufficient scientific data for this area to prove negative impacts associated with this potential upcoming mission. The biologists for the base through antidotal data and personal knowledge draw personal conclusions to the negative impacts but have no scientific data for the base to prove their case.

This is not just a Natural Resources wildlife concern this is a Safety Concern.

Project Delay: *(Project was POM’d for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)*

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) or Contract & Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report and Geodatabase
5	PreFinal Report and Geodatabase
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices) and Geodatabase
7	GIS Data Layers (In Navy Standard Format, i.e. WGS84)

8	Copies of All Associated Data Collected (Datasheets, sample collection info., pictures, etc.)
9	Maps
10	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission. In general the data will be utilized to identify any trends in impact to bird species of concern given the various military missions, it will be used to identify potential habitat modification requirements to minimize bird strikes, it will be used to update Bird Depredation Permits where required, and it will be used to help in conducting planning level reviews of proposed projects and activities with consideration for impacts to wildlife and the mission.

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)
 - Cost estimation was derived from the FY2014-2015 NAVFAC LANT inhouse costs with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%.
 - Annual recurring shorebird assessments were previously funded under EPR32442NR204 and as of POM18 have been reclassified under this new EPR Number for Better Tracking purposes since the surveys are tied to 2 specific threatened and endangered species (Piping plover and Red knot).
 - See 2014-2015 SOW for details.

• **Estimate #1:**

BASE	2015 TOTAL COST
NASO DNA	\$13,700.00

Project Requested Funding: (Recurring Funds Project)

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$14,510.04	\$14,800.24	\$15,096.25	\$15,398.17	\$15,706.14

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 15 July 2015

Project Number: 60191NR238; 32442NR238; 4275ANR238

Project Title: MSFCA MA NASO/NALFF – Climate Change Assessments; MSFCA MA NASO DNA – Climate Change Assessments; MSFCA MA NSA NWA –Climate Change Assessments

Guidebook & Chapter: 12101

Legal Drivers:

Primary: MSFCM

Secondary: ESA

Tertiary: SIKES

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Funding Need Date: (What year & quarter will funding be needed?) FY2018-FY2022, Split Quarters 2nd (85%) & 4th (15%)

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana – Dam Neck Annex (NASO DNA); and Naval Support Activity Hampton Roads – Northwest Annex (NSA NWA).

Project Duration: (Estimated length of time and Start & End Dates) ~1 year, 5 months for each 10 year assessment. Time estimates are subject to change due to project delays (i.e. weather conditions and mission training precluding scheduled surveys) and will be handled on a case by case basis. Frequency of assessments may be increased due to mission changes or major landscape changes (man-made or natural).

Project Description: (What does this project entail?) Conduct research and analyses to produce a report to be incorporated into the INRMP on the history of climate change, the predictions for future climate change, and the associated impacts of this climate change in association with installation properties. Produce maps, timeline, etc., to depict the predicted climate change impacts. Identify military mission vulnerabilities and recommendations associated with predicted planning for climate change impacts (include, changes in property boundaries, sea level rise and impacts to infrastructure, etc.). Identify potential habitat and species of concern impacts associated with predicted planning for climate change impacts. Work/Coordinate with the South and Mid/North Atlantic Landscape Conservation Cooperative (SALCC, MALCC), USGS, and other Navy partners working on Climate Change initiatives to ensure consistency amongst climate change terminology and estimations. Identify potential climate change initiatives the Navy can support within the installation's contributing ecosystems (e.g., watersheds, joint venture boundaries, SALCC, bird conservation regions, etc.). Climate change assessment should be completed every 10 years, sooner if a major land alteration or climatic condition change occurs.

Project Purpose: (Why is this project needed?)

Project need was identified in 2010 via the INRMP metrics annual review, indicating that the INRMP does not sufficiently address climate change. INRMP update list and project lists were updated to include this need.

Currently, these bases do not have a climate change assessment that will allow them to plan for future climate change concerns. This lack of information puts the Navy at risk for violating several federal and state laws. In addition to federally mandated requirements, Navy and State Policies and Plans dictate that we should have a working knowledge of our impacts to wildlife. This EPR exhibit works to get the Navy in compliance with these requirements.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Assessments of Climate Change associated with bases are necessary to understand how mission requirements will affect species and habitats of concern and vice versa (how impact to species, habitats, and landscapes will impact the military mission). Various laws and regulations will be impacted by climate change (endangered species act, soil conservation act, clean water act, marine mammal protection act, essential fish habitat, etc.). The Sikes Act, National Environmental Policy Act, and Navy & DoD Policy (OPNAVINS M-5090.1, 4715.03, etc.) requires installations with INRMPs to have a working knowledge of climate change and near shore environments, which are to be included in the INRMPs. Knowing in advance what potential concerns there are would allow the command to plan around avoiding potential impacts and to plan for permitting and mitigation requirements, which may be needed to meet military training requirements.

Not having sufficient biological information related to Climate Change leaves the Navy vulnerable to lawsuits when this insufficient information is produced in NEPA documentation associated with military action projects. Obtaining sufficient information will help to avoid these situations or at least help the Navy to win or have such accusations overturned in a court of law.

Project Delay: *(Project was POM'd for, approved, and funding was not received as scheduled? If so, how many years has project been delayed?)* Project need was identified in 2010 via the INRMP metrics annual review, indicating that the INRMP does not sufficiently address climate change. INRMP update list and project lists were updated to include this need. Exhibit was approved without funding for FYs 2014 & 2015. No Climate change assessments have been funded to date. POM 16/17 Acceptable Risk, approved without funding. Project was originally part of the associated installation's NR231EPR; however in POM18 a request was made to split it out for better tracking purposes.

Proposed Deliverables:

ITEM:	DESCRIPTION:
1	Statement of Work (SOW)
2	Cooperative Agreement (CA) or Contract & Support Documentation
3	Quarterly Project Status Reports
4	Draft Final Report and Geodatabase
5	PreFinal Report and Geodatabase
6	Final Report (Introduction, Study Area, Methods, Results, Conclusion, Recommendations, Literature Cited/References, Appendices) and Geodatabase
7	GIS Data Layers (In Navy Standard Format, i.e. WGS84)
8	Copies of All Associated Data Collected (Datasheets, sample collection info., photographs, etc.)
9	Maps
10	Expenditure/Financial Reports (SF-269 or SF-271)

Navy Utilization of Deliverables:

Navy staff will work with appropriate grantee staff to develop and obtain approvals of SOW and CA/Contract. Grantee will provide quarterly status reports and financial reports, which the Navy will utilize to track project status, and identify & address accordingly potential concerns. The submittal of draft and pre-final reports will allow the Navy to ensure that they are receiving a product that meets the approved SOW requirements (a quality assurance check) prior to receiving a project that may or may not meet the needs of the Navy. The final product with the additional support data (GIS layers, data sheets, etc.) will be utilized to: update the INRMP; update the GeoReadiness Center Files; develop appropriate survey and habitat restoration or protection requirements; and to identify potential impacts to the military mission. In general the data will be utilized to identify any trends in impact to bird species of concern given the various military missions, it will be used to identify potential habitat modification requirements to minimize bird strikes, it will be used to

update Bird Depredation Permits where required, and it will be used to help in conducting planning level reviews of proposed projects and activities with consideration for impacts to wildlife and the mission.

Cost Estimations:

- **How was estimate derived?** (*Past Similar Project Costs; Contractor Estimate; Regulatory Agency Estimates; etc.*)
 - Cost estimation was derived utilizing the FY2015 Negotiated Nearshore Assessment Projects since this type of information and surveys are utilized in developing climate change assessments with the following applied annual inflation rates and rounded up to the nearest dollar: years 2015 = 1.7%; year 2016 = 1.8%; and years 2017-2022 = 2.0%.
 - If similar projects for 60191NR238, 32442NR238 and 4275ANR238 are not funded at the same time the overall cost will likely be more expensive due to additional coordination, inhouse fees, and equipment mobilization requirements.
 - Project was originally part of the associated installation’s NR231EPRs; however in POM18 a request was made to split it out for better tracking purposes.

BASE	2015 Near Shore Contract Award	2015 Near Shore Inhouse Fees	~2015 Climate Change (Inhouse Fees included)
NASO DNA	\$404,904.84	3,277.71	\$76,250.00
NSA NWA	\$0.00	0.00	\$51,250.00
NASO/NALFF	\$65,000.00	0.00	\$76,250.00

Project Requested Funding: (Non-Annual Recurring Funds Project within a given POM Cycle)

- FY18 is for the Initial/Baseline Climate Change Assessments (Recurring assessment due every 10 years after initial baseline).

BASE	FY2018	FY2019	FY2020	FY2021	FY2022
NASO DNA	\$80,758.45	\$0.00	\$0.00	\$0.00	\$0.00
NSA NWA	\$54,280.27	\$0.00	\$0.00	\$0.00	\$0.00
NASO/NALFF	\$80,758.45	\$0.00	\$0.00	\$0.00	\$0.00

Note: Recommend prior to each POM cycle obtaining a new cost estimate as the inflation rates and advances in technology change. This change can result in cost fluctuations well above or well below projected cost estimates.

POM18 Region Requested Support Information for Manpower Justifications:

Heavy

Complex NR/Mission Conflict

- NAS Oceana Bird/Animal Aircraft Strike Hazards
- NALFF Bird/Animal Aircraft Strike Hazards
- NASO Airfield Vegetation Height Obstruction Management
- NALFF Airfield Vegetation Height Obstruction Management
- Nesting Sea Turtle and Marine Animal Stranding Response (Ranges sometimes have to interrupt training to allow for sea turtle or stranding response)
- Zoonotic Disease, Human Health & Safety Concerns
- Venomous & Poisonous Wildlife, Human Health & Safety Concerns
- Coastal Dune Management, Facility Protection, and Military Training Needs
- Pier Management and protected marine species
- Invasive Plant Species Creating Security Hazards

Complex or Multiple Installation/Region or Consolidated INRMP/EA

- NAS Oceana and NALFF are part of a Consolidated INRMP and associated EA
- NASO Dam Neck Annex has a standalone INRMP and associated EA
- There are NOSCs (9) and other Special Areas to which either NASO ICO &/or NASO PWD Oceana have some level of facility oversight that is not included in the aforementioned INRMPs and EAs. The NOSCs are currently undergoing Natural Resources assessments by NAVFAC LANT to determine if significant Natural Resources exist that warrant an INRMP to be developed for that facility. At least 1 of 3 NOSCs that are not Navy Owned property, but leased, is covered under an existing Air Force INRMP and EA. The Navy also leases additional acreage from the Air Force at Dare County Bombing Range in NC, covered under another existing Air Force INRMP and EA.
- Project review for potential natural resources concerns oversight covers properties in multiple states: Virginia, North Carolina, Maryland, New Jersey and Delaware.

Multiple /Complex EPRs/INRMP Projects (>\$750,000 a Year Total)

- Currently Maintains 52 EPRs between 2 INRMPs:
 - Annual Recurring Budgeted Costs = ~\$975,416.00
 - Non-Annual Recurring Budgeted Costs = ~\$6,038,000.00 (Per POM Cycle)

Large/Complex Habitat Management Program with Monitoring

- 1 Large Ecological Reserve Area
- We are reassessing the installation's prescribed fire program to aide with proper habitat management for multiple purposes: forest stand improvement, vegetation height/successional stage goals, species habitat improvements (canebroke rattlesnake, northern long-eared bat,

monarch butterfly, etc.). Prescribed fire program has a monitoring component as does species specific related actions.

- Actively enhancing Oceana Pond and other recreational fishing locations to be native self-sustainable recreational fishing areas.
- Managing over 15 Special Interest Areas on the installation identified during Natural Heritage-T&E Species and Vegetation Communities of Concern Inventories.
- Agricultural Outlease Program has an annual monitoring component.
- Forest Resources Program has both a commercial forest and urban forest management component which both require monitoring; however, this is not implemented on an annual basis as would be the ideal.

Large/Complex Mitigation Sites

- Currently maintain on installation (Associated with a Regulatory Action)
 - Wetland Mitigation Sites = 14+ sites
 - Dune Mitigation Sites = 4 sites
 - Forest = 1 site
- Currently maintained on installation (not associated with a permit driven regulatory action)
 - 3 Atlantic White Cedar Study/Restoration Sites
 - 2 Long-leaf Pine Study/Restoration Sites

Medium /Heavy and Recurring Soil Erosion Control Requirements

- Every 10 years the water resources of the installation are assessed for Erosion Control concerns that could negatively impact Natural Resources. The 2013 plan identified 26 sites recommended for repair. Estimated total cost of repairs = ~\$1,167,575.00.
- Agricultural Outlease Program Requires the implementation of multiple Soil Conservation Plans.

100+ Plant & 50+ Wildlife Species Managed

- Flora = 247+
- Fauna = 401+
 - 171+ bird species confirmed of potential 275+
 - 44+ fish species
 - 46+ herp species
 - 40+ mammal species
 - 100+ invertebrate species

Large/Complex Invasive/Nuisance Species Program

- Invasive/Nuisance Flora Species Inventoried
 - Non-native species Actively Being Managed = 4 (Alligator weed, Golden bamboo, kudzu and phragmites)

- Non-native species Pending Funding for Control = 31
- Invasive/Nuisance Fauna Species Actively Managed (Additional Species Likely pending completion of comprehensive non-native invasive fauna inventory):
 - Non-native species = 3 (Nutria, Feral swine, and Feral cats)
 - Native species = 9+ (coyote, raccoon, deer, beaver, fox, Canada geese, bear, squirrel, opossum, etc.)

5+ Listed Species and/or Critical Habitat

- Federal Listed Species of Concern
 - 10 Endangered/Threatened: Northern long-eared bat, breeding; Piping plover, migrant/potential breeder; Red knot, migrant; Loggerhead sea turtle, breeding; Kemp's ridley sea turtle, breeding; green sea turtle, potential breeder; loggerhead sea turtle, strandings; hawksbill sea turtle, strandings; Atlantic sturgeon, strandings; Shortnose sturgeon stranding; etc.)
 - 2 Proposed or Candidate for Listing (American eel, and Monarch Butterfly)
- State Listed Only Species of Concern
 - 4 Endangered/Threatened (Southeastern dismal swamp shrew, Rafinesque's big-eared bat, Canebrake rattlesnake, and long beach seedbox)
 - 5 Watchlist Species (Atlantic white-cedar, viviparous spikerush, baldwin's spikerush, mud plantain, and longleaf pine)

100+ Acres of Wetland Areas and Recurring Impacts

- ~3154 Acres of wetlands (Does not cover nearshore environment for which the installation may have influence but does not have ownership)
- Annually there are requests to covert wetlands for military mission requirements (permits and in some cases mitigation required)

Large/Complex Near Shore Management Requirements (10+ Miles of Shoreline)

- NASO DNA = ~4 miles of shoreline to the Atlantic Ocean
- NASO = ~2.3 miles of shoreline to Rudee Inlet/Owls Creek, with direct connection to Atlantic Ocean
- NALFF = ~1.3 miles Forested Submerged Banks of the North Landing River, directly connected to the River, but not immediately adjacent to the open water (unforested).

Large/Complex Forestry and/or Ag. Outlease Programs

- Forestry
 - There is over 3137 acres of potential commercial forest quality forest and over 500 acres of urban forest area. The installation currently does not actively manage forests specific for the purpose of timber sale. Most forest is managed specific to wildlife requirements and left in a more natural state. With this said there is a proposal to

convert over 1,200 acres of the aforementioned commercial forest quality forested area into a more traditional Timber Sale Management regime in order to better meet Airfield Height Obstruction Requirements and to minimize BASH concerns.

- There have been a number of projects that required timber clearing and timber values to be assessed for monetary contribution to the Forestry Reserve Account over the years.
- Agriculture
 - 1562.2 acres of agricultural land managed via 5 real-estate lease agreements. Each lease has an associated soil conservation plan that must be implemented and monitored.

Established/Complex Outdoor Recreation Opportunities Including Hunting and Fishing

- Yes. (Involves Sikes Act Account, partnership with MWR)
 - Fishing (~500 fishermen)
 - 1 Mile of Saltwater Fishing Area at NASO DNA
 - Several Freshwater Fishing Locations at NASO and NASO DNA
 - Hunting Available at NASO, NASO DNA and NALFF (~500 Hunters, 11 Small Game Hunting Areas, 121 Big Game Hunting Areas)
 - Big Game, furbearer, small game, dove and waterfowl hunting.
 - Installation Hunter Indoctrination training required, and weapons qualifications required.
 - Bow, fire-arm, and trapping authorized.
 - 3 Educational Trails/Platforms over 2 miles total (2 at NASO DNA, 1 at NASO)
 - 2 Miles of Wildlife Viewing Beaches
 - 1 Watchable Wildlife Designated Area (Partnership with Virginia Aquarium and Marine Science Center)

Complex/Involved BASH Requirements

- Yes.
 - 2 Airfields are covered under the INRMP. Very active BASH program with Instruction/Plan. USDA-WS BASH support. Requires permitting, land management, wildlife management, etc.
 - 1 Aerial Bombing Range (Leased Property at DCBR)
 - 1 Drone Target Launch Facility (NASO DNA)
 - Multiple Helicopter Landing Sites are also found at 4 of the larger parcels for which PWD Oceana has oversight (e.g., NASO, NALFF, NASO DNA, and DCBR).

Large/Complex NEPA Support

- INRMP Associated NEPA Documents:
 - 2 INRMP EAs
 - 1 Aerial Spraying Invasive Plant Species EA with Mult Addendums/Supplemental EAs

- 2 Airfield Obstruction Management Plan EAs (Not an NR driven EA; however encompasses a large amount of NR oversight with Timber Harvests & Mngt, Agriculture, Ditch Maintenance, Wetlands Permitting, Endangered Species, etc.)
- Multiple CATEXs
- Average Number of non-NR Projects Reviewed for NR/EV concerns/year
 - Environmental Checklists = ~55
 - Site Work Induction Board = ~365
 - Work Permits = ~365
- Average Number of NEPA Documents Processed or Coordinated/year
 - CATEX = ~50
 - EA = >5 (currently coordinating on 8)
 - EIS = <1 (currently coordinating on 2)

Complex/Intense and Recurring Interaction with FWS and State Fish and Game Offices

- Yes, throughout the year. Annual INRMP Metrics, various partnership meetings, ecosystem management meetings, LCC meetings, feral animal meetings, conducting survey efforts, obtaining permits, general information sharing, training opportunities, NMFWA meetings, DoD PIF meetings, Bird Strike Committee Meetings, etc. (USFWS Region 5; VDGIF; USDA-WS; VDEQ; VDOP; City of Chesapeake; City of Virginia Beach; USACE; Back Bay NWR; Great Dismal Swamp NWR; Alligator River NWR; VAST; NOAA-NMFS; etc.)
 - INRMP Operation & Effect Signature Coordination
 - Maintain a USFWS Migratory Bird Depredation Permit for Multiple Properties
 - Maintain a USFWS Eagle Harassment Permit
 - Maintain a VDGIF Kill Permit
 - Maintain Recreational Hunting Program Deer Population Control Programs via VDGIF approved extended hunting seasons and additional deer harvest tags/limits (beyond State established seasons and limits).
 - Maintain a NOAA-NMFS Sturgeon Collection Permit
 - Preparing Sea Turtle Management USFWS/VDGIF Permit Package
 - Wetland Permitting & Mitigation Consultations
 - Coordinating Sea Turtle Management BA/BO
 - NLEB Consultations & Training Opportunities
 - Osprey Nest Removal Consultations
 - Prescribed Fire Planning
 - Urban Forestry Planning
 - USFWS Consultation Process Training
 - VDGIF State Listed Species Joint Survey Efforts
 - USFWS, VDGIF and Navy Conservation Law-Enforcement Coordination
 - Etc.

POM 16 Project Justifications and Cost Estimates

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 30 July 2013

Project Number: 60161NR201; 32442NR201; 4275ANR201

Project Title: 1 S MA NASO/NALFF - Threatened & Endangered Species Inventory; 1 S MA NASO DNA - Threatened & Endangered Species Inventory; 1 S MA NSA NWA - Threatened & Endangered Species Inventory;

Guidebook & Chapter: 12104

Legal Drivers:

Primary: Endangered Species Act

Secondary: Sikes Act

Tertiary: Migratory Bird Treaty Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO)/ Naval Auxiliary Landing Field (NALFF); NASO Dam Neck Annex; and Naval Support Activity Hampton Roads Northwest Annex (NSA NWA)

Project Description: (What does this project entail?) Conduct Presence/Absence Inventory of Federal and State Threatened and Endangered Species. A complete updated list of known and potential T&E species (under all taxonomic groups) will be developed and used to focus inventory surveying efforts. Surveys will be conducted utilizing standard techniques approved by USFWS, State Wildlife Programs, and DoD. Any ground disturbing techniques will have prior coordination with base planning and environmental to ensure no threats to resources, utilities, and surveyor safety.

Project Purpose: (Why is this project needed?) Federal and State T&E species lists are not static. Species statuses change on those lists. Since most T&E inventories are focused towards looking for the specific species of concern listed at the time of the inventory surveys may not have been conducted which would have picked up species listed after the last inventory. Also, species themselves are generally not static: species move as landuse changes occur (human and wildlife competition for limited resources); weather & land conditions change and become favorable for certain species to “re-appear” (species lay dormant until that special trigger/niche is met); other wildlife bring in and establish a population of species of concern (raptors dropping fish into a water source, animals eating plants and dropping seeds, etc.); etc. Over a decade of time has passed since the last T&E species inventory. During this time frame, substantial land alterations both natural and man-made have occurred on NASO and NALFF, all of which warrant an updated inventory.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Not funding this program would put the Navy at risk for being negligent to properly managing for species of concern on their bases. Not funding increases the potential for violations of various Federal Laws to occur, including but not limited to the Endangered Species Act and the Sikes Act. Not properly managing for species of concern could: open the Navy and the Base to Lawsuits from the public; result in very costly mitigation and permitting requirements; and could stop or at least restrict military mission operations (resulting in loss of required military training and the associated costs with such a situation).

Funding this project could prevent most of the not-funding concerns. Funding this project would identify which species of concern are located on base and allow the Navy to better assess risks to military mission and allow the military to address the concerns accordingly and stop the need for an issuance of a military mission stopping violation. Also, funding a project which looks for both listed and species of concern for listing species will allow the base to manage on property, and develop off property partnerships to increase stability

of species populations in an attempt to get species delisted or keep them from becoming listed (A GREAT Benefit to the Military Mission).

Cost Estimations:

BASE	FY2012	FY2017	FY2022	FY2027	FY2032	FY2037
NASO/NALFF	\$260,274.00	\$285,000.03	\$312,075.03	\$341,722.16	\$374,185.77	\$409,733.41
NSA NWA	\$208,499.86	\$228,307.35	\$249,996.54	\$273,746.22	\$299,752.11	\$328,228.56
TOTAL:	\$468,773.86	\$513,307.38	\$562,071.57	\$615,468.38	\$673,937.88	\$737,961.97

BASE	FY2014	FY2019	FY2024	FY2029	FY2034	FY2039
NASO DNA	\$105,840.00	\$120,298.80	\$131,727.19	\$144,241.27	\$157,944.19	\$172,948.89
TOTAL:	\$105,840.00	\$120,298.80	\$131,727.19	\$144,241.27	\$157,944.19	\$172,948.89

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 30 July 2013

Project Number: 60161NR202; 32442NR202; 4275ANR202

Project Title: CWA MA NASO/NALFF - Wetland Mapping Inventory; CWA MA NASO DNA - Wetland Mapping Inventory; CWA MA NSA NWA - Wetland Mapping Inventory

Guidebook & Chapter: 12105

Legal Drivers:

Primary: Clean Water Act

Secondary: Coastal Zone Management Act

Tertiary: EO 11990

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO) & Naval Auxiliary Landing Field (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); and Naval Support Activity Norfolk - Northwest Annex (NSA NWA)

Project Description: (What does this project entail?) Conduct the “5 year” baseline wetland inventory re-evaluation (finalized re-evaluation due 6 months prior to every 5 year baseline or re-evaluation completion date) and new “10 year” baseline wetland delineations. Re-evaluation includes verification of previous inventory boundaries and updating the boundaries as necessary to reflect changes in the wetland property boundaries. Baseline wetland delineations reassess the existing boundaries, identify new wetland areas, and remove new upland areas from within the boundaries of previously delineated wetland areas. Surveyors must map all parcels utilizing updated USACE standard wetland mapping protocols. The people who conduct these surveys should have experience in conducting wetland delineations in Southeastern VA and Northeastern NC as this area is notoriously difficult to survey accurately for wetlands, even for trained professionals conducting wetland delineations in other regions of the US. Any ground disturbing techniques will have prior coordination with base planning and environmental to ensure no threats to resources, utilities, and surveyor safety.

Note: If 5 year re-evaluations are not completed 6 months prior to existing wetland delineation’s 5 year USACE expiration date, then a new baseline inventory/wetland delineation may be required, which will substantially increase the costs associated with that 5 year wetland delineation re-evaluation.

Only areas on bases that are not scheduled to be mapped under the baseline wetland mapping efforts, and thus not subject to 5 /10 year re-evaluations, are those properties that fall within agricultural leases. If the property is to be removed from agricultural production the property will then be evaluated for wetlands. Note: Main Base stormwater ditches that run through agricultural fields will be or have been assessed for inclusion in baseline wetlands inventories (shallow agricultural ditches have not been assessed).

Project Purpose: (Why is this project needed?) Substantial land alterations both natural and man-made can occur in a 5 and 10 year time spans. These alterations impact land classifications from wetland to upland and vice versa within this 5 year period. The changing classification potential warrants an updated mapping effort. USACE guidance and permitting requirements indicate that wetland inventories should be re-evaluated every 5 years for accuracy and adjusted accordingly.

Updating the data layers will provide the base staff with better information for reporting, protecting, and species of concern modeling purposes. This updated information should also help base staff, Navy HQ staff, DoD staff, etc. to make more informed property management decisions.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Funding this program would allow the base to better plan projects and mission training assignments. Besides construction threats to wetlands and water quality there are also temporary training exercises which threaten the integrity of wetland habitats. Impacts to these habitats could result in Notices of Violation and costly regulatory mitigation requirements.

Providing a better map of known wetland areas will allow planners: to attempt to avoid wetland impacts; to plan for funding and conducting jurisdictional determinations; to plan for funding and processing required permits; to plan for and fund mitigation requirements; and to plan for and fund NEPA documentation and surveying requirements. Being able to better plan around potential wetland concerns will save time and money because there will be fewer unplanned delays and interruptions to contract awarded projects and military training exercises.

Cost Estimations:

BASE	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020
NASO	\$31,383.00	\$0.00	\$0.00	\$0.00	\$0.00	\$648,002.60
NALFF	\$0.00	\$14,511.00	\$0.00	\$0.00	\$0.00	\$0.00
NASO DNA	\$0.00	\$9,842.00	\$0.00	\$0.00	\$0.00	\$0.00
NSA NWA	\$0.00	\$20,447.00	\$0.00	\$0.00	\$0.00	\$0.00
TOTAL:	\$31,383.00	\$44,800.00	\$0.00	\$0.00	\$0.00	\$648,002.60

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist
Date Prepared: 30 July 2013

Project Number: 60161NR203; 32442NR203; 475ANR209
Project Title: CWA MA NASO/NALFF - Mitigation Site Monitoring; CWA MA NASO DNA - Mitigation Site Monitoring; CWA MA NSA NWA - Mitigation Site Monitoring

Guidebook & Chapter: 12105

Legal Drivers:

Primary: Clean Water Act
Secondary: Coastal Zone Management Act
Tertiary: EO 11990

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (*Base*) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field (NALFF); NASO Dam Neck Annex (DNA); and Naval Support Activity Hampton Roads Northwest Annex (NSA NWA).

Project Description: (*What does this project entail?*) Conduct wetland mitigation site and project site wetland monitoring in accordance with issued legally mandated permit requirements. Surveys include but are not limited to: flora and fauna density, diversity and abundance assessments; hydrology assessments; etc. Any ground disturbing techniques will have prior coordination with base planning and environmental to ensure no threats to resources, utilities, and surveyor safety.

Project Purpose: (*Why is this project needed?*)

There have been several areas on base that have resulted in mitigation monitoring requirements due to Notices of Violations (NOVs) and new Construction permit requirements. The permits associated with the NOVs and Construction required wetland mitigation projects to be established.

There are several mitigation sites on NASO and NALFF; however currently, there is only 1 outstanding project (Aeropines), funded by the Navy, which has not completed the monitoring requirements established under its permit. Required to evaluate hydrology and vegetation at 1- (2006), 2- (2007), 3- (2008), 5- (2010), 7-(2012), and 10- (2015) years. Aeropines is slated to meet its permitted requirements in FY 2016.

There is one additional project (Wherry Housing) which has met its monitoring requirement, but has not yet received concurrence of completion by the state regulatory office.

There are several wetland mitigation sites at NASO DNA. We have not yet received a letter of concurrence by the state or USACE regulatory offices indicating that the Lovett's Marsh Mitigation site has met its mitigation requirements; however monitoring of the site has been completed in accordance with permit requirements.

There are several mitigation sites on NSA NWA. One site, MOUS-P-131, has not received a letter of concurrence that the site has met the mitigation criteria. Quarterly photos of the site are taken and reporting continues until notice of compliance is received.

Annually, each installation has projects that require wetland site monitoring, remarking of wetland boundaries, and many time coordination with regulatory agencies regarding permits and mitigation requirements. The wetlands media manager at NAVFAC MIDLANT CORE who handles wetland permitting and mitigation is reimbursable and requires funding annually for these services.

Additional funding may be requested in future POM cycles as additional mitigation site monitoring becomes required. The Navy will first pursue obtaining mitigation banking credits or creating wetland off base in lieu of further restricting training property by constructing new wetlands on base. In some cases this is not possible and mitigation will be required on base. It is anticipated that there may be some wetland mitigation monitoring requirements established due to implementing the Clear Zone Management Plan (CZMP). The CZMP is in draft form and has an EA in development. Wetland impacts and mitigation requirements have not yet been finalized.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Not funding this exhibit may result in the issuance of another Notice of Violation and additional mitigation requirements may be issued. Additional funds may have to be redirected from some other mission requirement to fund this project. Additionally, additional land may have to be encumbered and removed from being utilized for military training.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO/NALFF	\$2000.00	\$2,038.00	\$2,076.72	\$2,116.18	\$2,156.39
NASO DNA	\$2000.00	\$2,038.00	\$2,076.72	\$2,116.18	\$2,156.39
NSA NWA	\$2000.00	\$2,038.00	\$2,076.72	\$2,116.18	\$2,156.39
TOTAL:	\$6000.00	\$6,114.00	\$6,230.16	\$6,348.54	\$6,469.17

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 30 July 2013

Project Number: 32442NR204

Project Title: MBTA MA NASO DNA - Migratory & Breeding Bird Surveys

Guidebook & Chapter: 12101

Legal Drivers:

Primary: Migratory Bird Treaty Act

Secondary: Bald and Golden Eagle Protection Act

Tertiary: Sikes Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana - Dam Neck Annex (NASO DNA)

Project Description: (What does this project entail?) Conduct migratory and breeding bird surveys to establish bird population, activity (Feeding, Breeding, Stop-over, Flight Pattern, etc.), frequency and habitat utilization data.

Conduct seasonal (Winter, Spring, Summer, and Fall) bird surveys to determine use by migrating, breeding, and wintering birds in each habitat type (open grasslands, upland hardwood forest, pine forest, bottomland hardwood forest, dune & swales, ocean front, etc.). Migratory and breeding bird surveys should be repeated in 5 year intervals to show bird utilization trends and impacts to bird populations from land use impacts by the military. Project should consist of day and night time surveys. In addition to traditional surveys data collection (population size estimates, species ID, habitat location, etc.) should included assessment of flight patterns (types of flocking/migrating species, numbers in flocks, flight directions, etc.).

Due to the known presence of non-breeding T&E bird species utilizing the base, bird surveys focused around these species (e.g., Piping plover and Bald Eagle) should be conducted annually to show bird utilization trends. This data will be utilized to address potential impacts to these from military land use and to ensure that their status has not changed to breeding. This data will also be utilized in the creation of any required Biological Opinions (BO) for the management of these species. Once a BO is issued, the associated BO surveys would be classified under a different guide book chapter, 12104, due to the direct association with an Endangered Species Act legally mandated requirement.

Project may identify additional survey need requirements particularly if species with additional warranted protection requirements are identified (including: Federally Listed Species under various acts; and non-Federal T&E listed species that are federally and State recognized Species of Concern, which pose a mission threat or are in danger of potentially becoming a candidate for listing under the Endangered Species Act). If these needs are identified, then additional Projects will be requested at that time.

Project Survey Methodologies will be developed in coordination with the Installation Natural Resources Manager, DoD Coordinated Bird Monitoring Program, and INRMP signatory partners (USFWS and appropriate VA State Wildlife Agency).

Project Purpose: *(Why is this project needed?)* Currently, this base does not have sufficient biological information to determine if they are negatively impacting bird species of concern. This lack of information puts the Navy at risk for violating several federal and state laws. In addition to federally mandated requirements, Navy and State Policies and Plans dictate that we should have a working knowledge of our impacts to wildlife. This EPR exhibit works to get the Navy in compliance with these requirements.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Surveys of bird utilization on the base are necessary to understand how mission requirements will affect bird species of concern. MBTA, ESA, and BAGEPA listed species all utilize these bases and have the potential to have negative impacts on the mission. Not knowing the potential impacts to the species by military mission projects and training could cause a violation of any one of these federal laws and result in a NOV, which would be costly and put additional restrictions on military training property. Knowing in advance what potential concerns there are would allow the command to plan around avoiding potential impacts and to plan for permitting and mitigation requirements, which may be needed to meet military training requirements.

Though the primary mission of NASO DNA is more classroom oriented there are still helicopter, drone launch and approach and departure corridors for NASO, NALFF, and Chambers Field which utilize the air space over and on NASO DNA. As such there is still a BASH component associated with this base. Understanding usage and annual migration patterns in the various habitat types, including the airfield clear zones, aircraft flight paths and landing zones is a vital step to reducing BASH hazard on the bases. Data to quantify and qualify potential take are required for obtaining and maintaining a bird depredation permit for clear zone management (BASH reduction efforts). Permits are managed through the Natural Resources program.

In addition, with the increase for renewable energy resources there is a strong push to place wind-turbines on NASO DNA since it is located on the ocean front. At this time there is not sufficient scientific data for this area to prove negative impacts associated with this potential upcoming mission. The biologists for the base through antidotal data and personal knowledge draw personal conclusions to the negative impacts but have no scientific data for the base to prove their case.

This is not just a Natural Resources wildlife concern this is a Safety Concern.

Cost Estimations:

NASO DNA	\$4,467.00	\$20,804.00	\$4,630.00	\$4,712.00	\$4,957.00
TOTAL:	\$4,467.00	\$20,804.00	\$4,630.00	\$4,712.00	\$4,957.00

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 30 July 2013

Project Numbers: 60161NR205; 32442NR205; 4275ANR205

Project Title: 4 SAR MA NASO/NALFF - Species and Habitat of Concern Protection; 4 SAR MA NASO DNA - Species and Habitat of Concern Protection; 4 SAR MA NSA NWA - Species and Habitat of Concern Protection

Guidebook & Chapter: 12104

Legal Drivers:

Primary: Endangered Species Act

Secondary: Clean Water Act

Tertiary: Migratory Bird Treaty Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Norfolk - Northwest Annex (NSA NWA)

Project Description: (What does this project entail?) Implement various habitat enhancement and restoration projects in support of Species of Concern and Habitats of Concern in accordance with resources management plans. Obtain appropriate surveys and assessments and monitoring of project areas. (see cost estimate section for the exact projects).

Project Purpose & Impact/Benefit to Military Mission: (Why is this project needed? How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Projects allows the base to maintain compliance with the: Endangered Species Act; Migratory Bird Treaty Act; Sustainable Fisheries Act Amendment to the Magnuson-Stevens Fishery Conservation and Management Act in 1996; the Chesapeake Bay Preservation Act; the Clean Water Act; Essential Fish Habitat protection; OPNAVINST 5090.1C; base INRMPS; Sikes Act; and numerous other plans including but not limited to the: Southern Watershed Area Management Plan (SWAMP); Lynnhaven River Watershed Restoration Plan (sub of Chesapeake); and Back Bay Watershed Restoration Plan (sub of southern).

The waterways of NASO, NALFF, NASO DNA, and NSA NWA connect to several watersheds which all have the potential to influence Essential Fish Habitat (EFH) within the Atlantic Ocean, and Chesapeake Bay.

These projects support wetland enhancement & protection, T&E species & habitat protection, soil and water protection, and recreational opportunity enhancement and protection.

Maintaining compliance with Federal and State Laws, Regs, and Conservation Goals, helps to ensure that DoD Lands will not be further restricted from military utilization, and helps to ease permitting requirements when new military actions are proposed.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO/NALFF	\$23,072.12	\$23,510.49	\$23,957.19	\$24,412.38	\$24,876.21
NASO DNA	\$19,329.36	\$19,696.62	\$20,070.85	\$20,452.20	\$20,840.79
NSA NWA	\$14,185.98	\$14,455.52	\$14,730.17	\$15,010.05	\$15,295.24
TOTAL:	\$56,587.46	\$57,662.62	\$58,758.21	\$59,874.62	\$61,012.24

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 30 July 2013

Project Numbers: 60161NR206; 32442NR206; 4275ANR206

Project Title: SIKES MA NASO/NALFF - Forest Management; SIKES MA NASO DNA - Forest Management; SIKES MA NSA NWA - Forest Management

Guidebook & Chapter: 12108

Legal Drivers:

Primary: Forest and Rangeland Renewable Resources Planning Act

Secondary: Soil & Water Conservation Act

Tertiary: Sikes Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Norfolk - Northwest Annex (NSA NWA)

Project Description: (What does this project entail?) Conduct an inventory and assessment of urban, natural, and timber harvest forest conditions every 5 years or sooner as deemed necessary due to major land or mission changes. Conduct annual inspections and assessments of forest habitats to identify potential disease and insect outbreaks, and storm damage concerns. Utilize the inventories and assessments and inspections as guides to: establish and conduct routine pre-commercial thinning and maintenance; provide guidance to appropriate commands for hazard tree removal; and implement arboricultural treatments as recommended and appropriate.

Project Purpose & Impact/Benefit to Military Mission: (Why is this project needed? How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Proper management of forest resources aids the military mission in multiple ways, to include but not limited to: creating realistic conditions for in field military training; creating noise buffers around ranges; creating visual and access buffers around sensitive training facilities; reducing/removing height obstructions associated with various mission requirements; reducing the potential for species of concern to become listed under the Endangered Species Act; etc.

Existing forest inventories are over 10 years old and there have been substantial changes to the land/forests since that survey. Land changes include: timber harvests; building construction; severe weather conditions (drought, lightning fires, ice storms, hurricanes, tornadoes, etc.); disease outbreaks; etc. Stand condition analyses are needed to determine hazardous conditions, commercial value, and value to species of concern.

SIKES ACT, 10 USC 2665, DoDINST 7310.5 AND OPNAVINST 5090.1C requires that Naval bases manage appropriate forested areas for multiple use and optimum sustainable yield of forest products consistent with other Natural Resources programs. Forest stand improvement methods are required at NASO, NALFF, NASO DNA, and NSA NWA to maintain existing forested stands. If project is not funded the bases will be out of compliance with one or more of the following: DoD and Navy policies, the 1990 Forest Suppression Memorandum of Agreement between Dept. of Agriculture and DoD, the Chesapeake Bay 2000 Agreement, the Clean Water Act phase II program, the Sikes Act, the Soil and Water Conservation Act, the Forest Resource Conservation and Shortage Relief Act, and/or the Forest and Rangeland Renewable Resources Planning Act of 1974 (or RPA).

Preservation of existing urban resources and proper management of commercial forest stands is important to meeting the nutrient reduction and non-point source pollution control objectives of the Chesapeake Bay Agreement, the Clean

Water Act and other Federal and State plans, and policies. Proper management also promotes thermal protection of waterways, and benefits to morale and welfare.

Trees are natural energy efficiency promoters/increasers. Trees provide shading/cooling and insulating benefits to structures and people working outside. Properly managing trees and landscaping in the Urban areas of the bases additionally supports the Navy’s Policy and Goals towards energy efficiency and the 26 Apr 1994 Presidential Memorandum regarding “environmentally economically beneficial practices on Federal landscaped grounds,” which also requires use of native plants for federally landscaped grounds.

Additionally, protection of urban forest environments is a continuing requirement that is exacerbated by hurricanes and coastal storms. Urban forest management involves the removal and trimming of trees that pose safety threats, and property damage. An update of the Urban forest hazard trees will allow the base to address these threats to human safety and property assets.

Proper commercial forest management is: beneficial to a variety of species by providing various phases of vegetation succession; and improves the value of the timber, thus making them commercially more profitable. Timber harvesting activities promote these changes in succession, which mimics natural events that caused succession changes. Wildfires are an example of these natural events, which would clear areas of vegetation and create open areas. A variety of species require these conditions to survive, including species of concern (i.e., Endangered Species Act and Migratory Bird Treaty Act listed species). On many Military base, due to threat to human health, safety, equipment, and training, wildfires are typically suppressed and not allowed to create open areas. Urban development around and training missions on NASO, NALFF, NASO DNA, and NSA NWA require such suppression. Conducting timber harvests allows these bases to provide this habitat conversion in support of species of concern initiatives.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	
NASO & NALFF	\$45,099.92	\$45,956.82	\$46,830.00	\$104,375.48	\$48,609.54
NASO DNA	\$13,405.96	\$13,660.68	\$13,920.23	\$31,026.60	\$14,449.20
NSA NWA	\$24,394.86	\$24,858.36	\$25,330.67	\$56,457.55	\$26,293.24
TOTAL:	\$82,900.75	\$84,475.86	\$86,080.90	\$191,859.63	\$89,351.97

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 30 July 2013

Project Numbers: 60161NR209; 32442NR209; 4275ANR209

Project Title: CWA MA NASO/NALFF - Soil & Water Conservation - Erosion Control; CWA MA NASO DNA - Soil & Water Conservation - Erosion Control; CWA MA NSA NWA - Soil & Water Conservation - Erosion Control

Guidebook & Chapter: 12107

Legal Drivers:

Primary: Clean Water Act

Secondary: EO Wetlands Protection

Tertiary: Soil & Water Conservation Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); NASO Dam Neck Annex (NASO DNA); NSA Northwest Annex (NSA NWA)

Project Description: (What does this project entail?) Conduct base wide erosion and sediment control assessment every 5 years as deemed necessary due to major land or mission changes. Identify areas in need of repair due to erosion. Identify causes for the erosion. Stop and repair the erosion problems.

Project Purpose & Impact/Benefit to Military Mission: (Why is this project needed? How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Projects allows the base to maintain compliance with the: Clean Water Act, the Chesapeake Bay Preservation Act; Essential Fish Habitat protection; OPNAVINST 5090.1C; base INRMPs; Sikes Act; and numerous other plans and policies.

Erosion can lead to Notices of Violation associated with water quality testing. Erosion can damage wetland habitats, essential fish habitats, and other species of concern habitats. Erosion can create ideal habitat suitable for invasive species to grow. Erosion can also cause security and safety concerns. All of these concerns pose negative impacts to military training, which could lead to loss of land on which the military can train.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO & NALFF	\$412,422.00	\$70,074.00	\$292,439.00	\$129,475.00	\$83,842.00
NASO DNA	\$9,736.00	\$14,651.00	\$7,665.00	\$7,798.00	\$0.00
NSA NWA	\$96,187.00	\$30,913.00	\$36,860.00	\$10,360.00	\$8,007.00
TOTAL:	\$518,345.00	\$115,638.00	\$336,964.00	\$147,633.00	\$91,849.00

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Numbers: 60161NR211; 32442NR211; 4275ANR211

Project Title: CHS MA NASO/NALFF - Landcover Mapping; CHS MA NASO DNA - Landcover Mapping; CHS MA NSA NWA - Landcover Mapping

Guidebook & Chapter: 12101

Legal Drivers:

Primary: Sikes Act

Secondary: Migratory Bird Treaty Act

Tertiary: EO_ (Invasive Species or Pest Control)

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (*Base*) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Norfolk - Northwest Annex (NSA NWA)

Project Description: (*What does this project entail?*) Acquire updated high resolution satellite imagery in an effort to produce a raster landcover layer of vegetative community types; analyze imagery; conduct ground-truthing surveys; and provide maps, data, and final report.

Project Purpose: (*Why is this project needed?*) Vegetation community layers are needed to identify specific community types on base which may be important to species of concern and thus warrant protection and possibly enhancement. Landcover vegetation community level layers should be updated at least every 5 years to identify changes in communities and to capture landcover changes due to military training and development and other ecosystem changes due to environmental factors such as disease outbreaks, storm damage, etc .

Utilizing GIS and satellite imagery to create landcover layers are time and funding efficient. These layers allow biologists to obtain a better understanding of their base's resources, by providing a view/analysis of areas of the base that are not easily accessible on foot. The other option to mapping these communities is to conduct a 100% on the ground physical mapping of the entire base, which requires a 10 fold field work effort and still some GIS data processing in the office.

Data created from this project will help the installation answer annual INRMP metrics questions related to ecosystems as well as maintaining INRMPs sufficient enough to obtain concurrence from regulatory partners during reviews for Operation and Effect.

Project Impact/Benefit to Military Mission: (*How would not funding this project affect the mission? What benefits does funding this project have to the mission?*) Funding this project promotes protection of wildlife species and vegetation communities of concern. There is a number of Federal and State listed species of concern that either live or seasonally visit bases in the Hampton Roads Area. As such this project allows the Navy to maintain compliance with various Federal and State laws, regulations, policies, and conservation agreements (ESA, MBTA, MMPA, NMFA, Invasive and Pest Control, Sikes Act, INRMP, 5090.1C, State Wildlife Action Plan, USFWS Strategic Plan, etc.).

Funding this project not only helps to keep the base from receiving NOV's related to species of concern, it also provides a better understanding of the layout of the base, which can prove beneficial for military planners designing field training requirements and for development and placement of potential construction sites.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO/NALFF	\$0.00	\$191,698.00	\$0.00	\$0.00	\$0.00
NASO DNA	\$0.00	\$88,827.00	\$0.00	\$0.00	\$0.00
NSA NWA	\$0.00	\$108,842.00	\$0.00	\$0.00	\$0.00
TOTAL:	\$0.00	\$389,367.00	\$0.00	\$0.00	\$0.00

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Number: 32442NR215

Project Title: CHS MA NASO DNA - Dune and Beach Restoration

Guidebook & Chapter: 12107

Legal Drivers:

Primary: Endangered Species Act

Secondary: Coastal Zone Management Act

Tertiary: Soil & Water Conservation Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana - Dam Neck Annex (NASO DNA)

Project Description: (What does this project entail?) Conduct dune habitat: assessments; mapping; stabilization; and restoration.

Project Purpose & Impact/Benefit to Military Mission: (Why is this project needed? How would not funding this project affect the mission? What benefits does funding this project have to the mission?)

This project supports Endangered Species Act, Soil & Water Conservation Act; Coastal Zone Management Act; Magnuson-Stevens Fishery Conservation and Management Act; State Wildlife Action Plans; INRMPS; Clean Water Act; and other Federal and State Regulatory and Plan guidance/goals/objectives.

This project supports Commander, Navy Region Mid Atlantic Natural Resource managers with the implementation of shoreline and dune stabilization and conservation/habitat restoration along the coastal region of NASO Dam Neck Annex (DNA).

Federal regulations require sound management in support of the mission. NASO DNA's mission is tied to the stability of beach and dune lands. The beach and dunes at this site are in danger of erosion due to wave and wind action associated with storm and general weather conditions. Beach stability has already been compromised due to such storms as Hurricane Isabel. This storm resulted in buffer, training sites, and sensitive ecological habitat areas being degraded. Currently, there are several severely eroded dune areas along the NASO DNA beaches. In order to sustain the most valuable resources and training area, protective measures and stabilization is required.

The dune habitats have been identified as Special Interest Areas in the INRMP through coordination with the State Natural Heritage Program and Marine Resources Commission. These dunes and beaches are essential habitat for a number of species of concern included federally and State listed T&E species. Erosion and degradation of the dunes and beach also threatens the Mid-Atlantic essential fish habitat (EFH) by potentially allowing harmful chemicals and objects to enter the ocean.

If the dunes were not maintained the base would be more susceptible to oceanic water breeches which would flood the base and facilities and stop the military missions on NASO DNA.

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Number: 32442NR215

Project Title: CHS MA NASO DNA - Dune and Beach Restoration

Guidebook & Chapter: 12107

Legal Drivers:

Primary: Endangered Species Act

Secondary: Coastal Zone Management Act

Tertiary: Soil & Water Conservation Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana - Dam Neck Annex (NASO DNA)

Project Description: (What does this project entail?) Conduct dune habitat: assessments; mapping; stabilization; and restoration.

Project Purpose & Impact/Benefit to Military Mission: (Why is this project needed? How would not funding this project affect the mission? What benefits does funding this project have to the mission?)

This project supports Endangered Species Act, Soil & Water Conservation Act; Coastal Zone Management Act; Magnuson-Stevens Fishery Conservation and Management Act; State Wildlife Action Plans; INRMPS; Clean Water Act; and other Federal and State Regulatory and Plan guidance/goals/objectives.

This project supports Commander, Navy Region Mid Atlantic Natural Resource managers with the implementation of shoreline and dune stabilization and conservation/habitat restoration along the coastal region of NASO Dam Neck Annex (DNA).

Federal regulations require sound management in support of the mission. NASO DNA's mission is tied to the stability of beach and dune lands. The beach and dunes at this site are in danger of erosion due to wave and wind action associated with storm and general weather conditions. Beach stability has already been compromised due to such storms as Hurricane Isabel. This storm resulted in buffer, training sites, and sensitive ecological habitat areas being degraded. Currently, there are several severely eroded dune areas along the NASO DNA beaches. In order to sustain the most valuable resources and training area, protective measures and stabilization is required.

The dune habitats have been identified as Special Interest Areas in the INRMP through coordination with the State Natural Heritage Program and Marine Resources Commission. These dunes and beaches are essential habitat for a number of species of concern included federally and State listed T&E species. Erosion and degradation of the dunes and beach also threatens the Mid-Atlantic essential fish habitat (EFH) by potentially allowing harmful chemicals and objects to enter the ocean.

If the dunes were not maintained the base would be more susceptible to oceanic water breeches which would flood the base and facilities and stop the military missions on NASO DNA.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO DNA	\$44,732.24	\$45,582.15	\$46,448.21	\$47,330.73	\$48,230.01
TOTAL:	\$44,732.24	\$45,582.15	\$46,448.21	\$47,330.73	\$48,230.01

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Numbers: 60161NR216; 32442NR216; 4275ANR216

Project Title: EO 13112 MA NASO/NALFF - Habitat Management - Prescribed Fire; EO 13112 MA NASO DNA - Habitat Management - Prescribed Fire; EO 13112 MA NSA NWA - Habitat Management - Prescribed Fire

Guidebook & Chapter: 12101

Legal Drivers:

Primary: EO 13112 Invasive Species

Secondary: Migratory Bird Treaty Act

Tertiary: Endangered Species Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity - Northwest Annex (NSA NWA)

Project Description: (What does this project entail?) Create and implement a cooperative agreement with appropriate agencies to supply Prescribed Burning and Wildfire Control for NASO, NALFF, NASO DNA, and NSA NWA.

Project Purpose: (Why is this project needed?) Current Navy staffing and training levels in the NAVFAC MIDLANT Hampton Roads area are inadequate to SAFELY accomplish desired prescribed burning and wildfire control. Prescribed burning is utilized for habitat management/restoration and invasive species control. This management and control technique is designed to address species of concern needs and requirements. NASO, NALFF, NASO DNA, and NSA NWA all have annual Prescribed Burning and Smoke Management Plans prepared by the base Natural Resources Specialist and approved by the base Commanding Officer to address species and habitat management objectives identified in the INRMP. In recent years 0% of the desired and planned burn areas have been treated due to weather conditions and inadequate staffing levels.

Existing prescribed burning plans need to be re-assessed for current validity and updated accordingly to meet current habitat management goals and objectives.

Project would adequately staff the Prescribed Fire program to complete prescribed burning and wildfire control goals and objectives and provide support complete field work for assessing and updating the base Prescribed Burning and Smoke Management Plans.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Funding this project aides the Navy in maintaining compliance with Federal and State laws, regs., and policies and reduces the potential for incurring Notices of Violations (NOV). Improper management of known threats to species of concern, such as habitat degradation, can lead to potential NOV situations.

The prescribed burning program provides multiple benefits to species, the ecosystem and the military. In addition to the aforementioned species of concern benefits, prescribed burning: is considered to be more ecologically friendly particularly for nutrient recycling and plant regeneration; supports the reduction of Bird-Animal Aircraft Strike Hazards (BASH) concerns by altering vegetation structure to reduce site desirability for species that would or have posed BASH threats; reduces height obstructions associated with various military equipment requirements (i.e., Antenna arrays, Flight Ops, etc.); and reduces the risk of facilities being overrun by uncontrollable “wildfires.”

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO/NALFF	\$70,774.65	\$72,119.36	\$73,489.63	\$74,885.93	\$76,308.77
NASO DNA	\$35,386.81	\$36,059.16	\$36,744.29	\$37,442.43	\$38,153.83
NSA NWA	\$35,386.81	\$36,059.16	\$36,744.29	\$37,442.43	\$38,153.83
TOTAL:	\$141,548.27	\$144,237.69	\$146,978.20	\$149,770.79	\$152,616.44

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Numbers: 60161NR218; 32442NR218; 4275ANR218

Project Title: EO 13112 MA NASO/NALFF - Invasive Species; EO 13112 MA NASO DNA - Invasive Species; EO 13112 MA NSA NWA - Invasive Species

Guidebook & Chapter: 12106

Legal Drivers:

Primary: EO 13112 Invasive Species

Secondary: National Invasive Species Act

Tertiary: Soil and Water Conservation Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Description: (What does this project entail?) Develop an invasive species assessment and management plan (to be updated every 5 years); remove/control invasive species (as plan recommends upon approval), and conduct pre, during and post invasive species control monitoring (annually).

Assessment plans at a minimum will include: surveying for invasive species; providing a prioritized list of invasive species on base for removal; developing population estimates; mapping extent of species on base; providing management techniques and plan for the control/removal of the invasive species from the base; production of GIS layers associated with species distribution and management.

Annual Monitoring will be an assessment of implemented control techniques. This may include water quality testing; vegetation sampling or surveying; mapping of control area application boundaries prior to treatment; mapping of control area after treatment; etc.

Existing control treatments via herbicide and prescribed burning have already obtained environmental approval via a 2006 Environmental Assessment for the control of Phragmites and Kudzu. Currently, herbicide treatment for these species is the only control treatment option associated with this EPR. Prescribed burning is covered under a different EPR. Additional control treatments for other invasive species may be added at later dates upon the results of the comprehensive baseline assessment and monitoring plans.

Project Purpose: (Why is this project needed?)

To obtain compliance with and contribute to the goals of the: National Invasive Species Act, EO 13112 Invasive Species, Soil and Water Conservation Act, Clean Water Act, 5090.1C, Integrated Natural Resources Management Plan, Integrated Pest Management Plan, Endangered Species Act, Migratory Bird Treaty Act, Essential Fish Habitat, etc.

Neither NR Staffing Levels nor training/certifications are adequate to handle the severity of the invasive species problem on these 4 bases. NASO, NALFF, NASO DNA, and NSA NWA all have known invasive species issues that are or could potentially kill species of concern, damage habitats of concern, damage ditch and stream banks (promoting erosion and sediment control problems), and threaten base and military mission security. This project is needed to maintain compliance with a variety of Federal, State, and Navy laws, regulations, and policies.

Between the 4 bases 23 invasive plant species have been identified to occur on base. 7 known vertebrate/invertebrate invasive species are known to occur with an additional 2 suspected to occur. There is undoubtedly additional species that should be added to the list of invasive species. A project was funded in FY2012 that will provide us the updated species list, locations, and recommended control techniques. The final product is due 1st quarter FY2014.

The 2006 EA associated with this EPR for the control of phragmites and kudzu indicates that in addition to the aerial herbicide application that manual ground herbicide treatments will be used for treatment of stands that are not accessible by aircraft and prescribed burning will be used as a follow-up treatment for the control of this species. Unfortunately, adequately trained staffing levels and weather conditions have made it almost impossible to both conduct the manual spraying or conduct prescribed burns (prescribed fire is covered under a different EPR) on the frequency needed to control these species.

Due to security requirements along fence and building perimeters there is an annual mowing contract which cuts the vegetation away from the fence line out to 30ft. This mowing stops some invasive species. Unfortunately, this mowing is also spreading and increasing the threat of other invasive species such as Phragmites. Phragmites grows quickly and forms dense tall stands which: block the view of the security perimeter; chokes out the native plant and animal species; and clogs ditches vital to keep the base from flooding during storm events.

NR staff is observing similar levels of destruction occurring due to other species such as Kudzu, Wisteria, Tree-of-Heaven, Bamboo, and Sericea lespedeza.

Several of these species have invaded wetland mitigation sites and are threatening the integrity and the success of the wetland. If adequate control can not be maintained the site may fail to be approved by the permit/mitigation regulating agencies and may require renegotiations and additional mitigation to be conducted elsewhere.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Funding this project aides the Navy in maintaining compliance with laws, regs., and policies reduces the potential for incurring Notices of Violations. NOVs could be issued for a number of reasons to include, but not limited to: knowingly allowing invasive species to negatively impact species of concern; and failing water quality testing, due to lack of proper erosion and sediment control. Internal to the navy additional NOVs can be issued for fire and security hazards.

Proper management of invasive species provides multiple benefits to species, the ecosystem and the military. This project: supports the reduction of Bird-Animal Aircraft Strike Hazards (BASH) concerns by altering vegetation structure to reduce site desirability for species that would or have posed BASH threats; reduces height obstructions associated with various military equipment requirements (i.e., Antenna arrays, Flight Ops, etc.); reduces the risk of facilities being overrun by uncontrollable “wildfires” or flooding; and reduces disease outbreaks.

Allowing invasive species to damage ditches and streams also poses health and safety threats to the base in that the damage by these species can clog vital storm water run-off structures. Damage of these water structures could cause flood and damage to the base, waste water treatment facilities, training facilities, homes, etc. Such devastation could make the base or portions of the base unusable for military training and displace people who live on or adjacent to the base. In addition pooling water creates ideal breeding habitats for a variety of mosquito species (some of which are classified as invasive species), which increase the threat of wildlife borne disease which can spread to humans and other wildlife.

Cost Estimations:

BASE	FY2015	FY2017	FY2018	FY2019	FY2020
NASO/NALFF	\$88,381.95	\$132,035.47	\$91,677.84	\$93,419.72	\$95,194.69
NASO DNA	\$18,709.86	\$27,605.39	\$19,407.58	\$19,776.32	\$20,152.07
NSA NWA	\$38,871.79	\$58,246.27	\$40,321.38	\$41,087.49	\$41,868.15
TOTAL:	\$145,963.60	\$217,887.13	\$151,406.79	\$154,283.52	\$157,214.91

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Numbers: 60161NR219; 32442NR219; 4275ANR219

Project Title: SIKES MA NASO/NALFF - Wildlife Emergency Response; SIKES MA NASO DNA - Wildlife Emergency Response; SIKES MA NSA NWA - Wildlife Emergency Response

Guidebook & Chapter: 12999

Legal Drivers:

Primary: SIKES Act

Secondary: Endangered Species Act

Tertiary: Migratory Bird Treaty Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Description: (What does this project entail?)

Purchase of wildlife control equipment and supplies to support emergency wildlife calls supported by the Base and Region Natural Resources Program Staff. Refresher training/cert. for NR staff in support of Emergency Wildlife control calls is covered under a separate training EPR.

Project Purpose: (Why is this project needed?) NASO, NALFF, NASO DNA, and NSA NWA are all located within the Hampton Roads Region of VA. Hampton Roads is a mix of urban, rural, and natural areas. This land fragmentation, coupled with urban sprawl, puts wildlife and humans in direct competition for the same limited resources and results in human-wildlife conflicts. In an attempt to minimize impacts to humans and wildlife the base Natural Resources staff, in coordination with USFWS and State & Local Wildlife Agencies, respond to emergency wildlife calls.

People who respond to these calls need to be supplied with appropriate equipment to safely and efficiently address these concerns.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Funding this project promotes safety of NR personnel, military, civilians, and wildlife. This project minimizes impacts to military training in two primary manners by: 1. expeditiously and safely addressing wildlife concerns; and 2. protecting species of concern, preventing potential Notices of Violation and mitigation costs/requirements. There is a number of Federal and State listed species of concern that either live or seasonally visit bases in the Hampton Roads Area. As such this project allows the Navy to maintain compliance with various Federal and State laws, regulations, policies, and conservation agreements (ESA, MBTA, MMPA, NMFA, Invasive and Pest Control, Sikes Act, INRMP, 5090.1C, State Wildlife Action Plan, USFWS Strategic Plan, etc.).

Any call that can not be safely and efficiently handled by base NR staff will be turned over to State Wildlife Agency officials to address.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO & NALFF	\$2,675.35	\$2,726.19	\$2,777.98	\$2,830.76	\$2,884.55
NASO DNA	\$1,337.68	\$1,363.10	\$1,389.00	\$1,415.39	\$1,442.28
NSA NWA	\$1,337.68	\$1,363.10	\$1,389.00	\$1,415.39	\$1,442.28
TOTAL:	\$5,350.72	\$5,452.38	\$5,555.98	\$5,661.54	\$5,769.11

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Numbers: 60161NR220; 32442NR220; 4275ANR220

Project Title: 4 SAR MA NASO/NALFF – Nuisance Wildlife Inventory, Assess & Remove; 4 SAR MA NASO DNA – Nuisance Wildlife Inventory, Assess & Remove; 4 SAR MA NSA NWA – Nuisance Wildlife Inventory, Assess & Remove

Guidebook & Chapter: 12101

Legal Drivers:

Primary: Sikes Act

Secondary: Endangered Species Act

Tertiary: Migratory Bird Treaty Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Description: (What does this project entail?) Develop a nuisance wildlife assessment and management plan (revised every 5 years); remove nuisance wildlife, and conduct pre, during and post nuisance wildlife removal effort monitoring (annually).

Project Purpose: (Why is this project needed?) NASO, NALFF, NASO DNA, and NSA NWA all have nuisance wildlife issues that are killing species of concern, damaging habitat of species of concern, and damaging ditch and stream banks (promoting erosion and sediment control problems).

This project is needed to maintain compliance with a variety of Federal, State, and Navy laws, regs., and policies.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Funding this project aides the Navy in maintaining compliance with laws, regs., and policies reduces the potential for incurring Notices of Violations. NOVs could be issued for a number of reasons to include, but not limited to: knowingly allowing nuisance wildlife to negatively impact species of concern; and failing water quality testing, due to lack of proper erosion and sediment control.

Allowing nuisance wildlife to damage ditches and streams also poses health and safety threats to the base in that the damage by nuisance wildlife can collapse and clog vital storm water run-off structures. Damage of these water structures could cause flood and damage to the base, waste water treatment facilities, training facilities, homes, etc. Such devastation could make the base or portions of the base unusable for military training and displace people who live on or adjacent to the base. In addition pooling water creates ideal breeding habitats for a variety of mosquito species (some of which are classified as invasive species), which increase the threat of wildlife borne disease which can spread to humans and other wildlife.

In addition controlling wildlife species in support of species of concern, water quality, human health & safety, and training land functionality there are also some residual beneficial side effect. Such benefits may include: increasing agricultural crop yields; reduction of emergency wildlife calls; and reduction of potential BASH concerns.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO/NALFF	\$60,552.04	\$84,523.77	\$62,853.01	\$64,047.22	\$65,264.12
NASO DNA	\$12,818.00	\$17,671.85	\$13,305.09	\$13,557.88	\$13,815.48
NSA NWA	\$26,631.57	\$37,286.91	\$27,643.56	\$28,168.79	\$28,704.00
TOTAL:	\$100,001.60	\$139,482.53	\$103,801.66	\$105,773.90	\$107,783.60

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Numbers: 60161NR221; 32442NR221; 4275ANR221

Project Title: EFH MA NASO/NALFF - Fisheries, Ditches & Streams; EFH MA NASO DNA - Fisheries, Ditches & Streams; EFH MA NSA NWA - Fisheries, Ditches & Streams

Guidebook & Chapter: 12101

Legal Drivers:

Primary: Magnuson-Stevens Fishery Conservation and Management Act

Secondary: Clean Water Act

Tertiary: EFH

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); NASO Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads Northwest Annex (NSA NWA)

Project Description: (What does this project entail?) Conduct an inventory and assessment of ditch, stream, pond, and lake functions (this includes wildlife that live in and contribute to the functionality of the water resource, i.e. fish population assessments) and hydrology. Develop a Habitat enhancement plan for these water resources. Purchase equipment, supplies, fish, plants, etc. to assist with this project.

Project Purpose & Impact/Benefit to Military Mission: (Why is this project needed? How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Project allows the base to maintain compliance with: the Sustainable Fisheries Act Amendment to the Magnuson-Stevens Fishery Conservation and Management Act in 1996; the Chesapeake Bay Preservation Act; the Clean Water Act; Coastal Zone Management Act; Essential Fish Habitat protection; OPNAVINST 5090.1C; base INRMPs; Sikes Act; and numerous other plans Southern Watershed Area Management Plan (SWAMP); Lynnhaven River Watershed Restoration Plan (sub of Chesapeake); Back Bay Watershed Restoration Plan (sub of southern).

The waterways of NASO, NALFF, NASO DNA, and NSA NWA connect to several watersheds which all have the potential to influence Essential Fish Habitat (EFH) within the Atlantic Ocean, and Chesapeake Bay.

The fish stocking is intended to produce breeding populations of native fish to increase water resources and functionality (as appropriate). Since several of the water resources where fish are anticipated to need to be stocked are areas where recreational fishing is allowed this project also benefits the military community by allowing additional outdoor recreation opportunities, thus potentially increasing Morale and Welfare.

In addition the data is utilized to make more informed NEPA property management decisions in associated with DoD/military mission changes.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO/NALFF	\$17,411.65	\$17,742.47	\$133,533.94	\$18,416.69	\$18,766.61
NASO DNA	\$5,046.09	\$5,141.96	\$31,017.41	\$5,337.36	\$5,438.77
NSA NWA	\$8,599.34	\$63,478.25	\$8,926.12	\$9,095.71	\$9,268.53
TOTAL:	\$31,057.08	\$86,362.68	\$173,477.46	\$32,849.76	\$33,473.90

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Numbers: 60161NR222; 32442NR222; 4275ANR222

Project Title: MSFCA MA NASO/NALFF - Outdoor Recreation Program Requirements; MSFCA MA NASO DNA - Outdoor Recreation Program Requirements; MSFCA MA NSA NWA - Outdoor Recreation Program Requirements

Guidebook & Chapter: 12109

Legal Drivers:

Primary: Sikes Act

Secondary: MSFCA (originally planned to be Primary; however EPRweb does provide that option)

Tertiary: 5090.1C

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Description: (What does this project entail?) Maintain hunting, fishing, and nature: trails; boardwalks; fishing stations picnic shelters; ranges; elevated shooting stands/platforms; check-station; walk-in cooler; freezer; and brochures (i.e. mass production of rules & regulations pamphlets, maps, etc.).

Project Purpose: (Why is this project needed?) Maintenance of these items is required: to allow people to safely recreate on these bases; to allow people with physical disabilities to recreate; to ensure people have written documentation or rules/regs./procedures; to promote education opportunities; and to allow proper processing and checking of wildlife taken during recreational activities. Implementation of this project is conducted under the guides of the Sike's Act and in accordance with Navy, USFWS and State mandated policies regarding wildlife population management. The outdoor recreation program also supports objectives linked to the Endangered Species Act, Migratory Bird Treaty Act, an numerous other laws and policies linked to invasive species, water quality, and nuisance wildlife control.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Funding this project maintains upkeep of the arteries of the Natural Resources (NR) Outdoor Recreation program (ORP). The NR ORP supports a number of wildlife population management objectives, including but not limited to: deer herd population reduction; nuisance wildlife removal; invasive species removal; and bird aircraft strike hazard (BASH) reduction.

This program supports the military mission in 3 primary ways: 1. increasing Morale and Welfare by allowing outdoor recreation; 2. educating military regarding NR concerns and how they contribute; and 3. ensuring safety to allow military training to continue (BASH reduction).

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO & NALFF	\$4,626.93	\$1,577.73	\$1,607.71	\$1,638.25	\$1,669.38
NASO DNA	\$2,313.46	\$788.88	\$803.87	\$819.14	\$834.71
NSA NWA	\$2,313.46	\$788.87	\$803.86	\$819.13	\$834.69
TOTAL:	\$9,253.85	\$3,155.48	\$3,215.43	\$3,276.53	\$3,338.78

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Numbers: 60161NR223; 32442NR223; 4275ANR223

Project Title: SIKES MA NASO/NALFF - Equipment Storage Structures; SIKES MA NASO DNA - Equipment Storage Structures; SIKES MA NSA NWA - Equipment Storage Structures

Guidebook & Chapter: 12999

Legal Drivers:

Primary: Sikes Act

Secondary: CWA

Tertiary: SWCA

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads – Northwest Annex (NSA NWA)

Project Description: (What does this project entail?)

- Demolish metal temporary storage structure that is rusting and collapsing at the Natural Resources Center on NASO. Replace storage structure. (2014)
- Construct new equipment storage shed capable of housing tractors and associated equipment parts at NASO. (2015)
- Repair storm damaged tractor storage shed at NASO. (2014)
- Repair storm damaged tractor storage shed at NSA NWA. (2014)
- Maintain equipment storage structures. (annually)

Project Purpose: (Why is this project needed?) Existing storage structures are in disrepair and are not being utilized for their intended purposes. One structure is a safety hazard and needs to be demolished (needs to be replaced with a secure locking concrete storage shelter, vandals have been known to steal items from the Natural Resources Center). One structure is leaking during storm events and damaging equipment. One structure lost its doors during a storm event and now items can not be securely stored (due to location of this structure with out doors nothing can be stored in this structure). Even with the repair and replacement of these structures there is still not enough storage to properly store equipment from elemental damage. As such a new structure must be constructed to protect hundreds of thousands of dollars of equipment and extend the life cycle of this equipment.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) The equipment needing to be properly stored is utilized for various projects that support requirements under federal and state law and Navy policy. This equipment performs functions in support of Endangered Species work, Migratory Bird work, invasive species work, nuisance wildlife work, erosion control work, habitat enhancement work, the Sikes Act, etc.

Maintaining this equipment enables the Navy to continue supporting these efforts and help to keep the bases in compliance with these laws and regulations; as such, reducing the potential for NOV's to be

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Numbers: 60161NR223; 32442NR223; 4275ANR223

Project Title: SIKES MA NASO/NALFF - Equipment Storage Structures; SIKES MA NASO DNA - Equipment Storage Structures; SIKES MA NSA NWA - Equipment Storage Structures

Guidebook & Chapter: 12999

Legal Drivers:

Primary: Sikes Act

Secondary: CWA

Tertiary: SWCA

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads – Northwest Annex (NSA NWA)

Project Description: (What does this project entail?)

- Demolish metal temporary storage structure that is rusting and collapsing at the Natural Resources Center on NASO. Replace storage structure. (2014)
- Construct new equipment storage shed capable of housing tractors and associated equipment parts at NASO. (2015)
- Repair storm damaged tractor storage shed at NASO. (2014)
- Repair storm damaged tractor storage shed at NSA NWA. (2014)
- Maintain equipment storage structures. (annually)

Project Purpose: (Why is this project needed?) Existing storage structures are in disrepair and are not being utilized for their intended purposes. One structure is a safety hazard and needs to be demolished (needs to be replaced with a secure locking concrete storage shelter, vandals have been known to steal items from the Natural Resources Center). One structure is leaking during storm events and damaging equipment. One structure lost its doors during a storm event and now items can not be securely stored (due to location of this structure with out doors nothing can be stored in this structure). Even with the repair and replacement of these structures there is still not enough storage to properly store equipment from elemental damage. As such a new structure must be constructed to protect hundreds of thousands of dollars of equipment and extend the life cycle of this equipment.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) The equipment needing to be properly stored is utilized for various projects that support requirements under federal and state law and Navy policy. This equipment performs functions in support of Endangered Species work, Migratory Bird work, invasive species work, nuisance wildlife work, erosion control work, habitat enhancement work, the Sikes Act, etc.

Maintaining this equipment enables the Navy to continue supporting these efforts and help to keep the bases in compliance with these laws and regulations; as such, reducing the potential for NOV's to be

issued. This helps to save time and money enabling the military to continue training without interruption.

Protecting the equipment extends the life of the equipment and delays the need for costly repairs or even new equipment purchasing.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO & NALFF	\$46,074.67	\$918.63	\$936.08	\$953.87	\$971.99
NASO DNA	\$903.06	\$918.63	\$936.08	\$953.87	\$971.99
NSA NWA	\$903.06	\$918.63	\$936.08	\$953.87	\$971.99
TOTAL:	\$51,043.14	\$2,755.89	\$2,808.25	\$2,861.61	\$2,915.98

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Numbers: 60161NR224; 32442NR224; 4275ANR224

Project Title: SIKES MA NASO/NALFF - Equipment Maintenance & Repair; SIKES MA NASO DNA - Equipment Maintenance & Repair; SIKES MA NSA NWA - Equipment Maintenance & Repair

Guidebook & Chapter: 12999

Legal Drivers:

Primary: Sikes Act

Secondary: EO_Invasive Species

Tertiary: SWCA

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); and Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Description: (What does this project entail?)

Maintain and repair equipment to keep them in working in order to complete projects required under the Integrated Natural Resources Management Plan (INRMP). INRMP projects support Species and Habitats of Concern management, invasive species management, outdoor recreation, etc.

Project Purpose: (Why is this project needed?) Some equipment requires annual maintenance checks and repairs as needed. Other equipment may break while in use and will need repairs. This equipment is needed to support INRMP identified projects and maintain compliance with Federal, State, and Navy laws, regulations, and policies. Without working equipment the Navy cannot accomplish their INRMP and Permit requirements, and will be labeled non-compliant and possibly be issued Notices of Violation.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?)

Equipment repairs and maintenance are needed to maintain compliance with the: Sikes Act; Endangered Species Act; EO_Invasive Species; Migratory Bird Treaty Act; OPNAVINT 5090.1C; Clean Water Act; Soil & Water Conservation Act; etc.

The equipment needing to be properly maintained and repaired is utilized for various projects that support requirements under federal and state law and Navy policy. This equipment performs functions in support of Endangered Species work (issued biological opinion), Migratory Bird work, invasive species work, nuisance wildlife work, erosion control work, habitat enhancement work, the Sikes Act, outdoor recreation, environmental compliance inspection access, etc.

Maintaining this equipment enables the Navy to continue supporting these efforts and help to keep the bases in compliance with these laws and regulations; as such, reducing the potential for NOV's to be issued. This helps to save time and money enabling the military to continue training without interruption.

Proper maintenance and repair of the equipment extends the life of the equipment and delays the need for more costly repairs or even new equipment purchasing.

Without equipment the Natural Resources managed outdoor recreation program would likely have to shut down due to access and safety issues, thus reducing military morale and welfare.

Without this equipment the Military will have to pay additional funding to maintain areas (at a much greater cost) they utilize for training purposes because Natural Resources will not be able to maintain their dual purpose land management objectives.

Without this equipment the facilities will be endangered of wildfire intrusion because the Natural Resources program will not be able to maintain their firebreaks.

Without this equipment the facilities will be more likely to flood because invasive plant species management, which block the ditches and create security breaches, will have to be stopped until funding can be obtained.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO/NALFF	\$12,288.12	\$12,521.60	\$12,759.51	\$13,001.94	\$13,248.97
NASO DNA	\$2,601.51	\$2,650.94	\$2,701.30	\$2,752.63	\$2,804.93
NSA NWA	\$5,404.78	\$5,507.47	\$5,612.11	\$5,718.74	\$5,827.39
TOTAL:	\$20,294.40	\$20,680.00	\$21,072.92	\$21,473.30	\$21,881.30

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist
Date Prepared: 31 July 2013

Project Numbers: 60161NR225; 32442NR225; 4275ANR225
Project Title: SIKES MA NASO/NALFF - Conservation Law-enforcement Vehicle
Guidebook & Chapter: 12999

Legal Drivers:

Primary: SIKES Act

Secondary: ESA

Tertiary: CWA

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) NAVFAC MIDLANT Installations throughout Hampton Roads IPT (11 installations)

Project Description: (What does this project entail?)

Fund Funding Shortfall to maintain current Conservation Law-enforcement Vehicle.

Project Purpose: (Why is this project needed?) The conservation law-enforcement vehicle services 11 installations in the Hampton Roads IPT; however, the vehicle is maintained under NAS Oceana's Transportation department. During the 2012/2013 fleet vehicle reduction NASO was only allotted so much money, which would have left the Natural Resources program without an adequate Conservation Law-enforcement vehicle. As such Oceana PWD reached back to NAVFAC MIDLANT Region Environmental Business Line to fund the remaining rental cost to maintain the existing vehicle as the vehicle services Oceana Command and Non-Oceana Command installations. Funds were allocated to meet the shortfalls in FY 2013 and the installation Natural Resources Manager was requested to submit an EPR for out years.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) There are key safety concerns associated with transporting equipment via an undersized truck. One mishap could harm personnel or others, could delay project implementation, and could delay military training missions. The truck is used to perform functions in support of Endangered Species work, Migratory Bird work, invasive species work, nuisance wildlife work, erosion control work, habitat enhancement work, the Sikes Act, etc. Without being able to properly transport equipment or gain access into off-road areas there could be delays in project implementation which could have potential negative impacts on species of concern.

Cost Estimations:

FY2016	FY2017	FY2018	FY2019	FY2020
\$5,827.96	\$5,938.69	\$6,051.53	\$6,166.50	\$6,283.67

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Numbers: 60161NR226; 32442NR226; 4275ANR226

Project Title: CHS MA NASO/NALFF - INRMP Updates and Planning; CHS MA NASO DNA - INRMP Updates and Planning; CHS MA NSA NWA - INRMP Updates and Planning

Guidebook & Chapter: 12103

Legal Drivers:

Primary: Sikes Act

Secondary: ESA

Tertiary: CWA

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Description: (What does this project entail?) Acquire equipment and support necessary to keep INRMPs updated.

NASO/NALFF INRMP: Final Hard Copy Draft Aug 2008, pen and ink changes through 2012; Review for Operation and Effect Obtained Sept 2012. Project was funded in FY2012 to incorporate all pen and ink changes into the hard copy version of the INRMP.

NASO DNA INRMP: Final Hard Copy Draft Nov 2006, pen and ink changes through 2012; Review for Operation and Effect requested in 2007 and 2012. State Wildlife Agency reviewed in 2007, USFWS concurred if State concurred. State reviewed in 2012; however USFWS refused to review until the hard copy had been updated to incorporate the pen and ink changes within the document, since the original hard-copy was from 2006. Project was funded in FY2012 to incorporate all pen and ink changes into the hard copy version of the INRMP.

NSA NWA INRMP: Final Hard Copy Draft Nov 2006, pen and ink changes through 2012; Review for Operation and Effect requested in 2007 and 2012. State Wildlife Agency reviewed in 2007, USFWS concurred if State concurred. State reviewed in 2012; however USFWS refused to review until the hard copy had been updated to incorporate the pen and ink changes within the document, since the original hard-copy was from 2006. Project was funded in FY2012 to incorporate all pen and ink changes into the hard copy version of the INRMP.

Project Purpose: (Why is this project needed?) Existing equipment does not allow the functionality to properly update and produce planning level analyses for the INRMP. As such, equipment is needed that does not connect to the network; therefore not requiring some of the restrictions that interrupt and prevent completion of detailed analyses and mapping efforts. Additionally, the equipment that is issued does not possess the speed and storage capabilities necessary for data processing and storage.

Support to maintain and utilize the equipment and keep INRMP data updated in accordance with various Navy and INRMP identified requirements (e.g., Geographic Information System collection and metadata requirements, map updates, data updates, analyses, modeling, etc.).

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Funding this project will aide in making sure the bases are keeping in compliance with various Federal and State laws, regulations, policies, and conservation agreements (ESA, MBTA, MMPA, NMFA, Invasive and Pest Control, Sikes Act, INRMP, 5090.1C, State Wildlife Action Plan, USFWS Strategic Plan, etc.).

INRMPs have a number of updates that are listed and approved by the annual INRMP metrics review teams (Navy, USFWS, and State Wildlife Agency representatives) as needed to be made to the INRMP plan, but current staffing levels and equipment are insufficient to accomplish the required updates. Update requirements have been building up since 2007 and have not been incorporated into a complete digital document. A running list of required updates and an updated project list have been made and are provided when copies of the INRMP are requested for review. Many updates require research, analysis, and data modeling to accomplish the completed desired results for the official INRMP document.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO/NALFF	\$8,464.719	\$83,310.70	\$8,789.434	\$8,956.433	\$9,126.605
NASO DNA	\$4,232.359	\$17,418.23	\$4,394.717	\$4,478.217	\$4,563.303
NSA NWA	\$4,232.359	\$36,751.77	\$4,394.717	\$4,478.217	\$4,563.303
TOTAL:	\$16,929.438	\$137,480.70	\$17,578.868	\$17,912.866	\$18,253.211

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist
Date Prepared: 31 July 2013

Project Number: 32442NR229
Project Title: 2 BO MA NASO DNA - Threatened & Endangered Species Survey – Sea Turtle
Guidebook & Chapter: 12104

Legal Drivers:

Primary: Endangered Species Act

Secondary: SIKES Act

Tertiary: CZMA

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana - Dam Neck Annex (NASO DNA)

Project Description: (What does this project entail?) Conduct annual Threatened and Endangered species surveys for Nesting Sea Turtles and Stranded Sea Turtles or Marine Mammals along the 4 mile Ocean Front of NASO Dam Neck Annex.

Current biological opinion for the Logger Head Sea Turtle was issued in 2012, in support of the NASO Dam Neck Annex Beach Replenishment project. Conducting the beach patrols has both a term and condition requirement under the BO issued incidental take statement and a recommended conservation measure. Annual Sea-Turtle Beach Patrol Surveys are identified in the INRMP as a requirement per USFWS guidance.

Project Purpose: (Why is this project needed?) Conduct Nesting and Stranded Sea Turtle Surveys/Patrols. In accordance with the INRMP and the Biological Opinion nesting Sea-turtle surveys are required to minimize negative impacts to this T&E species.

Project Impact/Benefit to Military Mission: (How would not funding this project affect the mission? What benefits does funding this project have to the mission?) Maintains compliance with the Endangered Species Act and helps to prevent potential Notices of Violation and associated penalties, thus allowing those authorized military training and Morale and Welfare activities to continue on the beaches of NASO DNA.

Cost Estimations:

FY2016	FY2017	FY2018	FY2019	FY2020
\$6,679.55	\$6,806.46	\$6,935.78	\$7,067.56	\$7,201.84

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Number: 60161NR231; 32442NR231; 4275ANR231

Project Title: CHS MA NASO/NALFF – Nearshore Environment and Climate Change Assessments; CHS MA NASO DNA – Nearshore Environment Assessment and Climate Change Assessments; CHS MA NSA NWA – Nearshore Environment Assessment and Climate Change Assessments

Guidebook & Chapter: 12101

Legal Drivers:

Primary: Sikes Act

Secondary: NEPA

Tertiary: EFH/ESA/MMPA/MBTA

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana – Dam Neck Annex (NASO DNA); and Naval Support Activity Hampton Roads – Northwest Annex (NSA NWA).

Project Description: (What does this project entail?) Conduct research and analyses to produce a report to be incorporated into the INRMP on the history of climate change, the predictions for future climate change, and the associated impacts of this climate change in association with installation properties. Produce maps, timeline, etc., to depict the predicted climate change impacts. Identify military mission vulnerabilities and recommendations associated with predicted planning for climate change impacts (include, changes in property boundaries, sea level rise and impacts to infrastructure, etc.). Identify potential habitat and species of concern impacts associated with predicted planning for climate change impacts. Work/Coordinate with the South Atlantic Landscape Conservation Cooperative (SALCC), USGS, and other Navy partners working on Climate Change initiatives to ensure consistency amongst climate change terminology and estimations. Identify potential climate change initiatives the Navy can support within the installation's contributing ecosystems (e.g., watersheds, joint venture boundaries, SALCC, bird conservation regions, etc.).

Where appropriate (currently, NASO and NASO DNA are the only installations with identified near shore environments) conduct a more detailed analysis/assessment of near shore environment associated with shore installations for inclusion in the INRMP. Identify and map (providing GIS layers and metadata) boundary of near shore environment. Provide property ownership information on the near shore environment lands and agreements between the property owner and the Navy. Provide species and habitat data information within the near shore environment. Provide near shore environment topography and tidal fluctuation information. Identify military training that currently impacts the near shore environment and how the environment is impacted. Identify potential conflicts with the military mission and the near shore environment. Identify potential habitat conservation initiatives the Navy can support associated with the near shore environment.

Project recurs every 5 years unless a major change in mission or landuse/cover occurs.

Project Purpose: (Why is this project needed?)

Project need was identified in 2010 via the INRMP metrics annual review, indicating that the INRMP does not sufficiently address climate change or near shore environments. INRMP update list and project lists were updated to include this need.

Currently, these bases do not have sufficient biological information to determine if they are negatively impacting species and habitats within the near shore environment. Currently, these bases do not have a climate

change assessment that will allow them to plan for future climate change concerns. This lack of information puts the Navy at risk for violating several federal and state laws. In addition to federally mandated requirements, Navy and State Policies and Plans dictate that we should have a working knowledge of our impacts to wildlife. This EPR exhibit works to get the Navy in compliance with these requirements.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Assessments of Climate Change and near shore environments associated with bases are necessary to understand how mission requirements will affect species and habitats of concern and vice versa (how impact to species, habitats, and landscapes will impact the military mission). Various laws and regulations will be impacted by climate change (endangered species act, soil conservation act, clean water act, marine mammal protection act, essential fish habitat, etc.). The Sikes Act, National Environmental Policy Act, and Navy & DoD Policy (5090.1C, 4715.03, etc.) requires installations with INRMPs to have a working knowledge of climate change and near shore environments, which are to be included in the INRMPs. Knowing in advance what potential concerns there are would allow the command to plan around avoiding potential impacts and to plan for permitting and mitigation requirements, which may be needed to meet military training requirements.

Not having sufficient biological information related to Climate Change and Near shore environments levels the Navy vulnerable to lawsuits when this insufficient information is produced in NEPA documentation associated with military action projects. Obtaining sufficient information will help to avoid these situations or at least help the Navy to win or have such accusations overturned in a court of law.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO/NALFF	\$109,007.90	\$0.00	\$0.00	\$0.00	\$0.00
NASO DNA	\$190,763.83	\$0.00	\$0.00	\$0.00	\$0.00
NSA NWA	\$43,603.16	\$0.00	\$0.00	\$0.00	\$0.00
TOTAL:	\$343,374.90	\$0.00	\$0.00	\$0.00	\$0.00

Project Justification & Cost Estimate Information

Prepared By: Michael Wright, Installation Natural Resources Specialist

Date Prepared: 31 July 2013

Project Numbers: 60161NR232; 32442NR232; 4275ANR232

Project Title: SIKES MA NASO/NALFF - Resource Protection Agreement; SIKES MA NASO DNA - Resource Protection Agreement; SIKES MA NSA NWA - Resource Protection Agreement

Guidebook & Chapter: 12101

Legal Drivers:

Primary: Sikes Act

Secondary: Endangered Species Act

Tertiary: Migratory Bird Treaty Act

ERL: 4

Navy Level: 1

Funding Sources: (OM&N, 19G, Forestry, Legacy, Sikes, etc.) O&MN

Project Location: (Base) Naval Air Station Oceana (NASO); Naval Auxiliary Landing Field Fentress (NALFF); Naval Air Station Oceana - Dam Neck Annex (NASO DNA); Naval Support Activity Hampton Roads - Northwest Annex (NSA NWA)

Project Description: (What does this project entail?) Create and maintain a cooperative agreement with the US Fish & Wildlife Service, the VA Department of Game & Inland Fisheries, and/or installation Security to supply Conservation Law-enforcement protection over the natural resources on Navy Property.

Project Purpose: (Why is this project needed?) Protection of Natural Resources via adequately staffed and trained Conservation Law-enforcement Officers (CLEOs) is required under the Sikes Act. The CLEO's would enforce a wide number of legal and policy requirements at these installations: CWA; CZMA; EO 11990 (Protection of Wetlands); ESA (e.g., enforcing/executing existing Biological Opinions for such species as the Federally Threatened Loggerhead Sea Turtle); MBTA (e.g., ensuring Migratory Bird depredation work is being carried out in accordance with permit requirements); SWCA; 32 CFR 190 (Natural Resources Management Program); DoDI 4715.03 (Environmental Conservation Program); OPNAVINST 5090.1C; EO 13112 (Invasive Species); Chesapeake Bay Preservation Act and Federal Agreement; DoD Instruction 4150.7 (Pest Management); EO 13112 (Invasive Species); EO 11987 (Exotic Organisms); and various other Federal and State laws (particularly related to hunting and fishing regulations, and state T&E listed species), regulations, policies, and conservation agreements (MMPA, NMFA, EFH, State Wildlife Action Plan, USFWS Strategic Plan, etc.).

Neither NR staff nor military police currently have the staffing and training levels too sufficiently and legally process and investigate natural resources legal actions. NASO, NALFF, NASO DNA, and NSA NWA all require conservation law-enforcement officer (CLEO) support. Each of these facilities is located within a highly urbanized area and receives a high amount of authorized and unauthorized human access (bases are not 100% fenced in, majority of natural areas are found outside of "secured" compounds). Each of these bases support species of concern, habitats of concern, and hunting & fishing programs. There have been known and suspected negative impacts to natural resources on each of these bases (i.e., vandalism, killing, filling wetlands, planting of non-native invasive species, harassment of Endangered Species and Migratory Birds, poaching, etc.).

Conservation Law-enforcement is a dangerous job (diseased animals, aggressive animals, hunters with loaded weapons, etc.) and should be done in such a manner that when an officer responds to an emergency situation or a situation where they think they may need to use force (i.e., weapons) they should have adequately trained back-up or someone to attend/investigate with them for safety purposes. Also, staffing should be at a level in order to avoid a situation where a single person is working or on call 24 hours 7 days a week. It is recommended that at a minimum the cooperative agreement provide for 3 adequately trained individuals to provide conservation law-enforcement support to NASO/NALFF, NASO DNA, and NSA-NWA. This way there is the ability to safely work emergency situations and to allow for at least one CLEO to have official time-off on a rotational basis.

Project Impact/Benefit to Military Mission: *(How would not funding this project affect the mission? What benefits does funding this project have to the mission?)* Funding this project aides the Navy in maintaining compliance with laws, regs., and policies and reduces the potential for incurring Notices of Violations. NOV's could be issued for knowingly and unknowingly allowing the occurrence of negative impacts to resources. It has been identified that current staffing levels and training/cert. levels are not adequate for implementing conservation law-enforcement actions, across all four bases, regarding natural resources. In effect one may draw the conclusion the Navy is knowingly allowing negative impacts to occur to resources based on the lack of providing enough adequately trained conservation law-enforcement professionals.

Cost Estimations:

BASE	FY2016	FY2017	FY2018	FY2019	FY2020
NASO/NALFF	\$99,355.56	\$101,243.31	\$103,166.94	\$105,127.11	\$107,124.52
NASO DNA	\$21,032.16	\$21,431.77	\$21,838.97	\$22,253.92	\$22,676.74
NSA NWA	\$43,697.78	\$44,528.03	\$45,374.07	\$46,236.17	\$47,114.66
TOTAL:	\$164,085.49	\$167,203.12	\$170,379.98	\$173,617.20	\$176,915.92

POM 16_Manpower_OC_EV_Request to Region

One employee per row	POSITION INFO						FY16 Cost (\$)	FY17 Cost (\$)	FY18 Cost (\$)	FY19 Cost (\$)	FY20 Cost (\$)	Natural Resources	Notes
	Administrative (Y/N)	Supervisory (Y/N)	Civilian (C) / Contractor (K) / Military (M)	Direct (D) / Reimbursable (R)	Existing position (E) / FY14 addition (A)								
1	N	N	C	R	E	\$109,341	\$111,418	\$113,535	\$115,692	\$117,890	100	GS 12, Multi-Media Manager - Natural Resources. Professional Position. Detailed to PWD Oceana EV. This position handles budgeting/acquisition oversight, Contract and Contractor Coordination, ensuring INRMP compliance, EV Checklist Reviews/NEPA/General Projects Induction Reviews, regulator and subject matter expert coordination, Installation Instruction Updates, Education & Outreach, Record Keeping, etc. This position oversees the complete installation Natural Resources Programs for the Oceana Command and NSAHR Northwest Annex managing/coordinating 3 INRMPs and the support personnel associated with the upkeep and implementation of the INRMPs.	
2	N	N	C	R	E	\$89,986	\$91,696	\$93,438	\$95,213	\$97,022	100	GS 9, Biological Science Technician(BST)/Conservation Law-enforcement Officer (CLEO). Non-professional Position. Detailed to PWD Oceana EV with regional responsibilities. Provides Hampton Roads regional CLEO support and biological science technician duties as requested/assigned and time allows.	
3	N	N	C	R	E	\$80,261	\$81,786	\$83,340	\$84,923	\$86,537	100	GS 9, Biological Science Technician. Non-professional Position. Detailed to PWD Oceana EV. Primary duty station is NASO, DNA, and NALFF, but does complete as assigned tasks for NWA. Provides BST duties as assigned and time allows.	
4	N	N	C	D	A	\$102,993	\$104,950	\$106,944	\$108,975	\$111,046	100	GS 11-12, Forester. Professional Position. Duty Stationed either at region or PWD Oceana EV. Neither region nor installations have a certified forester on staff. OPNAVINST 5090.1C stipulates that "All Navy installations with commercial forestry programs shall employ or use a professional forester to manage forest resources." NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and NSA Norfolk-Northwest Annex all have INRMP identified forestry programs, and due to the nature of various activity initiate projects require commercial forestry management (i.e., timber sales, and timber value assessments, etc.).	

POM 16_Manpower_OC_EV_Request to Region

POM 16_Manpower_OC_EV_Request to Region												
POSITION INFO												
One employee per row	Administrative (Y/N)	Supervisory (Y/N)	Civilian (C) / Contractor (K) / Military (M)	Direct (D) / Reimbursable (R)	Existing position (E) / FY14 addition (A)	FY16 Cost (\$)	FY17 Cost (\$)	FY18 Cost (\$)	FY19 Cost (\$)	FY20 Cost (\$)	Natural Resources	Notes
5	N	N	C	D	A	\$102,993	\$104,950	\$106,944	\$108,975	\$111,046	100	GS 11, Natural Resources Specialist-Team Lead for Specific NR Program Areas. Professional Position. Detailed to PWD Oceana EV. Coordinates with the NASO GS 12 Natural Resources Specialist/Manager to determine work plans, inspection requirements, and needs for program and staff, in addition to aiding in completing field work (surveys, inspections, nuisance/emergency wildlife response, etc.) for the 2 NASO Command Integrated Natural Resources Management Plans (INRMPs). Works with and oversees BSTs and volunteers in support of completing INRMP identified projects. Programmatic needs include, but are not limited to: Rare, Threatened & Endangered Species Management; Species & Habitats of Special Concern Management; Bird-Animal Aircraft Strike Hazards Management; Invasive Species Management; Prescribed Burning Management; Geographic Information Systems Management; Data Management; Wetland & other Water Resource Management (mapping, evaluating, restoring, mitigation, etc.); Emergency-Call&Nuisance Wildlife Management; Migratory Bird Management; Forest Management (inventory, silviculture, market assessment, disease, etc.); Vegetation Management; Agricultural Lands Management; Erosion & Sediment Control Management; General Fish & Wildlife Management (population, habitat, disease, etc.); NR Recreational Program Management (Hunting, Fishing, Trails, Archery, etc.); Climate Change; Ecosystem/Watershed Management; Conservation Law Enforcement; Coastal/Marine Management; Floodplain Management; In-field training of Support Staff Management; Data Analysis and Interpretation Management; etc.

POM 16_Manpower_OC_EV_Request to Region

POM 16_Manpower_OC_EV_Request to Region													
One employee per row	POSITION INFO						FY16 Cost (\$)	FY17 Cost (\$)	FY18 Cost (\$)	FY19 Cost (\$)	FY20 Cost (\$)	Natural Resources	Notes
	Administrative (Y/N)	Supervisory (Y/N)	Civilian (C) / Contractor (K) / Military (M)	Direct (D) / Reimbursable (R)	Existing position (E) / FY14 addition (A)								
6	N	N	C	D	A	\$102,993	\$104,950	\$106,944	\$108,975	\$111,046	100	GS 11, Natural Resources Specialist for Specific NR Program Areas. Professional Position. Detailed to PWD Oceana EV. Coordinates with the NASO GS 12 Natural Resources Specialist/Manager and the NASO GS 11 Natural Resources Specialist - Team Leader to determine work plans, inspection requirements, and needs for program and staff, in addition to aiding in completing field work (surveys, inspections, nuisance/emergency wildlife response, etc.) primarily to support the NSAHR Northwest Annex Integrated Natural Resources Management Plan (INRMP), which is managed and supported out of the NASO Environmental Program Office. Works with and oversees BSTs and volunteers in support of completing INRMP identified projects. It is highly recommended that this position be required to maintain a Society of American Foresters (SAF) National Forester Certification. Programmatic needs include, but are not limited to: Rare, Threatened & Endangered Species Management; Species & Habitats of Special Concern Management; Bird-Animal Aircraft Strike Hazards Management; Invasive Species Management; Prescribed Burning Management; Geographic Information Systems Management; Data Management; Wetland & other Water Resource Management (mapping, evaluating, restoring, mitigation, etc.); Emergency-Call&Nuisance Wildlife Management; Migratory Bird Management; Forest Management (inventory, silviculture, market assessment, disease, etc.); Vegetation Management; Agricultural Lands Management; Erosion & Sediment Control Management; General Fish & Wildlife Management (population, habitat, disease, etc.); NR Recreational Program Management (Hunting, Fishing, Trails, Archery, etc.); Climate Change; Ecosystem/Watershed Management; Conservation Law Enforcement; Coastal/Marine Management; Floodplain Management; In-field training of Support Staff Management; Data Analysis and Interpretation Management; etc. Since 2007, annually the NSAHR Northwest Annex INRMP metrics have reflected a staffing shortfall and specifically the need to have an individual on-site at NSAHR Northwest Annex, per the Installation Commanding Officer (ICO).	
TOTAL:						\$588,566	\$599,748	\$611,144	\$622,755	\$634,588			
TOTAL In-Core:						\$279,588	\$284,900	\$290,313	\$295,829	\$301,450			
TOTAL Above-Core:						\$308,978	\$314,849	\$320,831	\$326,926	\$333,138			

Enclosure 3 INRMP Updates and Annual Metrics



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DEPARTMENT OF THE NAVY

NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO:

5090
Ser N4/028
30 Jan 17

Mr. Robert Duncan
Executive Director
VA Department of Game and Inland Fisheries
4010 West Broad Street
Richmond, VA 23230-3916

Dear Mr. Duncan:

SUBJECT: FISCAL YEAR (FY) 2016 NATURAL RESOURCES/INTEGRATED
NATURAL RESOURCES MANAGEMENT PLAN (INRMP) METRICS
SUMMARY REPORT

Per the Chief of Naval Operations Instruction 5090.1D and associated Environmental Readiness Manual M-5090.1, naval installations are required to submit annual reports summarizing recent Natural Resources/INRMP Metrics meeting updates along with the status of the INRMP.

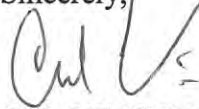
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Thank you for your participation in the NAS Oceana Natural Resources Program. My point of contact for this matter is the NAS Oceana Natural Resources Manager, Michael Wright, and she can be reached at (757) 433-3461 or via e-mail at michael.f.wright@navy.mil.

Sincerely,



C. P. VINCELETTE
Captain, U.S. Navy
By direction
Executive Officer

Enclosure: (1) FY 2016 Natural Resources/INRMP Metric Meeting Invitation
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NOAA Attn: Mr. Brian Hopper



DEPARTMENT OF THE NAVY

NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO:

5090
Ser N4/027
30 Jan 17

Ms. Amy Ewing
Environmental Services Biologist
VA Department of Game and Inland Fisheries
4010 West Broad Street
Richmond, VA 23230-3916

Dear Ms. Ewing:

**SUBJECT: FISCAL YEAR (FY) 2016 NATURAL RESOURCES/INTEGRATED
NATURAL RESOURCES MANAGEMENT PLAN (INRMP) METRICS
SUMMARY REPORT**

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By direction
Executive Officer

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DEPARTMENT OF THE NAVY

NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO:

5090
Ser N4/026
30 Jan 17

Mr. Peter Acker
Wildlife Biologist
VA Department of Game and Inland Fisheries
3909 Airline Blvd.
Chesapeake, VA 23321-3305

Dear Mr. Acker:

SUBJECT: FISCAL YEAR (FY) 2016 NATURAL RESOURCES/INTEGRATED
NATURAL RESOURCES MANAGEMENT PLAN (INRMP) METRICS
SUMMARY REPORT

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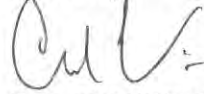
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Sincerely,



C. P. VINCELETTE
Captain, U.S. Navy
By direction
Executive Officer

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DEPARTMENT OF THE NAVY
NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO:

5090
Ser N4/025
30 Jan 17

Ms. Cynthia Schulz
Ecological Services Office
U.S. Fish and Wildlife Service
6669 Short Lane
Gloucester, VA 23061-4410

Dear Ms. Schulz:

**SUBJECT: FISCAL YEAR (FY) 2016 NATURAL RESOURCES/INTEGRATED
NATURAL RESOURCES MANAGEMENT PLAN (INRMP) METRICS
SUMMARY REPORT**

Per the Chief of Naval Operations Instruction 5090.1D and associated Environmental Readiness Manual M-5090.1, naval installations are required to submit annual reports summarizing recent Natural Resources/INRMP Metrics meeting updates along with the status of the INRMP.

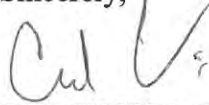
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Sincerely,



C. P. VINCELETTE
Captain, U.S. Navy
By direction
Executive Officer

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DEPARTMENT OF THE NAVY

NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO:

5090

Ser N4/024

30 Jan 17

Ms. Sarah Nystrom
Ecological Services Office
U.S. Fish and Wildlife Service
6669 Short Lane
Gloucester, VA 23061-4410

Dear Ms. Nystrom:

SUBJECT: FISCAL YEAR (FY) 2016 NATURAL RESOURCES/INTEGRATED
NATURAL RESOURCES MANAGEMENT PLAN (INRMP) METRICS
SUMMARY REPORT

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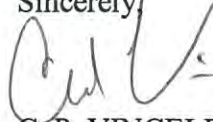
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Sincerely,



C. P. VINCELETTE
Captain, U.S. Navy
By direction
Executive Officer

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DEPARTMENT OF THE NAVY

NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO:

5090
Ser N4/023
30 Jan 17

Mr. David O'Brien
Marine Habitat Resource Specialist
Chesapeake Bay Office
National Oceanic and Atmospheric Administration
P.O. Box 1346
Gloucester Point, Virginia 23062-1346

Dear Mr. O'Brien:

**SUBJECT: FISCAL YEAR (FY) 2016 NATURAL RESOURCES/INTEGRATED
NATURAL RESOURCES MANAGEMENT PLAN (INRMP) METRICS
SUMMARY REPORT**

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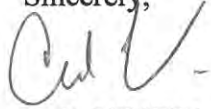
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Sincerely,



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Captain, U.S. Navy
By direction
Executive Officer

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DEPARTMENT OF THE NAVY

NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO:

5090
Ser N4/022
30 Jan 17

Mr. Brian Hopper
Section 7 Biologist
National Oceanic and Atmospheric Administration
177 Admiral Cochrane Dr.
Annapolis, MD 21401-7307

Dear Mr. Hopper:

SUBJECT: FISCAL YEAR (FY) 2016 NATURAL RESOURCES/INTEGRATED
NATURAL RESOURCES MANAGEMENT PLAN (INRMP) METRICS
SUMMARY REPORT

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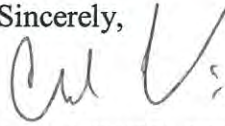
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Captain, U.S. Navy
By direction
Executive Officer

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DEPARTMENT OF THE NAVY

NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO:

5090
Ser N4/021
30 Jan 17

Mr. William Barnhill
Section 7 Biologist Northeast Region
National Oceanic and Atmospheric Administration
55 Great Republic Drive
Gloucester, MA 09130-2276

Dear Mr. Barnhill:

SUBJECT: FISCAL YEAR (FY) 2016 NATURAL RESOURCES/INTEGRATED
NATURAL RESOURCES MANAGEMENT PLAN (INRMP) METRICS
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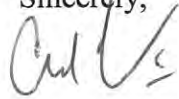
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Captain, U.S. Navy
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(2) FY 2016 NASO/NALFF INRMP Metrics Results Summary
(3) FY 2016 NASO DNA INRMP Metrics Results Summary
(4) FY 2016 NASO/NALFF INRMP Signature Page and Updates Summary
(5) FY 2016 NASO DNA INRMP Signature Page and Updates Summary

Copy to: CNIC Washington DC (N45)
NAVFACENCOM Washington DC (EV2)
COMNAVREG MIDLANT (N45)
NAVFACENCOM MIDLANT CORE (EV22)
USFWS Attn: Ms. Cynthia Schulz
USFWS Attn: Ms. Sarah Nystrom
VDGIF Attn: Mr. Robert Duncan
VDGIF Attn: Ms. Amy Ewing
VDGIF Attn: Mr. Peter Acker
NOAA Attn: Mr. David O'Brien
NOAA Attn: Mr. Brian Hopper

-----Original Appointment-----

From: Wright, Michael F CIV NAVFAC MIDLANT, PWD Oceana

Sent: Wednesday, September 07, 2016 12:17 PM

To: Podbesek, Jennifer A CIV NAVFAC MIDLANT, PWD Yorktown; Austin, Taylor S CIV NAVFAC MIDLANT, EV; Olexa, Thomas J CIV NAVFAC MIDLANT, PWD Yorktown; Hammond, John; Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek; Russell, Kyle B CIV NAVFAC MIDLANT, PWD Little Creek; Chamberlain, Terry N CIV NAVFAC MIDLANT, PWD Oceana (terry.n.chamberlain@navy.mil); Hicks, Linda CIV NAVFAC MIDLANT, PWD NSA Hampton Roads; Pulver, John J CIV NAVFAC MIDLANT, PWD Yorktown; Hoskin, Sumalee; Edwards, Mark L CIV NAVFAC MIDLANT, PWD Oceana; Nystrom, Sarah <sarah_nystrom@fws.gov> (sarah_nystrom@fws.gov); Jones, Michael H CIV NAVFAC MIDLANT, EV; Carawan, Emmett; Crum, Pete CIV NAVFAC MIDLANT, EV; Bassi, Jessica CIV NAVFAC MIDLANT, EV; Waller, Blake; Markham, Jack J CIV NAVFAC MIDLANT, EV; McGrogan, Lawrence F CIV NAVFAC MIDLANT, PWD Oceana; chris.ludwig@dcr.virginia.gov; chris.turner@ncwildlife.org; Ewing, Amy; Engelmeyer, Todd; Coe; Boettcher, Ruth (DGIF; maria.dunn@ncwildlife.org; david.l.o'brien@noaa.gov; Acker, Pete; donald_schwab@fws.gov; Aherron, Mike (DOF) (mike.aherron@dof.virginia.gov); tim_craig@fws.gov; Kleopfer, John (DGIF) (John.Kleopfer@dgif.virginia.gov); Page, Daren K CIV NAS Oceana, N32; Chad.Boyce@dgif.virginia.gov; chad.thomas@ncwildlife.org; jeremy.mccargo@ncwildlife.org

Subject: 2016 Navy Natural Resources Annual Metrics Meeting Request

When: Wednesday, October 12, 2016 9:00-14:00 (UTC-05:00) Eastern Time (US & Canada).

Where: NAS Oceana, VA Beach, VA Bldg 820, 2nd Floor, FEAD Conference Room

Hello Everyone,

It is that time again, to schedule our annual Integrated Natural Resources Management Plan (INRMP) metrics meeting for Naval Installations in the Hampton Roads/Tidewater Area of Virginia & North Carolina. The US Navy developed a standard method for the collection and reporting of business metric information for its installation natural resources programs. These metrics are used to keep the INRMPs current and inform stakeholders of new information since the previous year's review. The Navy's Mid-Atlantic Region is now in the process of generating annual metrics for its installations in Hampton Roads for 2016 and we are requesting your participation and feedback in this exercise.

Over the years our INRMP Metrics Team/Partnership has grown and evolved. Our meetings meet the basic requirement to come to mutual agreements on the Navy Natural Resources metrics questions' answers and provide findings and recommendations associated with the questions. Our meetings also go beyond this basic requirement and include discussions on: hot topic items of concern within our region's ecosystems/watersheds; partnering opportunities; updates being made to and updates needing to be made to the existing INRMPs; and other items of interest brought to the table.

We are planning this year's meeting to occur 12 Oct 2016. This meeting will involve reviewing Navy's 2016 assessments for its bases around Hampton Roads, that currently have Sikes Act Required INRMPs, including: NAS Oceana, NALF Fentress, NASO Dam Neck Annex, NWS Yorktown, NWSY Cheatham Annex, NSAHR Northwest Annex, JEB Little Creek and JEBC Ft. Story.

The focus of the meeting is to: 1. come to mutual agreements on the responses to the questions in the attached guide for each INRMP; 2. allow the Navy and each Partner Agency to share programmatic updates; 3. provide an opportunity for partnership development and networking; and 4. provide a forum to share important conservation opportunities and information. Closer to the meeting date we will send out documentation to help familiarize everyone with the

INRMP Metrics Database and Associated Questions. For those of you that have attended these meetings in the past you will notice some slight differences as information/questions have been added, removed and updated to the INRMP Metrics Datacall. Also, the presentation will be slightly different because the Navy transitioned the INRMP Metrics to a new, still web-based, data call-station.

The meeting is expected to be held at NAS Oceana, Public Works Building 820, 953 Hornet Dr. Virginia Beach VA 23460-2190 between 9:00 am and 4:00 pm. We do not expect the meeting to last the entire scheduled 7 hours. We scheduled the full day in the event that someone would like to tour/conduct an infield site visit of one or more of the associated installations. Often we work through lunch to try and attempt to finish the meeting by 1300 or 1400 hours. The group will take a vote to either break for lunch or work thru lunch. I recommend packing a lunch to be safe.

We have established a conference call-in line for individuals that cannot meet in person, but would like to participate in the group's discussions: Call-in 1-877-718-5284; and Participant code 5430144. If you are unable to attend in person we can email you the metrics and you can respond with comments, concerns or questions via email. We hope you or one of your staff members will be able to participate. (If you are wondering why you are on this mailing list, one of your State Wildlife, USFWS, NOAA-NMFS or Navy cohorts recommended that you be invited to this meeting.)

Directions: [Take Interstate 64 to interstate 264 east; take the 1st Colonial BLVD exit; turn right onto 1st Colonial Blvd, which turns into Oceana Blvd; continue along Oceana Blvd, after the Horse stables turn right onto Tom Cat Blvd (if you end up at General Booth Blvd you've gone too far). Go to the main gate off of Tomcat Blvd to gain access. A list of Non-Navy attendees will be kept at this gate. Once you have gone through the gate, you will drive down Tomcat to the roundabout and turn left onto Hornet Drive, continue on Hornet Dr. past the softball fields to Building 820, parking is adjacent to the building. If there is no parking in the front of the building, drive around the block, there is a large parking area off of D Ave with a walkway that leads to Bldg 820. Visitor Parking in front of the building is 1st come 1st served.]

Please confirm within the next couple of weeks if you plan to attend this meeting and if you are interested in conducting an in-field site visit. Please let us know which installation you'd like to visit and what you'd like to accomplish on that site visit (specific natural resources item of interest).

If you have any trouble accessing the installation or calling in please call me, Michael Wright, on my cell phone at 757-373-8531 so that we can resolve the issue.

We are looking forward to sharing our updates, hearing your updates, and planning for the future.

Sincerely,
Mike
Michael Wright
Natural Resources Manager (NASO and NSHR NWA)
DoD Partners in Flight Rep. (VA)

Office: 757-433-3461
Cell: 757-373-8531
Fax: 757-433-2719

Address:
Naval Air Station Oceana
Public Works Department
Environmental Program Division
ATTN: Natural Resources
953 Hornet Dr.
Bldg. 820, Suite 206
Virginia Beach, VA 23460-2190

ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) - WE "CARE"
Comply with the rules
Always improve
Reduce waste
Eliminate pollution

-----Original Message-----

From: Wright, Michael F CIV NAVFAC MIDLANT, PWD Oceana

Sent: Thursday, October 06, 2016 9:00 AM

To: Podbesek, Jennifer A CIV NAVFAC MIDLANT, PWD Yorktown; Austin, Taylor S CIV NAVFAC MIDLANT, EV; Olexa, Thomas J CIV NAVFAC MIDLANT, PWD Yorktown; 'Hammond, John'; Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek; Russell, Kyle B CIV NAVFAC MIDLANT, PJD Little Creek; Chamberlain, Terry N CIV NAVFAC MIDLANT, PWD Oceana; Hicks, Linda CIV NAVFAC MIDLANT, PWD NSA Hampton Roads; Pulver, John J CIV NAVFAC MIDLANT, PWD Yorktown; 'Hoskin, Sumalee'; Edwards, Mark L CIV NAVFAC MIDLANT, PWD Oceana; 'Nystrom, Sarah <sarah_nystrom@fws.gov> (sarah_nystrom@fws.gov)'; Jones, Michael H CIV NAVFAC MIDLANT, EV; Carawan, Emmett CIV NAVFAC MIDLANT, EV; Crum, Pete CIV NAVFAC MIDLANT, EV; Bassi, Jessica CIV NAVFAC MIDLANT, EV; Waller, Blake E CIV NAVFAC MIDLANT, EV; Markham, Jack J CIV NAVFAC MIDLANT, EV; McGrogan, Lawrence F CIV NAVFAC MIDLANT, PWD Oceana; 'chris.ludwig@dcr.virginia.gov'; 'chris.turner@ncwildlife.org'; 'Ewing, Amy'; 'Engelmeyer, Todd'; Coe, Adam M CIV NAS Oceana, N32; 'Boettcher, Ruth (DGIF)'; 'maria.dunn@ncwildlife.org'; 'david.l.o'brien@noaa.gov'; 'Acker, Pete'; 'donald_schwab@fws.gov'; 'Aherron, Mike (DOF) (mike.aherron@dof.virginia.gov)'; 'tim_craig@fws.gov'; 'Kleopfer, John (DGIF) (John.Kleopfer@dgif.virginia.gov)'; Page, Daren K CIV NAS Oceana, N32; 'Chad.Boyce@dgif.virginia.gov'; 'chad.thomas@ncwildlife.org'; 'jeremy.mccargo@ncwildlife.org'

Subject: RE: 2016 Navy Natural Resources Annual Metrics Meeting Request

Hello Everyone:

I have had several requests for additional information in association with next week's meeting.

Attached for your reference in preparation for next week's meeting:

1. Reporting Unit Report Example, FY2016: These are essentially the questions that the Navy must answer and from which reports to Congress are created regarding INRMP signatory Agency(s) compliance with the Sike's Act. Many of these questions are the same or similar to questions we have answered during previous INRMP Metrics reviews. With this said, there are some new questions and some questions have been further clarified.
2. NASO/NALFF & NASO DNA, and NSAGR NWA 2015 Annual INRMP Metrics Packages Submittals: For these installations most questions will be answered similarly from 2015 to 2016; however, there will be additional clarification on a few of the focus areas (e.g.,: Ecosystem Integrity, updated information allows us to sub-divided acreages not reported under a National Vegetation Classification (NVC) associated ecological system into the appropriate NVC ecological system; project funding updates; etc.).
3. FY2016 ESOH Data Call, Attachment #8 – Natural Resources, Specific to the INRMP Metrics: Helps to clarify the reporting requirements and processes. Provides an understanding of how the 7 INRMP Metrics focus areas are scored.

<<...>> <<...>> <<...>>

If you would like to have copies of the FY2015 INRMP Metrics Packages for any of the other installation's in Hampton Roads we can get those out to you as well.

Sincerely,

Mike

-----Original Appointment-----

From: Wright, Michael F CIV NAVFAC MIDLANT, PWD Oceana

Sent: Wednesday, October 12, 2016 3:49 PM

To: Wright, Michael F CIV NAVFAC MIDLANT, PWD Oceana; Nystrom, Sarah <sarah_nystrom@fws.gov> (sarah_nystrom@fws.gov); Waller, Blake E CIV NAVFAC MIDLANT, EV; Austin, Taylor S CIV NAVFAC MIDLANT, EV; Russell, Kyle B CIV NAVFAC MIDLANT, PWD Little Creek; Olexa, Thomas J CIV NAVFAC MIDLANT, PWD Yorktown

Cc: Chamberlain, Terry N CIV NAVFAC MIDLANT, PWD Oceana; Hicks, Linda CIV NAVFAC MIDLANT, PWD NSA Hampton Roads; Waligora, Sharon L CIV NAVFAC MIDLANT, PWD Little Creek; Podbesek, Jennifer A CIV NAVFAC MIDLANT, PWD Yorktown

Subject: 2016 Hampton Roads Naval Facilities and USFWS Region 5 (VA Field Office) INRMP Metrics Briefing

When: Thursday, October 13, 2016 9:30-11:00 (UTC-05:00) Eastern Time (US & Canada).

Where: Conference Call

If you wish to attend this meeting please provide me, Michael Wright, the phone number on which you wish to be called and I will conference call you into the meeting.

Sincerely,

Mike

Michael Wright

Natural Resources Manager (NASO and NSHR NWA)

DoD Partners in Flight Rep. (VA)

Office: 757-433-3461

Cell: 757-373-8531

Fax: 757-433-2719

Address:

Naval Air Station Oceana

Public Works Department

Environmental Program Division

ATTN: Natural Resources

953 Hornet Dr.

Bldg. 820, Suite 206

Virginia Beach, VA 23460-2190

ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) - WE "CARE"

Comply with the rules

Always improve

Reduce waste

Eliminate pollution

Reporting Unit Metrics Q&A Report: NAS OCEANA

Introduction

Reporting Unit Metrics Q&A Report: NAS OCEANA

Welcome to the Annual Navy Natural Resources Conservation Metrics!

This site has been designed to help guide you step-by step through a series of questions that will inform decision- makers on the status of your Natural Resources program. Data is being collected for fiscal year 2016. Questions followed by an asterisk * are mandatory and must be completed before the data call can be approved and forwarded to DoD. The [User Guide and Training Brief](#) can be found here. The FY16 DoD Environmental Data call memorandum can be found [here](#).

Note:

Please click "Save" located at the bottom of each page to add your draft answers to the database. After you save if you leave or are logged out of the system, your answers will be retained the next time you log in. Click on the buttons at the top to jump to a different section.

Getting Started...

Please add all participants and attendees that were involved in the Annual Navy Natural Resources Conservation Metrics. The drop down list includes all people currently using the CN Web system and those entered using the blue 'Add Personnel to List' button. If the person you need to add is not in the pull down list, click the blue 'Add Personnel to List' button and fill out the required fields, indicated by an asterisk.

Note: The Navy Lead is the Navy POC responsible for the completion of the Metrics for this installation/site.

Reporting Unit Metrics Q&A Report: NAS OCEANA

1. Aherron, Michael
Virginia Department of Forestry
757-510-6456
mike.aherron@dof.virginia.gov

Is this person the Navy Lead?

Yes
 No

2. Austin, Taylor
757-341-0446
taylor.s.austin@navy.mil

Is this person the Navy Lead?

Yes
 No

3. Boettcher, Ruth
Virginia Department of Game and Inland Fisheries
757-709-0766
ruth.boettcher@dgif.virginia.gov

Reporting Unit Metrics Q&A Report: NAS OCEANA

Is this person the Navy Lead?

Yes
 No

4. Carawan, Emmett
757-341-0495
emmett.carawan@navy.mil

Is this person the Navy Lead?

Yes
 No

5. Chamberlain, Terry
757-433-3437
terry.n.chamberlain@navy.mil

Is this person the Navy Lead?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

6. Engelmeyer, Todd
Virginia Department of Game and Inland Fisheries
804-829-6580
todd.engelmeyer@dgif.virginia.gov

Is this person the Navy Lead?

Yes
 No

7. Hicks, Linda
757-836-1862
linda.hicks1@navy.mil

Is this person the Navy Lead?

Yes
 No

8. Meadows, Richard
CNRMA - NASO

richard.j.meadows@navy.mil

Reporting Unit Metrics Q&A Report: NAS OCEANA

Is this person the Navy Lead?

Yes
 No

9. Nystrom, Sarah
U.S. Fish and Wildlife Service
804-824-2413
sarah_nystrom@fws.gov

Is this person the Navy Lead?

Yes
 No

10. O'Brien, David
NOAA
301-427-8325
david.o'brien@noaa.gov

Is this person the Navy Lead?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

11. Olexa, Tom
757-887-7521
thomas.olexa@navy.mil

Is this person the Navy Lead?

Yes
 No

12. Rockwell, Shawn
NAVFAC ML PWD-Oceana

shawn.rockwell@navy.mil

Is this person the Navy Lead?

Yes
 No

13. Russell, Kyle
123-456-7890
Kyle.B.Russell@navy.mil

Reporting Unit Metrics Q&A Report: NAS OCEANA

Is this person the Navy Lead?

Yes
 No

14. Turner, Chris
North Carolina Wildlife Resources Commission
252-221-9961
chris.turner@ncwildlife.org

Is this person the Navy Lead?

Yes
 No

15. Vincelette, Chad
CNRMA - NASO

chad.vincelette@navy.mil

Is this person the Navy Lead?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

16. Waligora, Sharon
757-462-5350
sharon.waligora@navy.mil

Is this person the Navy Lead?

Yes
 No

17. Waller, Blake
757-341-2109
blake.waller@navy.mil

Is this person the Navy Lead?

Yes
 No

18. Wright, Michael
757-433-3461
michael.f.wright@navy.mil

Reporting Unit Metrics Q&A Report: NAS OCEANA

Is this person the Navy Lead?

Yes
 No

INRMP Status

Navy INRMP Status Check

Objective: This purpose of this section of the Natural Resources Conservation Metrics data call is to gather required information associated with the Natural Resources program, specifically the status of Integrated Natural Resources Management Plans (INRMP). These questions have been added here to collect information that will support the Defense Environmental Program Annual Report to Congress (DEPARC) and Office of the Secretary of Defense Environmental Management Review (EMR). By combining these questions with responses to the Metric's seven (7) focus areas, Natural Resources Managers are faced with fewer annual data calls. Questions followed by an asterisk * are mandatory and must be completed before the data call can be approved and forwarded to DoD.

1. Is an INRMP necessary for this installation/site(s)? *

Yes
 No

2. Is there currently a compliant INRMP that covers this/these installation/site(s)? *

Yes
 No
 INRMP - Under Revision
 INRMP Under Development (First Version)

2.a. Enter the name of First Compliant INRMP

Integrated Natural Resources Management Plan Naval Air Station Oceana and Naval Auxiliary Landing Field Fentress

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.b. Date of First Compliant INRMP (Usually Dated 2001/2002) Format: MM/DD/YYYY

11/15/2001

2.c. What type of NEPA Documentation was done for the first compliant INRMP?

EA / FONSI

EIS / ROD

NEPA document is currently under development

2.d. When was the NEPA completed for the first compliant INRMP? Format: MM/DD/YYYY

11/16/2001

2.e Name of the most current INRMP that covers this/these installation/site(s) *

Integrated Natural Resources Management Plan Naval Air Station Oceana and Naval Auxiliary Landing Field Fentress

2.e.1 Date of the most current INRMP that covers this/these installation/site(s). Format: MM/DD/YYYY

This date records when the Regional Commander/Commanding Officer endorsed (signed) the most recent INRMP (with valid NEPA coverage) and/or completed a review for operation and effect.

*

6/9/2015

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.f. Select the species where the INRMP was used to exempt critical habitat designation under ESA Section 4(a)(3)(B)(i) on this/these site(s). Select all that apply. Leave blank if not applicable. See i-note for bug work around. Please gauge your responses for this reporting period only.

3. Has a 5-year INRMP review for operation and effect been completed for the most recent INRMP?

Comment: There were two different 5 year review time periods: USFWS reviewed 12//19/2012 and NMFS, VDGIF, & Navy last reviewed between 02/11 - 06/09/2015. USFWS will receive INRMP for 5 year O&E review post 2016 INRMP Metrics Briefing.

Yes
 No
 N/A
 In Progress

Enter the date that the 5-year INRMP review was completed. Format: MM/DD/YYYY

6/9/2015

3.a. If a 5-year INRMP review for operation and effect been completed, did the review result in an addendum/appendix, update or revision of the INRMP?

Addendum / Amendment
 Update
 Revision

3.b. What is the expected completion date of the Addendum/Amendment, Update, Revision? Format: MM/DD/YYYY

8/25/2015

Reporting Unit Metrics Q&A Report: NAS OCEANA

3.c. If a 5-year INRMP review for operation and effect has not been completed; please explain why a review for operation and effect has not been completed?

3.d. Was the Mutual DoD & USFWS Guidelines for Streamlined Review of INRMP Updates to secure FWS approval and state approval for updated INRMPs used?

Comment: They guidelines came out after the reviews were completed; however, the basic concepts refelected in the guidelines were followed.

Yes
 No

3.d.1 Did using the guidelines expedite the process?

Yes
 No

3.d.2. Why not?

IF IT HAS BEEN MORE THAN 3 YEARS SINCE A REVIEW FOR OPERATION AND EFFECT, ADMINISTRATIVE PROCESS SHOULD BE UNDERWAY IN CASE THE INRMP NEEDS TO BE UPDATED/REVISED.

Reporting Unit Metrics Q&A Report: NAS OCEANA

4. Has USFWS concurrence been received on the most recent INRMP or review for operation and effect?

- Yes
 No
 In Progress

4.a. If question 4. is "Yes" or "In Progress", which USFWS Region(s) are applicable? (Choose all that apply)

- Northeast

4.b List the Field Office, if applicable, that did or will sign concurrence documentation

- Virginia Field Office - Gloucester, VA

4.c.If question 4. is "Yes", what is the date of concurrence? Format: MM/DD/YYYY

12/19/2012

4.d. If question 4. is "No", what is the reason for the delay?

Reporting Unit Metrics Q&A Report: NAS OCEANA

4.e Was an ESA Section 7 Consultation completed with USFWS for the INRMP?

Comment: Via their Online Application (IPAC system). At time of their review there were no Federal T&E species known to breed on the installation. We will be submitting a new USFWS O&E request this year and a T&E consultation may be required as the NLEB was documented on the installation in 2015.

Yes
 No
 N/A
 In Progress

4.f. Which USFWS field office do you regularly conduct ESA Section 7 consultations with typically?

Virginia Field Office - Gloucester, VA

4.g. Did the Threatened and Endangered Species Listing and Recovery personnel participate in the INRMP review, update or revisions?

Yes
 No
 N/A

5. Has NOAA Fisheries (NMFS) concurrence been received on the most recent INRMP or review for operation and effect?

Yes
 No
 N/A

5.a. If question 5. is "Yes", which NOAA Fisheries (NMFS) Region(s) are involved? (Choose all that apply)

Greater Atlantic

Reporting Unit Metrics Q&A Report: NAS OCEANA

5.b Select the Local Office, if applicable, that did or will sign concurrence documentation.

Virginia Field Office - Gloucester Point, VA

5.c. If question 5. is "Yes", what is the date of concurrence? Format: MM/DD/YYYY

5/29/2015

5.d. If question 5. is "No", what is the reason for the delay?

5.e Was an ESA Section 7 Consultation completed with NOAA Fisheries (NMFS) for the INRMP?

Yes
 No
 N/A

5.f. Did the Threatened and Endangered Species Listing and Recovery personnel participate in the INRMP review, update or revisions?

Yes
 No
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

6. Has State fish and wildlife agency(ies) concurrence been received on the most recent INRMP or review for operation and effect?

- Yes
 No
 In Progress
 N/A

6.a. If question 6. is "Yes", which State fish and wildlife agency(ies)? (Choose all that apply)

- Virginia Department of Game and Inland Fisheries - Henrico, VA

6.a. If question 6. is "In Process", which State fish and wildlife agency(ies)? (Choose all that apply)

6.b. If question 6. is "Yes", what is the date of concurrence? Format: MM/DD/YYYY

2/26/2015

6.c. If question 6. is "No", what is the reason for the delay?

Reporting Unit Metrics Q&A Report: NAS OCEANA

7. If this/these site(s) is/are located on lands affected by tribal treaty rights or other known rights; were Federally-recognized Tribe(s) consulted with to develop or revise the Integrated Natural Resource Management Plan?

Comment: We have coordinated the INRMP with the NAVFAC MIDLANT Cultural Resources Manager. A Cultural affiliations study was awarded in 2013 for the MIDLANT installations to determine which tribes may have an affiliation interests over MIDLANT Naval Property (excluding NOSCs). The 1st Federally recognized tribe in VA is located in New Kent County, the Pamunkey. There are at least 11 tribes in VA, many of which are seeking and may receive Federal Recognition. There are 40+ tribes with interest in MIDLANT installations, many are not federally recognized, but are state recognized. Once tribes are identified with interest over this installation's property, coordination will be conducted regarding the INRMP with those tribes and will be coordinated thru the NAVFAC MIDLANT EV2 Cultural Resources program manager.

Yes
 No
 N/A

8. Are migratory birds, specifically birds of conservation concern, adequately addressed in the INRMP for this installation to support the mission and needed NEPA analyses?

Comment: In the INRMP, we: discuss Migratory Birds as they pertain to the MBTA; discuss Birds of Conservation Concern (BCC) in a more general manner; identify which known species occur on the installation; identify potential species that could occur on the installation; identify if species are on BCC or other special status lists; provide more detailed information on individual ESA/SAR species; and provide Best Management Practices to minimize and avoid potential impacts to Migratory Birds. In the INRMP we do not provide installation specific nor greater landscape population level detailed information on each of the confirmed present BCC species nor do we provide population specific information on the remaining potential to occur species of the 36 BCC with a potential to occur on the installation. The INRMP provides links to USFWS, State Wildlife, and other NGO National databases/information sources as references to obtain greater landscape level information on specific BCC species. To obtain more installation specific population level information would require additional funding for surveys, monitoring, and analysis. The installation monitors the status of species and seeks funding to conduct additional survey efforts and provides more specific data in the INRMP on ESA-Endangered, Threatened, Candidate, and Watchlist species at both Federal and State levels.

Yes
 No

9. If the INRMP was updated/revise did the INRMP require new or supplementation NEPA?

Comment: Each INRMP project undergoes environmental review to ensure compliance with updates to EV laws and regulations. No new or supplementation EAs or EISs have been completed since the 2008 revision of the INRMP. The NAVFAC MIDLANT NEPA department has determined that these projects are covered by the NEPA documentation already in existence. Discussions have been initiated regarding NEPA and newly designated federally listed species that do or have the potential to occur on the installation.

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

9.a. If so, what was the type of NEPA?

- CATEX
 EA / FONSI
 EIS / ROD

9.b. When was the NEPA completed? Format: MM/DD/YYYY

10. Has the Regional Commander / Installation Commanding Officer concurrence been received on the most recent INRMP or review for operation and effect?

- Yes
 No
 In Progress

10.a. If question 10. is "Yes", what is the date of concurrence? Format: MM/DD/YYYY

6/9/2015

10.b. If question 10. is "No", what is the reason for the delay?

Reporting Unit Metrics Q&A Report: NAS OCEANA

11. If the Regional Commander has final authority over whether this/these site(s)' INRMP is compliant has the Regional Commander concurred with/signed the most recent INRMP or review for operation and effect?

Yes
 No
 N/A

11.a. If question 11. is "Yes", what is the date of concurrence? Format: MM/DD/YYYY

11.b. If question 11. is "No", what is the reason for the delay?

12. Please select (all that apply) and upload these documents. *

New or Current INRMP
 INRMP NEPA documentation
 5-year operation & effect review letter(s)
 Signed Correspondence with Regulatory Partners
 Annual review briefs to Commanding Officer or Regional Commander
 INRMP Waiver Letter
 Final INRMP not available

12.1 Please upload the following documents where applicable: INRMP *

12||NAS Oceana INRMP 2015

Reporting Unit Metrics Q&A Report: NAS OCEANA

12.2 Please upload the following documents where applicable: INRMP NEPA documentation *

Comment: See associated appendix

12||NAS Oceana INRMP 2015

12.3 Please upload the following documents where applicable: 5-year operation & effect review letter(s) *

Comment: See front signature page and associated appendix

12||NAS Oceana INRMP 2015

12.4 Please upload the following documents where applicable: Other Signed Correspondence with Regulatory Partners *

Comment: See front signature page and associated appendix

12||NAS Oceana INRMP 2015

12.5 Please upload the following documents where applicable: Annual review briefs to Commanding Officer and/or Regional Commander *

Comment: See associated appendix

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12.6 Please upload the following documents where applicable: INRMP Waiver Letter *

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13. Please confirm if you uploaded or sent any INRMP Related document(s). *

- Uploaded to Conservation Website Document Library
 Uploaded through Army Safe Website
 Sending / Sent by US Mail
 Not Uploaded / Sent

Army SAFE – Safe Access File Exchange

<https://safe.amrdec.army.mil/SAFE/>

US Mail

Naval Facilities Engineering Command Headquarters

Attn: Tom Mayes – EV2

1322 Patterson Ave. SE, Suite 1000

Washington Navy Yard, DC

20374-5065

Goals and Objectives

Please enter all Goals and Objectives as listed in the INRMP for this/these site(s). Enter Goals in the Goals Tab and the Objectives in the Objective tab. Enter Goals first so they can be linked to recommendations.

Please enter a short or abbreviated Goal and Objective name when creating them. To create a new Goal or Objective, click on the appropriate tab button and then click the blue 'Manage Goals' and 'Manage Objectives' buttons. You will be able to add the full text of the Goal or Objective later by clicking on the row with the shore name.

Goals

Enter or review, as appropriate, the Reporting Unit's Goals as documented in the current INRMP.

1. Implement an ecosystem based natural resources program that provides for conservation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations.

Please enter the full description of the Goal:

Please describe any Key Considerations or Issues associated with this Goal.

2. Implement an adaptive management based natural resources program that provides for the identification and assessment of military mission operations and facility requirements, analysis and assessment of risks to natural resources, completion of needs assessment surveys, monitoring and preparation of the needs assessment results, updating natural resources inventories to ensure information is current, reanalysis and reassessment of risks to natural resources, and incorporation of adjustments into the overall NRP, as necessary (DoD 2013).

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Please enter the full description of the Goal:

Please describe any Key Considerations or Issues associated with this Goal.

3. Implement an ecosystem management program that maintains and improves the sustainability and native biodiversity of ecosystems, considers ecological units and timeframes, supports sustainable human activities, develops a vision of ecosystem health, develops priorities and reconciling conflicts, develops coordinated approaches to work toward ecosystem health, relies on the best science and data available, uses goals and objectives to monitor and evaluate outcomes, uses adaptive management, and implements activities through existing installation plans and programs.

Please enter the full description of the Goal:

Please describe any Key Considerations or Issues associated with this Goal.

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4. Utilize existing tools to assess the potential impacts of climate change to natural resources. Identify significant natural resources that are likely to remain on DoD lands or that may in the future occur on DoD lands due to climate change. When not in conflict with mission objectives, take steps to implement adaptive management to ensure the long-term sustainability of those resources that are anticipated to be impacted by climate change.

Please enter the full description of the Goal:

Please describe any Key Considerations or Issues associated with this Goal.

5. Interact with the surrounding community to develop positive and productive community involvement, participation, and educational opportunities. Develop partnerships with state and federal natural resources agencies, local colleges and universities, and local conservation groups.

Please enter the full description of the Goal:

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Please describe any Key Considerations or Issues associated with this Goal.

6. Maintain sufficient number of and training of professional NR management and NR law enforcement personnel.

Please enter the full description of the Goal:

Please describe any Key Considerations or Issues associated with this Goal.

Objectives

Enter or review, as appropriate, the Installation/site(s) Objectives as documented in the current INRMP. Associate Objectives with goals as appropriate.

1. Integrate management of forests, fish & wildlife, land and outdoor recreation opportunities, as practicable and consistent with the military mission and established land uses.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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2. Utilize planting techniques that encourages root growth.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

3. Reduce deer herd size.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

4. Removal of feral animals from the environment

Select the INRMP Goal that this Objective applies to.

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Enter full description of Objective.

Enter Key Considerations if applicable.

5. Silvicultural systems that produce stand structures that approach the complexity and diversity of natural forests

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

6. avoid or minimize impacts to wetlands to the greatest extent practicable, to mitigate any unavoidable impacts in accordance with state and federal regulations, and to enhance wetland habitats where feasible

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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7. reducing nutrients and toxins, protecting stream corridors, enhancing and protecting wetlands, protecting priority watersheds, identifying and controlling invasive species on priority sites, and expanding conservation landscaping on federal facilities

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

8. establishing or enhancing riparian forest buffers along unprotected waterways and enforcing the buffer zones in which building is prohibited; and enhancing and protecting wetlands on degraded sites

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

9. incorporating LID and LEED concepts that reduce the rate of runoff, filter out pollutants, and facilitate the infiltration of water into the ground. Features such as filter strips, rain gardens, dry wells, bayscapes, and water quality treatment wetlands should be incorporated into all new development plans, and existing development should be assessed to determine if retrofitting is feasible

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

10. maintain and enhance landscaped areas and urban forests, while minimizing the use of energy, water, chemical herbicides, and fertilizers

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

11. minimize BASH potential around Installation airfields

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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12. conserve and promote conservation of game and nongame fish, wildlife and their habitats; particularly habitats of state or federally listed rare, threatened, or endangered fish or wildlife species

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

13. maintain and enhance habitat for resident and migratory bird species in areas that do not conflict with the BASH Program

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

14. balance wildlife population levels with habitat-carrying capacity

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

15. provide recreational opportunities for the military community and personnel

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

16. maintaining a diversity of ecological communities and enhancing habitat value where practicable

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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17. support the conservation of migratory birds through habitat conservation and enhancement, and to avoid the incidental take of migratory birds through military readiness actions in accordance with the MBTA to the greatest extent practicable

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

18. reduce the attractiveness to birds and wildlife by minimizing food sources, nesting sites, androosting habitat within the airfield operations area

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

19. protect all known and potentially occurring federally listed species in compliance with the federal ESA, and to give special consideration to state-listed species and other rare species

Select the INRMP Goal that this Objective applies to.

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Enter full description of Objective.

Enter Key Considerations if applicable.

20. maintain the health and integrity of a diversity of healthy and productive natural forested ecosystems that support a full complement of native wildlife species

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter Key Considerations if applicable.

21. provide for sustained multipurpose uses to the extent consistent with the mission and ecosystem management

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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22. protect unique and sensitive natural areas and habitats

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

23. protect soil and water resources

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

24. foster understanding and awareness of the environment through educational conservation programs

Select the INRMP Goal that this Objective applies to.

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Enter full description of Objective.

Enter Key Considerations if applicable.

25. Review plans and proposed actions to ensure consistency with the Virginia CZM Program and help obtain a federal CCD as required by the CZMA

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

26. Continue to maintain partnerships with DoD SERDP and the South Atlantic LCC to identify potential climate change impacts to the Installation and adaptive management techniques that can be implemented to ensure the long-term stability of Installation natural resources

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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27. Continue to implement management measures that support watershed protection in accordance with the Chesapeake Bay agreements and goals of the Chesapeake Bay Program, and initiatives that establish or enhance riparian forest buffers along unprotected waterways

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

28. Coordinate with appropriate Installation and NAVFAC departments to identify additional areas to enhance or establish riparian buffers. Establish reduced mowing and no mowing zones along selected ditches and wetlands, and plant appropriate native trees and shrubs where practicable

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

29. Review plans for projects that have the potential to impact wetlands and/or water quality against Installation wetland delineation and water resources maps, and assist the proponent of an action in applying for, reviewing, and obtaining all required federal, state, interstate, and local certifications and permits required by point and nonpoint pollution control, groundwater protection, dredge and fill operations, stormwater management programs and wetlands protection permits for any actions that may impact water quality or wetlands

Select the INRMP Goal that this Objective applies to.

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Enter full description of Objective.

Enter Key Considerations if applicable.

30. Update Installation wetland delineations every five years

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

31. Review erosion and sediment control plans and SWP3 for construction projects and actions that disturb 10,000 ft² (929 m²) or one or more ac (0.4 or more ha), respectively

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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32. Conduct frequent site visits during construction to ensure compliance with sediment erosion and control plans and to ensure BMPs are being implemented

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

33. Implement LID and LEED practices and other sustainable development into planned projects to the extent practicable

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

34. Assist ERP RPM to identify potential impacts to natural resources caused by the release of contaminants, participate in the ERP decision-making process as appropriate, attend Restoration Advisory Board meetings, review and comment on ERP documents, and ensure response actions are undertaken in a manner that minimizes impacts to natural resources on the Installation

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

35. Manage oil and hazardous substances to protect water quality and other natural resources

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

36. Development and implement plans for removal of cattails and control of grass carp within wetland mitigation areas of the Installation where these species are impacting postrestoration success

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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37. Review all plans where tree removal is proposed to ensure compliance with this INRMP and associated instructions. Develop recommendations for tree protection measures or mitigation for lost trees, or assist with the selection of alternate sites

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

38. Review new and revised landscaping plans and contracts (including plant species lists) to ensure conformance with EO 13148, EO 13112, and Navy policy on beneficial landscaping. Promote the use of beneficial landscaping practices and the importance of using native species

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

39. Assist with hazardous tree recognition and removal

Select the INRMP Goal that this Objective applies to.

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Enter full description of Objective.

Enter Key Considerations if applicable.

40. Participate in National Arbor Day Foundation's Tree City USA program. Submit a recertification application, forest work plan, and proclamation in support of Arbor Day to the VDOF by 31 December each year

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

41. Coordinate an annual, joint Arbor Day–Earth Day celebration event. Utilize opportunities such as Earth Day and Arbor Day to plant additional native species at Installation sites identified by the NR personnel

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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42. Review all development plans and actions where tree removal and pruning is proposed and provide recommendations for tree protection, mitigation for lost trees, or selection of alternate sites.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

43. Continue to coordinate with VDOF to provide pruning and tree care instruction for the FEAD, Disaster Preparation Team, and others concerned with tree care. Offer training sessions on an as-needed basis.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

44. Continue to coordinate with MWR personnel on natural resources issues such as tree care and reducing nonpoint pollution at recreational facilities on an as needed-basis.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

45. Conduct a habitat assessment and species inventory of the nearshore environment at NASO.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

46. Manage SIAs and other habitats to support pollinators, and rare, threatened, and endangered plant and animal species known or with the potential to occur at the Installation.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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47. Manage airfield clear zones, and adjacent habitats, and agricultural outlease lands to minimize BASH risk.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

48. Arrange a consultation with the VDCR-DNH if changes in land use or management practices are proposed for any of the Installation SIAs to obtain recommendations for minimizing impacts to these resources.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

49. Assist with the removal of invasive plants and/or noxious weeds in identified infestation areas.

Select the INRMP Goal that this Objective applies to.

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Enter full description of Objective.

Enter Key Considerations if applicable.

50. Conduct a targeted field assessment to identify and treat all invasive species that currently occur at the SIAs, especially in locations where rare plants species have been observed to protect the continued existence of these plants.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

51. Oversee agricultural ditch maintenance practices to ensure adequate vegetative cover and 3-ft (1-m) buffers are maintained.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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52. Coordinate with NAVFAC Mid-Atlantic environmental staff on enforcement of conservation measures on agricultural outlease parcels, and provide oversight of agricultural outlease agreements.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

53. Complete ongoing forest inventories

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

54. Assist Cultural Resources Manager in resource protection management of cultural resources.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

55. Complete the Environmental Checklist (see Appendix A), as needed, for those natural resources management actions that may affect a regulated resource, or other Navy managed environmental resource. Conduct associated consultations and required mitigations, and acquire associated permits in coordination with the appropriate Navy environmental media manager.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

56. Conserve and promote conservation of game and nongame fish, wildlife and their habitats; particularly habitats of state or federally listed rare, threatened, or endangered fish or wildlife species known to occur at the Installation.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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57. Continue to implement natural resources management strategies and recommendations that also satisfy the goals and objectives of the Virginia SWAP in conserving the state's natural resources.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

58. Coordinate with the USFWS, NOAA NMFS, and/or VDGIF as required, when actions have the potential to affect federal or state listed fish and wildlife species.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

59. Maintain and enhance habitat for resident and migratory bird species and other wildlife in areas that do not conflict with the BASH Program.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

60. NR staff will coordinate with and obtain required permits from the appropriate state and federal agencies for any Installation activities that have the potential to impact terrestrial and marine resources.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

61. NR personnel will continue to maintain a database of all marine animal sightings and strandings (dead or live) that occur on NASO.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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62. NR personnel will receive training in the identification of marine mammals and sea turtles, and be available to assist other personnel in identification of these species when needed.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

63. Conduct period surveys to document changes in fish and wildlife species occurrences at the Installation, and to include surveys for newly listed (state and federal ESAs) species.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

64. Develop an inventory and monitoring program for any federally listed fish or wildlife species that are observed at the Installation.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

65. Implement protective measures for rare, threatened, and endangered wildlife species known to occur at the Installation, in consideration of military mission and BASH Program requirements.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter Key Considerations if applicable.

66. Implement protective measures for rare, threatened, and endangered migratory bird species that are identified at the Installation, including maintaining at least a ¼-mi (0.4-km) buffer around nesting sites, establishing fenced or posted wildlife protection areas, keeping pets leashed and cats indoors, controlling predators, managing native vegetation and controlling invasive vegetation at nest sites, providing artificial nest sites, implementing mowing restrictions for protection of ground-nesting species, and establishing and maintaining an emergency response plan for oil and chemical spills.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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67. Conduct annual inspections and maintenance of bird and bat nest boxes during the fall.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

68. Monitor nesting/roosting activity at bird and bat boxes throughout the nesting/roosting season.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

69. Implement management techniques established in the Installation BASH Program Plan (Appendix K) including CZ management and ensuring compatible land use in the vicinity of airfields on the Installation.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

70. Continue to work with Navy staff and USDA APHIS WS biologists to reduce the BASH potential around Installation airfields, and to conduct control and surveys for birds and white-tail deer in support of the BASH Program as needed.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter Key Considerations if applicable.

71. Continue to maintain USFWS migratory bird depredation and eagle take permits, and VDGIF kill permits for control of birds and mammals in support of the BASH Program.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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72. Implement mowing restrictions along forest edge habitat for protection of timber (canebrake) rattlesnake Coastal Plain population as recommended by VDGIF, and provide training to all mowing contractors for identification of this species. Observations of timber (canebrake) rattlesnake should be reported to the NRM.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

73. Develop and distribute an information sheet on conservation measures for protection of timber (canebrake) rattlesnake to all mowing contractors working at the Installation.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

74. Implement controlled burns to reduce fuel loads and enhance wildlife habitat in accordance with the Installation Prescribed Burn and Smoke Management Plan and the Installation BASH Program.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

75. Update the Prescribed Burn and Smoke Management Plan (2010) annually to reflect accomplishments and set new goals.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter Key Considerations if applicable.

76. Arrange a consultation with the VDCR-DNH if changes in land use or management practices are proposed for any of the Installation SIAs to obtain recommendations for minimizing impacts to these resources and the rare, threatened, and endangered species associated with these areas.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

Reporting Unit Metrics Q&A Report: NAS OCEANA

77. Conduct a habitat assessment and species inventory of the nearshore environment at NASO.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

78. Balance wildlife population levels with habitat-carrying capacity, including cooperating with VDGIF to set annual hunting seasons and bag limits at the Installation.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

79. Continue to collect, summarize, and report deer harvest data annually to VDGIF to help assess deer population levels and herd condition.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

80. Assist with the removal of nuisance and invasive wildlife as needed.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter Key Considerations if applicable.

81. Implement management strategies developed upon results of the nutria and coyote surveys and the nuisance wildlife management plan that is currently being prepared for the Installation.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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82. Continue to provide recreational opportunities for the military community and NASO and NALFF personnel through implementation of the fishing and hunting programs, and other outdoor recreational activities.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

83. Have appropriate NR staff attend annual CLE refresher courses.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

84. Review all plans where tree removal is proposed to ensure compliance with this INRMP and associated instructions. Develop recommendations for tree protection measures or mitigation for lost trees, or assist with the selection of alternate sites.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

85. Review new and revised landscaping plans and contracts (including plant species lists) to ensure conformance with EO 13148, EO 13112, and Navy policy on beneficial landscaping.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter Key Considerations if applicable.

86. Promote the use of beneficial landscaping practices and the importance of using native species.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

Reporting Unit Metrics Q&A Report: NAS OCEANA

87. Assist with hazardous tree recognition and removal.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

88. Conduct fire effects monitoring subsequent to each prescribed burn to assess whether objectives are being met.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

89. Maintain firebreaks and fire lines for each burn unit as needed.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

90. Coordinate timber harvesting or salvage operations with the NAVFAC Regional Forester as required.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter Key Considerations if applicable.

91. Coordinate with the NAVFAC Regional Forester to assess impacts of any proposed MILCON projects on forest and, where practicable, arrange timber sales.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

Reporting Unit Metrics Q&A Report: NAS OCEANA

92. Monitor forest stands to control southern pine beetle and other insect and disease outbreaks.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

93. Continue to provide outdoor recreation opportunities for Installation personnel and their authorized guests to the maximum extent possible within the constraints of the military mission and capability of available natural resources.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

94. Continue to foster understanding and awareness of the environment through educational conservation programs and distribution of environmental education pamphlets and brochures, and posting notices and information on Navy websites and social media, including notices about relevant notices of disease outbreaks that may affect NASO and NALFF personnel and guests, and promotion of preventative measures to limit their spread and transmission.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

95. Assess the potential for providing adaptive equipment for disabled military personnel authorized to participate in hunting and fishing activities at the Installation.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter Key Considerations if applicable.

96. Evaluate the potential to develop a recreational fishery at Dump Pond, within the concrete disposal site north of Southern Boulevard.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

Reporting Unit Metrics Q&A Report: NAS OCEANA

97. Participate in DoD Fish and Wildlife Law Enforcement training and Federal Phase 1 Law Enforcement training.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

98. Routinely patrol fishing and hunting areas of the Installation to ensure people recreating are complying with natural resources regulations and policies.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

99. Continue to pursue partnerships with local, state, and federal agencies and NGOs to offer recreational and research use of the Installation as appropriate.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

100. enforcement of natural resources laws and regulations

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter Key Considerations if applicable.

101. no net loss in the capability of military lands to support the military mission of the Installation. Conserve the environment for the purpose of the military mission (no net loss in the capability of military installation lands to support the military mission of the installation).

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

Reporting Unit Metrics Q&A Report: NAS OCEANA

102. limit or stabilize the population of deer on the installation

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

103. support the conservation of migratory birds through a number of measures including conservation objectives identified by PIF for the Mid-Atlantic Coastal Plain region

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

104. identifying and maintaining significant blocks of mixed upland forest, and considering the value of hardwood-dominated forests in management decisions;

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

105. preventing loss of forested wetlands

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter Key Considerations if applicable.

106. avoiding conversion of mixed forests or hardwood-dominated forests to pine monocultures

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

Reporting Unit Metrics Q&A Report: NAS OCEANA

107. sing open spacing for plantings and conducting multiple thinnings in pine plantations to delay canopy closure and to promote growth of understory vegetation

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

108. shifting management of early successional habitats greater than 20 ac (8 ha) in size to grassland habitat, and converting smaller early successional parcels to shrubland

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

109. monitoring and controlling infestations of invasive species within freshwater, estuarine, and wetland habitats

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter full description of Objective.

Enter Key Considerations if applicable.

110. identifying sensitive habitats in oil spill response plans

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter Key Considerations if applicable.

1 - Ecosystem Integrity

Focus Area Score **0.88**

Per DoD Instruction 4715 and OPNAV Manual 5090 the goal of ecosystem management is to ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Ecosystems are functioning units of nature consisting of complex networks of relationships between land, water, and living resources and are subjected to various stressors ranging from human impacts to climate change, and as such, need to be managed in a way that allows for mitigation, adaptation, and long-term sustainability on a regional basis. The intent of this module is to define the ecosystems that occur on the installation/sites. The information will assess the integrity of these ecosystems and inform the annual Navy Natural Resource Conservation Metrics and reporting requirements.

Ecosystem classifications have been preloaded under the Ecosystem Integrity button. The list of ecosystems is comprised of (1) terrestrial ecosystems identified in Nature Serve's, "[Ecological Systems of the United States: A Working Classification of US Terrestrial Systems](#)" and (2) marine ecosystems identified in [NOAA's Coastal and Marine Ecological Classification Standard](#). For additional information on these classification schemes, go directly to the Nature Serve's [ecosystem online reference](#) or [view a list](#) of terrestrial ecosystems by Land Cover Classes, Biogeographic Divisions, and Ecological Systems. Additionally, go directly to the [CMECS Catalogue of Units](#), view their [Standard](#) or [view a list](#) of marine ecosystems, which only includes the Benthic Biotic, Surface Geology, and Water Column components of the classification scheme. Locally-defined ecosystems may be added to capture specific INRMP details and program management.

All questions followed by an asterisk * are mandatory and must be completed before the datacall can be approved and forwarded to DoD.

To start populating ecosystem information, click the gray 'Ecosystem' button on the upper right side of the screen.

Ecosystems

Focus Area Score **0.76**

Please validate (add/delete) the list of ecosystems below, add as necessary if none are listed, and ensure that they are correct. To **ADD** an ecosystem to the site/installation click the [blue](#) 'Select EcoSystems' button in the upper left. If you need an ecosystem that is not listed contact Tom Mayes (tom.mayes@navy.mil) or Tammy Conkle (Tamara.Conkle@navy.mil). Click on an Ecosystem row to view or update answers about each Ecosystem.

1. Agricultural Land

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
 Ecosystem fragmentation is the result of four (4) of the phenomena
 Ecosystem fragmentation is the result of three (3) of the phenomena
 Ecosystem fragmentation is the result of two (2) of the phenomena
 Ecosystem fragmentation is the result of one (1) of the phenomena
 No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
 Severely Vulnerable to Stress
 Highly Vulnerable to Stress
 Moderately Vulnerable to Stress
 Slightly Vulnerable to Stress
 Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
 Minimally effective management
 Moderately effective management
 Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
 Condition is similar both on and off the site(s)
 Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

1402.85

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

2. Altered Vegetation and Conifer Plantation

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

432.8

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

3. Atlantic Coastal Plain Embayed Region Tidal Salt & Brackish Marsh

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

9.86

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

4. Atlantic Coastal Plain Small Brownwater River Floodplain Forest

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

426.8

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

5. Estuarine Shallow Water

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

70.73

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

6. Forest

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

123.36

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

7. Freshwater Ponds and Lakes

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

46.24

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

8. Northern Atlantic Coastal Plain Basin Swamp & Wet Hardwood Forest

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

25.69

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

9. Northern Atlantic Coastal Plain Stream & River

1.1. Has the ecosystem been identified in the INRMP? *

Yes

No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved

Somewhat Achieved

Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions

Actions have had a limited effect on conditions

Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

54.88

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

10. Scrubland

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

426.13

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

11. South-Central Interior Small Stream & Riparian

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

1.57

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

12. Southern Atlantic Coastal Plain Depression Pondshore

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

1.12

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

13. Southern Atlantic Coastal Plain Mesic Hardwood Forest

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

59.18

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

14. Southern Atlantic Coastal Plain Nonriverine Swamp & Wet Hardwood Forest

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

1688.66

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

15. Urban, High Density

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

1485.75

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

16. Herbaceous

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

2044.98

Reporting Unit Metrics Q&A Report: NAS OCEANA

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

0

Encroachment

Focus Area Score **1.00**

An Encroachment Action Plan (EAP) is the primary tool and process which results in the identification, quantification, mitigation, and prevention of the potential encroachment challenges to an installation or a range. NAVFAC provides planning, environmental, legal, real estate support, and program management oversight for the Commander, Navy Installations Command (CNIC) Encroachment Management program. Per OPNAVINST 11010.40, Navy natural resources managers shall coordinate with mission component commands, COs of Navy installations, range COs, range complex coordinators, enhanced readiness teams, community plans and liaison officers and others with roles and responsibilities for encroachment identification, quantification, mitigation, and prevention.

1.10. Are conservation easements, or buffers, in place to provide an ecosystem integrity benefit on the site(s)? *

Comment: We do have established wetland and stream buffers on base. There are easement and buffers that could be pursued that would benefit the ecosystem integrity requirement of the INRMP; however no EAP easements were added in FY2016. There are existing easements and buffers that already do this, but they are not considered conservation easements/buffers they are AICUZ. We are actively participating in encroachment and easement discussions and looking into how we can add a conservation component.

No = opportunity exists, but easements/buffers have not been pursued

Yes

N/A = no opportunity, development is immediately adjacent to installation

1.11. How many miles of shoreline habitat are conserved, enhanced or restored this fiscal year? (miles)

0

1.12. How many acres of aquatic habitat are conserved, enhanced or restored this fiscal year? (acres)

0

Reporting Unit Metrics Q&A Report: NAS OCEANA

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

1. Findings

In a review of the FY15 final report that either some NASO DNA INRMP ecosystems mistakenly got reported with the NASO/NALFF INRMP ecosystems or some ecosystems identified during a desktop analysis in preparation for the final vegetation community analysis mistakenly was entered into the Metrics . The FY16 Metrics were updated to reflect the FY15 received Final Vegetation Classification applicable ecosystems.

Several Ecosystems will be altered in upcoming years to support mission requirements to reduce frequency interference due to vegetation height obstructions. An updated Prescribed and Wildland Fire Management Plan is being developed in support of enhancing Ecosystem integrity, supporting military mission & safety requirements, and supporting species of concern conservation. INRMP does not specifically discuss each of these ecosystems, INRMP just supplies a map identifying these ecosystems. INRMP does not identify stressors and threats to these ecosystems.

1. Recommendations

Continue efforts to document and enhance ecosystem integrity, ensuring to document ecosystem conversions that occur due to military mission requirements. Obtain new/updated Vegetation Community Layers after conversion requirements have been implemented. Prior to implementation of Ecosystem conversion and Prescribed/Wildland Fire Management Plan Implementation ensure coordination has been completed with USFWS, State Wildlife Agencies, and USACE. INRMP needs to be updated to discuss each of these ecosystems. INRMP needs to identify stressors and threats to these ecosystems. INRMP needs to identify health indicators for these ecosystems (in FY14, USFWS recommended utilizing Dead or Stressed Trees as an indicator of Wetland Forest Health). INRMP needs to identify the level of importance of each ecosystem within the Ecoregion (need to clearly define, is this watershed, or other scale designation) and how the installation's portion of this community/ecosystem contributes to the overall community (is this a noncontiguous/isolated parcel less than 10% of the total community type in the ecoregion; is this the only known occurrence of this community type in the ecoregion; etc.). Utilize the most current Vegetation Community/Ecosystem layers for the installation to target species specific surveying efforts.

2 - Listed Species Critical Habitat

Focus Area Score **0.82**

Listed Species & Critical Habitat

Focus Area Purpose: Evaluates the extent to which federally listed species have been identified and the INRMP provides conservation benefits to these species and their habitats.

Supplemental Information: The intent of this Focus Area is to identify the federally listed species that occur on a Navy installation, as well as assess if an INRMP provides the conservation benefits necessary to preclude designation of critical habitat for a particular species. In addition, information is collected about Proposed and Candidate Species and also about State, Local and other Species of interest. The USFWS has defined criteria to determine if an INRMP provides adequate special management or protection. These criteria must be detailed in the INRMP to demonstrate that designation of critical habitat is not necessary and that the installation is implementing the necessary measures to protect and conserve the habitat. The list of available species is derived from USFWS and NMFS data sources tracking the status of species worldwide plus those entered by navy users. Species are automatically placed into the correct table based upon species population code and its status. If a species status changes over the year users will not need to manually move the species from one type of table to the other, i.e. Threatened and Endangered, Proposed and Candidate, and State, Local, and other.

Instructions: Please create and or review the site(s) list of species for each of the three groups of species statuses and ensure that they are correct. To **ADD** a species to the site select a species status tab button, click the blue 'Select Species button', type the filters you wish to filter on and click the blue 'Filter Results' button for the filtered species list. Clicking the blue Common Name of a species will take you to ECOS's web site for the selected species. Clicking the row of the species population applicable to the site(s) and pressing the blue 'Save Selected Species' button will add the species to the site(s) list of species. Note you do not need to be in any specific species status tab, the system will automatically place the species correctly. Also from the blue 'Select Species' button on each of the three specific species status tabs you can view more about the species, delete it from the site(s) and also manage which sites the species resides using the blue 'Manage' button.

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Select the name of the preloaded species to answer the questions for the current reporting period. To propose adding a species that is not in the database list or to propose a change or delete a species from the list click the main menu 'Species' then the submenu 'Search / Update'; from there you can propose all the above.

Please answer the questions for each of the species selected from the preloaded list for each of the three species status tab buttons. Questions are tailored to the species status. Last, please answer the questions in the 'Unoccupied Critical Habitat' tab button.

Questions followed by an asterisk * are mandatory and must be completed before the datacall can be approved and forwarded to DoD.

Federal Status Codes

(E) Endangered. A species in danger of extinction throughout all or a significant portion of its range.

(T) Threatened. A species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

(C) Candidate. A species under consideration for official listing for which there is sufficient information to support listing.

SAE, E(S/A) Endangered due to similarity of appearance. A species that is endangered due to similarity of appearance with another listed species and is listed for its protection. Species listed as E(S/A) are not biologically endangered or threatened and are not subject to Section 7 consultation.

SAT, T(S/A) = threatened due to similarity of appearance. A species that is threatened due to similarity of appearance with another listed species and is listed for its protection. Species listed as T(S/A) are not biologically endangered or threatened and are not subject to Section 7 consultation.

(EXPE, XE) Experimental essential population. A species listed as experimental and essential.

(EXPN, XN) Experimental non-essential population. A species listed as experimental and non-essential. Experimental, nonessential populations of endangered species (e.g., red wolf) are treated as threatened species on public land, for consultation purposes, and as species proposed for listing on

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private land.

(PE) Proposed endangered. Species proposed for official listing as endangered.

(PT) Proposed threatened. Species proposed for official listing as threatened.

(PEXPE, PXE) Proposed experimental population, essential. Species proposed for official listing as experimental and essential.

(PEXPN, PXN) Proposed experimental population, non-essential. Species proposed for official listing as experimental and non-essential.

PSAE, PE (S/A) Proposed endangered, due to similarity of appearance. Species proposed for official listing as endangered due to similarity of appearance with another listed species.

PSAT, PT (S/A) Proposed threatened, due to similarity of appearance. Species proposed for official listing as threatened due to similarity of appearance with another listed species.

(EE) Emergency Endangered - A temporary (240) day listing for emergency purposes when species is at significant, immediate risk.

(SC) Species of Concern - Species that have not been petitioned or been given E, T, or C status but have been identified as important to monitor.

(RT) Resolved Taxon - Species that have been petitioned for listing and for which a Not Warranted 12 month finding or Not Substantial 90-day finding has been published in the Federal Register. Also includes species that have been removed from the candidate list.

(UR) Under Review - Species that have been petitioned for listing and for which a 90 day finding has not been published or for which a 90 day substantial has been published but a 12 Month finding have not yet been published in the Federal Register. Also includes species that are being reviewed through the candidate process, but the CNOR has not yet been signed.

(NL) Not Listed.

State Codes

(SE) State listed as Endangered – Species is in imminent danger of extinction within the state.

(ST) State listed as Threatened - State population listed as Threatened

(StC) State Candidate – Candidate species for listing at the state level

(SCD) State Candidate (Delisting) - Candidate species for de-listing at the state level

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(SSC) State Species of Special Concern - Species identified by any state that have not been petitioned or been given E, T, or C status but have been identified as important to monitor.

Other Codes

(TER-E) Territory listed as Endangered – Species is in imminent danger of extinction within the territory.

(TER-T) Territory listed as Threatened – Species population is listed as threatened within the territory.

(TER-C) Territory Candidate – Species population is listed as a Candidate species for listing within the territory.

(TER-D) Territory Candidate (Delisting) – Species population is listed as a candidate species for De-listing within the territory.

(TER-SC) Territory Species of Special Concern – Species identified by any territory that have not been petitioned or been given E, T, or C status but have been identified as important to monitor.

[\(BCC\) Birds of Conservation Concern](#)

[IUCN Red List](#)

Threatened and Endangered Species

Focus Area Score **0.63**

Please validate (add/delete) the list of species below, add as necessary if none are listed, and ensure that they are correct. To **ADD** a species to the site/installation, select a species tab button, then click the [blue](#) 'Select Species' button in the upper left. Click on a species row to view or update answers about each species.

1. Northern Long-Eared Bat :: *Myotis septentrionalis*

2.1. Have surveys been completed for this species on the site(s)? *

- Yes
- No
- Extirpated
- Not Warranted

2.1.a. What is date when surveys were completed? Format: (MM/DD/YYYY)

5/26/2016

2.1.b. Why are surveys not required for this species?

- Only transits nearshore waters
- Only transits migratory flyway
- Occasional sighting during migration
- Occasional sighting based on seasonal conditions
- Other

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2.2. Do existing surveys provide adequate data on habitat conditions on the site(s)? *

- Yes
 No
 Not Warranted

2.3. Do existing surveys provide adequate data on population presence and numbers on the site(s)? *

- Yes
 No
 Not Warranted

2.4. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species? *

- None
 Minimal
 Moderate
 Good
 Excellent
 N/A

PLEASE GAUGE YOUR RESPONSES FOR THIS REPORTING PERIOD ONLY.

2.5. Has critical habitat been proposed for the species during the reporting period on the site(s) (per Federal Register [FR] Final Rule)? *

- Yes
 No
 N/A (Critical habitat designation was not proposed)
 CH determination currently under review

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2.5.a. Did the Navy respond?

Yes
 No

2.5.b. Please upload response to document library.

2.6. Has the critical habitat been designated for this species during the reporting period on the site(s)? *

Yes
 No
 N/A (Critical habitat has not been designated)

2.6.a. If critical habitat was proposed for this species but has not been designated during the reporting period on the site(s), under which provision of the ESA (Sec. 4) was exemption/exclusion granted? *

National Security (Exclusion) (4(b)(2))
 INRMP (Exemption) (4(a)(3)(B))
 N/A (Critical habitat designation was not proposed)

2.6.b. Why not? *

National Security (Exclusion)
 INRMP (Exemption)
 N/A (Critical habitat designation was not proposed)

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2.6.c. Date critical habitat was designated? Format: (MM/DD/YYYY)

2.6.d. Effective date of critical habitat? Format: (MM/DD/YYYY)

2.6.e. Acreage of critical habitat designated?

2.7. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the INRMP? *

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No
<input checked="" type="checkbox"/>	N/A

2.8. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the EPRWeb? *

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No
<input checked="" type="checkbox"/>	N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.9. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Comment: No Tree Removal in the months of June & July. This is already part of the INRMP.

Yes
 No

2.10. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices. *

Comment: Species has been confirmed on NALFF. We are consulting with Contractors that completed the acoustic survey efforts regarding if the species was confirmed present at NASO or if it just had an increased potential to occur. The species was confirmed west of NASO at NALFF (mist net) and east of NASO at NASO DNA (acoustic).

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

Proposed and Candidate Species

Please validate (add/delete) the list of species below, add as necessary if none are listed, and ensure that they are correct. To **ADD** a species to the site/installation, select a species tab button, then click the [blue](#) 'Select Species' button in the upper left. Click on a species row to view or update answers about each species.

State, Local, and other Species

Please validate (add/delete) the list of species below, add as necessary if none are listed, and ensure that they are correct. To **ADD** a species to the site/installation, select a species tab button, then click the [blue](#) 'Select Species' button in the upper left. Click on a species row to view or update answers about each species.

1. Atlanticbluet :: *Enallagma doubledayi*

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2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

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2.19. Estimate this installation's total management responsibility for the population of this species.

0

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

2. Bald eagle :: *Haliaeetus leucocephalus*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

1

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

3. Baldwin's spikerush :: *Eleocharis baldwinii*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

4. Beach, Virginian pinweed :: *Lechea maritima virginica*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

5. Black-crowned Night-Heron :: *Nycticorax nycticorax*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

1

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

6. Comet Darner :: *Anax longipes*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

7. Dismal Swamp (=southern bog) lemming :: *Synaptomys cooperi helaletes*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

8. Dismal Swamp southeastern shrew :: *Sorex longirostris fisheri*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

A 2014 Natural Heritage
Inventory did not reconfirm presence; however, presence had been previously confirmed.

9. Furtive Forktail :: *Ischnura prognata*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

10. Great blue heron :: Ardea herodias

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

11. Least, Virginia trillium :: Trillium pusillum virginianum

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

Highly Suitable Habitat Identified in 2014.

12. Little brown bat :: *Myotis lucifugus*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

13. Loblolly/Beach Heather :: *Hudsonia tomentosa*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

14. Long Beach seedbox :: *Ludwigia brevipes*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

15. Longleaf pine :: *Pinus palustris*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

Moderate Concern as trees may one day intersect with the Airfield Obstruction zone and may need to be cut or require additional consultations if listed.

16. Monarch butterfly :: *Danaus plexippus plexippus*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

17. Mud plantain :: *Alisma subcordatum*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

18. Non-riverine Wet Hardwood Forest Community :: Non-riverine Wet Hardwood Forest Community

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

A Portion of this community is located within the Airfield Obstruction Management Plan's vegetation control area.

19. Rafinesque's big-eared bat :: *Plecotus rafinesquii*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

20. Silky camellia :: *Stewartia malacodendron*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

21. Southeastern Cane Borer Moth :: *Papaipema* sp. 3

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

22. Southeastern myotis :: *Myotis austroriparius*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

23. spoonleaf sundew :: *Drosera intermedia*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

24. Spotted sandpiper :: *Actitis macularius*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

Migrant. Not confirmed to nest on site.

25. Timber rattlesnake :: *Crotalus horridus*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

Hunting Program prohibits take of squirrels to minimize impacts to Canebrake rattlesnakes. Confirmed at NALFF, not at NASO.

26. tri-colored bat :: *Perimyotis subflavus*

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

27. Viviparous spikerush :: Eleocharis vivipara

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
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- SAE, E(S/A) Endangered due to similarity of appearance
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- (EXPE, XE) Experimental essential population
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- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

28. Yaupon :: Ilex vomitoria

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
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- (EXPE, XE) Experimental essential population
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- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No
 N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

High
 Medium
 Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2.27. Provide any other comments below:

Unoccupied Critical Habitat

Focus Area Score **1.00**

2.28. Has unoccupied critical habitat for any federally listed species been designated on the site(s)? *

- Yes
- No
- N/A (Critical habitat designation was not proposed)

2.28.a. For which species?

2.29. Have management projects/actions addressing unoccupied critical habitat been clearly identified in the INRMP? *

- Yes
- No
- N/A

2.30. Have management projects/actions addressing unoccupied critical habitat been clearly identified in the EPRWeb? *

- Yes
- No
- N/A

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Reporting Unit Metrics Q&A Report: NAS OCEANA

2. Findings

INRMP information regarding the above referenced species is dated. Other Federally listed species (e.g. sea turtles, manatee, sturgeon, etc.) are known to occur in the nearshore environment of NASO; however, they have not been documented to occur on installation property (the Navy conducts after storm event surveys to see if any of these species have stranded on Navy property). Upland Sandpiper was identified via a BASH Strike Report associated with NASO. It is unclear if the bird actually occurred on the installation or was struck within the airspace adjacent to the installation. The species is not known to nest on site and is a potential for migratory occurrence.

2. Recommendations

Update INRMP with better goals, objectives and conservation criteria. Many of the goals, objectives, and conservation criteria are currently located in reference documents within the INRMP appendices. These should be clearly implemented into the INRMP.

3 - Recreation Use and Access

Focus Area Score **0.88**

Focus Area Purpose: Evaluate the availability and adequacy of public recreational use opportunities, such as fishing and hunting, and access for handicapped and disabled persons, given security and safety requirements for the installation.

Comment on this Focus Area and associated Questions: Select this link below each question if you would like to elaborate on the answer provided. This is also a good way to document the assumptions made by all partners that contributed to the answer.

3. Are there Natural Resources related recreational opportunities on the reporting unit?

- Yes
- No: Landscape doesn't support recreational opportunities
- N/A: Not available due to mission, security, safety, or environmental constraints

3.1. Does the INRMP adequately identify outdoor recreational activities? *

- Not Adequately Addressed
- Minimally Addressed
- Moderately Addressed
- Completely Addressed

3.1.a. Please indicate the type(s) of outdoor recreation activities addressed in the INRMP and offered on the installation.

- Hunting
- Fishing
- Trapping
- Hiking
- Archery
- Wildlife watching
- Fresh watersports
- Marine watersports
- Day use-picnic
- Camping

Reporting Unit Metrics Q&A Report: NAS OCEANA

3.1.b. Where mission, security, safety, and environmental constraints allow, the INRMP indicates use and access areas on the installation. *

Yes
 No
 N/A

3.2. If recreational opportunities are available, are they offered to the public? *

Yes
 No
 N/A (recreational opportunities are not available due to landscape or security constraints)

3.3. If recreational opportunities are available, are they offered to military or DoD civilian personnel? *

Yes
 No
 N/A (recreational opportunities are not available due to landscape or security constraints)

3.4. If recreational opportunities are available, are they accessible by disabled veterans/Americans? *

Yes
 No
 N/A (recreational opportunities are not available due to landscape or security constraints)

3.5. Are fees collected for outdoor recreational opportunities? *

Yes
 No
 N/A (recreational opportunities do not include hunting and fishing, and/or the collection of fees)

Reporting Unit Metrics Q&A Report: NAS OCEANA

3.5.a. How much was collected during the reporting period?

Comment: Hunting & Fishing Awaiting FY16 report from MWR to populate this question, reported is from FY15. FY16 is estimated to be about the same amount of funding. Program Permits and Permit sales apply to the following installations: NASO, NASO DNA, NALFF, NSAHR NWA, JEBLC, and JEBLC-FS.

8399

3.6. Are recreational facilities in good condition? *

Yes

No

N/A (recreational opportunities are not available due to landscape or security constraints)

3.7. Are sustainable harvest goals in the INRMP effective for the management of the species' population? *

Not Effective

Minimal Effectiveness

Moderate Effectiveness

Effective

Highly Effective

N/A = (recreational opportunities do not include hunting and fishing)

3.8. To what extent did the installation develop and provide public outreach/educational awareness, e.g. environmental educational opportunities, natural resource field trips/tours, pamphlets? *

No Public Outreach Provided

Low Outreach

Moderate Outreach

Good Outreach

Excellent Outreach

N/A

Reporting Unit Metrics Q&A Report: NAS OCEANA

3.9. Is there an active conservation law enforcement program (CLEP) on the installation? *

Comment: A Conservation Law-Enforcement Program Assessment has been completed for the following installations: NASO, NASO DNA, NALFF, and NSAHR NWA. The results from this report are on hold for release and inclusion/updates to the INRMP until appropriate briefings have been provided installation Commanding Officers.

Yes

No

N/A (INRMP or Natural Resources Program does NOT identify Conservation Law Enforcement as part of the program.

Recreational opportunities do not include hunting and fishing)

3.10. How many total work-hours per year are dedicated to law enforcement? (Includes full-time and part-time personnel)

Comment: We have a single regional individual servicing 11 installations. 1 billet. He puts in a lot of overtime. See Findings for additional information.

2503

3.11. Does the law enforcement program include federal (Non-Navy Civilian), state, or local or contractor personnel? (Select all that apply)

Federal (Non-Navy Civilian)

State

Local

Contractor

Military

3.12. Please describe the funding sources used by the Law Enforcement Program.

O&MN

O&MNR

MIS

GWOT

OPN

ER,N

RDT&EN

Other

Reporting Unit Metrics Q&A Report: NAS OCEANA

3.13. Are Law Enforcement personnel routinely supporting other programs? (Ex. Cultural Resources)

Yes
 No

3.14. Do you have any inter-jurisdictional agreements for conservation law enforcement with other military departments, Federal, tribal, state or local law enforcement, or land management agencies?

Yes
 No

3.15 Have conservation law enforcement officers completed the FLETC Land Management Police Training Program or equivalent?

Comment: Unsure how to answer this question. What is considered an equivalent? Our current CLEO has not taken FLETC LMPT ; however, he has taken NEC 9545 Navy Law Enforcement Specialist Phase I (Base Police Law-enforcement training), NEC 9545 Navy Law Enforcement Specialist Phase II (Comman Specific Law-enforcement training, NEC 9575 Correctional Custody Specialist Ashore, has completed 3/4 ths of the City of Chesapeake's Police Academy, has taken MBTA training for DoD, has taken a variety of CECOS and ECATTS environmental courses, and has taken the NMFWA Conservation Officer Refresher Training, when offered and travel approved, and qualifies on his weapons biannually with the Navy Security department. Our current CLEO has been woking in law-enforcement for 16 years (between military police and the Natural Resource CLEP), 13 of which have been as a CLEO.

Yes
 No
 N/A

3.16. Is a Conservation Law Enforcement Plan included in your INRMP and/or ICRMP?

Comment: his is a Yes & No Answer. Conservation law-enforcement is identified in the INRMP, but the region has not provided a regional CLEP plan for inclusion in the document, that identifies CLEO training requirements and specific CLEP obligations (roles & responsibilities). We have updated the INRMP to include a copy of the DoDI 5525.17 regarding the DoD CLEP dated 17 Oct 2013. We also on occassion reference the US Marine Corps CLEP instructions.

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

3.17. Please provide a brief description of the installation's Conservation Law Enforcement Program.

One NAVFAC Mid-Atlantic Conservation Officer, who also serves as the regional BST, is currently responsible for conservation law enforcement for the Hampton Roads Navy installations including NAS Oceana, NALF Fentress, NSAHR Northwest, NASO Dam Neck Annex, JEB Little Creek, JEBLC Fort Story, NWS Yorktown, Cheatham Annex, NS Norfolk, NSA Hampton Roads, and Lafayette River Annex. The Regional Conservation Officer serves as game warden and has arrest authority at these installations. Law enforcement is solely the responsibility of the Navy; however, Navy enforcement personnel cooperate with federal and state game wardens as needed to enforce federal and state wildlife laws. The Conservation Officer is required to be trained in law enforcement and federal and state wildlife regulations, and must attend annual wildlife law enforcement refresher training in order to stay abreast of changes in regulations and enforcement policies. The conservation officer occasionally identifies and works law-enforcement issues associated with the cultural resources program and other environmental programs outside of the natural resources program.

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Reporting Unit Metrics Q&A Report: NAS OCEANA

3. Findings

Currently there is no educational outreach coordinator. Outreach is subject to limited availability of Natural Resources Staff. Outreach was supplied through classroom training, public speaking, phone conversation, and handouts. (i.e., hunting, fishing, wildlife interactions, snakes, etc.).

The regional conservation law enforcement program is understaffed to adequately cover the needs of 11+ installations with regards to Natural, Cultural, and other Environmental Resources Law enforcement Coverage/Protection/Management/etc. At 2013 INRMP

Metrics review the VDGIF biologist associated with the NWS Yorktown INRMP provided a real life example on an Army installation in VA where he, installation security, state and federal wildlife agents conducted an intense study to determine the level of conservation law enforcement infractions occurring on the base, within one month. They found that in one month they observed and addressed numerous conservation law enforcement infractions on just a portion

In 2014 USFWS indicated that there is no way 1 officer can adequately service a range of resources that covers 11+ installations. The Navy did indicate that resource specialists in Natural and Cultural resources (though limited as well in numbers) are cross trained to identify issues and when issues are observed the Conservation Officer is notified and he responds.

The Virginia Feral Hog Action Team is coordinated by VDGIF and the Navy NRM is an active member of the team. Feral Swine are not a recreational hunting program species in VA. A single report of a potential feral hog at NALFF was submitted in FY15; however, no evidence was found to confirm the sighting. In FY16, a single potential trail camera sighting of a feral hog was submitted near the FY15 sighting at NALFF. Unfortunately, confirmation of the species was still unable to be confirmed.

The following was documented during the FY15 INRMP Metrics Review: In reference to State Endangered Canebrake rattlesnake, VDGIF meeting participant indicated that on an adjacent State Owned VDGIF managed property (Caviler WMA) they are being required when mowing hunting trails to have a scout ahead of the mower, the mower, and then a scout behind the mower identifying if a snake was struck. If a single snake is taken, then the mowing actions are no longer permitted, until further approvals are obtained. This is the 1st year VDGIF will be implementing this practice at this site.

3. Recommendations

Continue to support hunting, fishing and educational outreach programs.

Hire an Outreach Coordinator for the region.

Create an adequately staffed and more robust Conservation Law Enforcement Program.

Consider funding a project to determine the level of Conservation Law Enforcement infractions occurring on the installation.

Update recreational fishing program management practices.

Create joint installation Hunting and Fishing instructions for NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and NSAHR Northwest Annex.

Continue to stay active in CWD management and avoidance.

Continue to stay active in Feral Swine Management and Removal.

Follow up with VDGIF regarding hunting trail maintenance program.

4 - Sikes Act Cooperation

Focus Area Score

0.81

Focus Area Purpose: Determine to what degree USFWS, State Fish and Wildlife Agency and, when appropriate, NOAA Fisheries Service (NMFS), partnerships are cooperative and result in effective INRMP development, review for operation and effect, and mutual agreement.

Comment on this Focus Area and associated Questions Select this link below each question if you would like to elaborate on the answer provided. This is also a good way to document the assumptions made by all partners that contributed to the answer.

4. Select which Sikes Act partners work with this installation/site(s)? *

- USFWS
- State
- NOAA Fisheries Service

4.1. Was USFWS invited to participate in the annual INRMP/Natural Resources Program review? *

- Yes
- No

4.1.a. By what method was the agency invited to participate in the annual INRMP/Natural Resources Program review?

- Telephone call
- Electronic mail
- Official letter
- Other

4.1.b. Did the agency respond to the invitation to participate in the annual INRMP/Natural Resources Program review? *

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

4.1.c. How many attempts were made to invite the agency to participate in the annual INRMP/Natural Resources Program review?

0-3
 4-6
 7-10
 >10

4.1.d. Did the agency participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

4.1.e. If the agency participated in the annual INRMP/Natural Resources Program review, was it recognized as a review for operation and effect? *

Yes
 No

4.1.f. If the agency did not participate in the annual review, what type of correspondence was received from the agency to inform the site(s) that they were not able to participate?

Telephone call
 Electronic mail
 Official letter
 Other

4.1.g. If the agency did not participate in the annual INRMP/Natural Resources Program review, was a separate meeting held/correspondence sent as a review for operation and effect?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

4.1.g.a. What date? Format: MM/DD/YYYY

4.1.h. Was a report of the previous year's annual INRMP/Natural Resources Program review submitted to the agency during this reporting period? *

Yes
 No

4.2. Was the state invited to participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

4.2.a. By what method was the agency invited to participate in the annual INRMP/Natural Resources Program review?

Telephone call
 Electronic mail
 Official letter
 Other

4.2.b. Did the agency respond to the invitation to participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

4.2.c. How many attempts were made to invite the agency to participate in the annual INRMP/Natural Resources Program review?

0-3
 4-6
 7-10
 >10

4.2.d. Did the agency participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

4.2.e. If the agency participated in the annual INRMP/Natural Resources Program review, was it recognized as a review for operation and effect? *

Yes
 No

4.2.f. If the agency did not participate in the annual review, what type of correspondence was received from the agency to inform the site(s) that they were not able to participate?

Telephone call
 Electronic mail
 Official letter
 Other

4.2.g. If the agency did not participate in the annual INRMP/Natural Resources Program review, was a separate meeting held/correspondence sent as a review for operation and effect?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

4.2.g.1. What date? Format: MM/DD/YYYY

4.2.h. Was a report of the previous year's annual INRMP/Natural Resources Program review submitted to the agency during this reporting period? *

Yes
 No

4.3. Was the NOAA Fisheries Service invited to participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

4.3.a. By what method was the agency invited to participate in the annual INRMP/Natural Resources Program review?

Telephone call
 Electronic mail
 Official letter
 Other

4.3.b. Did the agency respond to the invitation to participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

4.3.c. How many attempts were made to invite the agency to participate in the annual INRMP/Natural Resources Program review?

0-3
 4-6
 7-10
 >10

4.3.d. Did the agency participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

4.3.e. If the agency participated in the annual INRMP/Natural Resources Program review, was it recognized as a review for operation and effect? *

Yes
 No

4.3.f. If the agency did not participate in the annual review, what type of correspondence was received from the agency to inform the site(s) that they were not able to participate?

Telephone call
 Electronic mail
 Official letter
 Other

4.3.g. If the agency did not participate in the annual INRMP/Natural Resources Program review, was a separate meeting held/correspondence sent as a review for operation and effect?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

4.3.g.1. What date? Format: MM/DD/YYYY

4.3.h. Was a report of the previous year's annual INRMP/Natural Resources Program review submitted to the agency during this reporting period? *

Yes
 No

4.4. The USFWS, state fish and wildlife agency, and when appropriate NOAA Fisheries Service, are familiar with and have reviewed the INRMP. *

Yes (All that apply) - These partners are familiar with and have reviewed the site(s)' INRMP.
 Two or more partners are familiar with and have reviewed the site(s)' INRMP.
 One or more partners are familiar with and have reviewed the site(s)' INRMP.
 No - Partners did not review the site(s)' INRMPs or INRMP updates, nor did they participate in other regular communications.

4.5. The USFWS, state fish and wildlife agency and, when appropriate, NOAA Fisheries Service are engaged in the INRMP development and implementation. *

The sites(s) engaged the USFWS, state fish and wildlife agency and, when appropriate, NOAA Fisheries Service and these efforts are well documented.
 The site(s) engaged the USFWS, state fish and wildlife agency and, when appropriate, NOAA Fisheries Service and these efforts are not documented.
 Partners were non-responsive to site(s) communications and/or are not familiar with the INRMP.
 The site(s) did not engage the USFWS, state fish and wildlife agency or NOAA Fisheries Service; therefore these partners did not review INRMPs or INRMP updates, nor did they participate in other regular communications.

4.6. What is the level of collaboration/cooperation between Sikes Act partners? *

None
 Minimal collaboration/cooperation
 Satisfactory collaboration/cooperation
 Effective collaboration/cooperation
 Highly effective collaboration/cooperation

Reporting Unit Metrics Q&A Report: NAS OCEANA

4.7. How well are site(s) natural resource management goals and objectives aligned with conservation goals of Sikes Act partners, e.g. USFWS/NOAA Fisheries Service regional goals and State Fish and Wildlife Agency regional goals (e.g. State Wildlife Action Plans ([SWAPs](#)))? *

- Not aligned
- Somewhat aligned
- Completely aligned

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Reporting Unit Metrics Q&A Report: NAS OCEANA

4. Findings

INRMP was made compliant in June 2015 having received all required agency signatures. INRMP does require an updated USFWS Operation and Effect Signature by 19 Dec 2017.

Coordination was maintained throughout the year with USFWS Region 5, VDGIF and NOAA-NMFS. The team (VDGIF, USFWS, NOAA-NMFS and NAVY) attempts to meet at least once a year to discuss Natural Resources Management concerns, updates, and opportunities. For the 2nd year USDA-WS was invited as an active participant in this coordinate meeting effort. For the 1st year State Fisheries Biologists, Sea Turtle Program Coordinator, and Foresters were also invited to participate. For the 1st time the USFWS Wildland Fire Coordinator was invited to participate. The USFWS Fisheries biologist that used to coordinate with the installation has retired and a new person had not been selected as of the INRMP Metrics meeting invitation.

During FY16 Partners Meeting a number of partnership opportunities and recommendations were discussed.

VDGIF would like to see the installation participate in the State's the 2018 Colonial Waterbird Survey Effort, and possibly the State's Breeding Bird Atlas program. VDGIF announced that the Agency Strategic Plan will be coming out for review and recommends the Navy participate in that process. VDGIF reports that hunting program has been losing about 3-3.5% of the hunting population since 1980s, which is resulting in resources and population control reductions. VDGIF would like to see the Navy promote and further participation in the State's Hunter Apprentice Programs. VDGIF would like the Navy to continue its efforts to control nutria and mentioned that VDGIF now has a conservation canine that is trained to find and remove nutria (they also obtain additional trained dogs via contract).

VDOF would like to see the installation increase efforts for invasive species monitoring and control along forest edges and within forest. Japanese stilt grass was identified as a target invasive species for control. Another species of particular concern was the Emerald Ash Bore, it is likely in our area, but not confirmed (targets bottom-land areas).

NMFS Final Critical habitat determination for Atlantic Sturgeon estimated to be announced June 2017; however, it is not anticipated that this installation will be impacted by this determination.

USFWS staff is down to 2 people in Permits from 6. Rusty patched bumble bee is proposed for listing and may pop up in iPAC as a historical record for our area, but it is not currently known to occur on installation. USFWS would like the installation to promote positive pollinator projects and partnerships. A fairly substantial list of invertebrate/pollinator species is anticipated to be issued for USFWS T&E listing review (petitioned and USFWS Initiated species)

4. Recommendations

VDOF recommends treating Emerald Ash Bore beetle infestations immediately upon observation, as an infestation will be 100% fatal to the bottomland forest trees.

Increase efforts and better promote existing projects that support pollinator species.

Continue Partnership Efforts.

In addition to the required INRMP signatory agency partners, continue to invite the VDOF, USDA, and other partners that contribute to the success of the INRMP.

Reporting Unit Metrics Q&A Report: NAS OCEANA

5 - Team Adequacy

Focus Area Score

0.82

Focus Area Purpose: Assess the adequacy of the natural resources team (professionally trained natural resources management and/or installation support personnel) in accomplishing INRMP/Natural Resources Program goals and objectives at each installation.

Comment on this Focus Area and associated Questions Select this link below each question if you would like to elaborate on the answer provided. This is also a good way to document the assumptions made by all partners that contributed to the answer.

5.1. Is there a Navy professional Natural Resources Manager designated by the Regional Commander/Installation Commanding Officer? *

Yes
 No

5.2. Is there an on-site Navy professional Natural Resources Manager? *

Yes
 No

5.3. Is there adequate installation staff assigned or available to properly implement the INRMP/Natural Resources Program goals and objectives? *

Comment: Installation has to reach back to NAVFAC MIDLANT and in some cases to LANT. Navy is currently having to contract our work that could be completed by Navy personnel, if adequately staffed. We need someone well versed in developing cooperative agreements, grants, and associated acquisitions.

Sufficient
 Insufficient
 None

Reporting Unit Metrics Q&A Report: NAS OCEANA

5.3.a. How many staff members are available?

3

5.3.b. How many staff members are required?

5

5.4. How well do higher echelon offices support the installation natural resources program? (e.g. reach back support for execution, policy support, etc.) *

Comment: Would like all higher echelon offices to keep the installation in the loop and have them participate in the review of contract documents before accepting/awarding a contractor's proposal. Would like all higher echelon offices to cross coordinate contractor product and proposal reviews with appropriate media experts/program managers before accepting/awarding a contractor's proposal or accepting a contractor's "final" product. (The same coordination should also be made on Cooperative Agreements and other such documents.) Forestry and Agricultural Program coordination is a particular concern.

- No Support
- Minimal Support
- Satisfactory Support
- Well Supported
- Very Well Supported

5.5. The team is enhanced by the use of contractors. *

- Disagree
- Somewhat Agree
- Neutral
- Agree
- Strongly Agree
- N/A (no contractor support)

Reporting Unit Metrics Q&A Report: NAS OCEANA

5.6. The team is enhanced by the use of volunteers. *

- Disagree
- Somewhat Agree
- Neutral
- Agree
- Strongly Agree
- N/A (No volunteer support)

5.7. The Natural Resources team is adequately trained to implement the goals and objectives of the INRMP.

- Professionals received adequate supplemental training
- Professionals have not received adequate training
- Professionals have not received any training

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Reporting Unit Metrics Q&A Report: NAS OCEANA

5. Findings

When staff have not been adequately trained to cover a subject matter of concern, if a question arises regarding compliance concerns then other Navy, USFWS, State or other agency subject matter experts are consulted.

NASO Installation natural resources (NR) staff are aiding to support short staffing at the regional level and other local installations.

Note: NAS Oceana NR personnel (1 Natural Resources Specialist and 2 Biological Science Technicians) help support the Hampton Roads area bases and are assigned to specifically handle (Oceana, Dam Neck Annex, Fentress, and Northwest Annex). One of these technicians is dual hatted supporting the region as a conservation law-enforcement officer and BST at ~11 installations.

Because of staffing levels at the installation and an attempt to maintain consistence of the programs throughout the region, NAVFAC MIDLANT CORE EV22 manages the Agricultural and Forestry programs for the installation. Regional staffing levels are not adequate to cover needs such as a professional forester, outreach coordinator, and individuals well versed in developing cooperative agreements, grants, and associated contracts.

Installation program enlists the support of over 20 regular gratuitous service program (GSP) supporters in order to accomplish its INRMP goals and objectives. At times the base signs upwards of 100 GSPs in a given year.

NAVFAC MIDLANT EV22 is attempting to implement previous recommendations to staff their program with multiple media specialist with the hiring of: 1 Natural Resources and Cultural Resources Supervisor; 1 Agriculture & Forestry Program Manager; 1 Marine Environment Program Manager; 1 T&E/INRMP Program Manager; 1 BASH/Nuisance Wildlife Program Manager and 1 Wetlands Program Manager. NAVFAC MIDLANT EV22, NAVFAC MIDLANT EV4 and Installation Staff do not agree on some INRMP identified projects/program management criteria (e.g., Agricultural mngt, Forest mngt., Vegetation Community Layer update frequency, nuisance wildlife inventory frequency, etc.) .

Proper coordination amongst varying levels of Navy Staff could improve.

5. Recommendations

Need to ensure installation Forestry Management Team includes at least one staff member that meets the OPNAVINST M-5090.1 standard to be designated as a professional certified forester (either meets and has obtained Society of American Forester Certification requirements or has received a professional forester certification by the State in which work is being conducted). Need to hire or train current staff to be well versed in cooperative agreement, grant, and contract development/acquisitions processes. Need to adequately staff the region and installations for Conservation Law Enforcement, Biological Science Technician, and Natural Resources Manager Support.

Hire NR staff to sit at the Region that specialize in each of the program areas relevant to INRMPs (i.e. forestry, agriculture, T&E species, wetlands, permits, fire, invasive species, BASH, etc.) and better define the roles and responsibilities between region and installation staff (keeping in mind existing Position Descriptions). Need to coordinate staffing and roles & responsibilities planning and implementation with NAVFAC MIDLANT EV2 and installation environmental program directors and installation natural resources managers prior to execution of such plans.

Need to develop an official/formalized conservation law-enforcement program either via cooperative agreement with USFWS or State Wildlife Agency or develop a service request for support with the Navy Installation Security Office. Obtain from NAVFAC MILDANT EV22 a detailed agricultural program management plan and a detailed forestry program management plan to be inserted into the INRMP and to clarify what support will be provided and how/when it will be provided by the region to the installation in relationship to these programs.

Improve coordination within the various levels of the navy and with agency partners.

6 - INRMP Implementation

Focus Area Score **0.37**

Focus Area Purpose: Evaluates the execution of actions, to include projects, taken to meet goals/objectives outlined in the INRMP.

Supplemental Information: The intent of this Focus Area is to assess how well actions are being implemented to execute the goals and objectives of the INRMP. Actions can include projects submitted via EPRWeb, as well as activities executed with alternative funds, not programmed through EPRWeb, or carried out by the use of volunteers or cooperative partnerships with other entities.

For each project or action executed, or partnership forged, or initiative engaged with, during the reporting period for the installation, the following questions are asked to evaluate INRMP action implementation. Note: For EPRWeb projects, the data such as project number, project title, funding source, and total obligated are pre-populated with data from EPRWeb. The user has the ability to edit the percentage applicable to this Reporting Unit (RU) if less than 100%.

Questions followed by an asterisk * are mandatory and must be completed before the datacall can be approved and forwarded to DoD.

FY16 Projects

Focus Area Score **0.37**

Instructions: This section is for projects planned in the installations/site(s) INRMP for award or emergent in FY16 only. Select a project from the list below (created in the Action Builder) to begin answering questions. To Add new projects, delete existing projects or modify the percentage allocated (share of the project) to this Reporting Unit (RU), click the Blue 'Add/Manage Projects' button. Select the red 'X' to delete a project, if a project doesn't apply to the Reporting Unit or is not a project that occurred during the current reporting period. If this is an incomplete list, use the filters to find any missing projects, check the appropriate check boxes, and click the Blue 'Add Projects' to add additional INRMP actions (projects), e.g. emergent projects, unfunded efforts, or actions that do not require funding, and begin answering questions. Users can also create non-EPRWeb projects by clicking the Green 'Create Project' button.

1. 60191NR205 : 4 SAR MA NASO/NALFF - Species and Habitat of Concern Protection

FY16 EPRWeb Total Spent

\$29,004.00

FY16 RU Share of Total Spent

\$29,004.00

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

4 SAR MA NASO/NALFF - Species and Habitat of Concern Protection (Tree Planting); 4 SAR MA NASO/NALFF - Species and Habitat of Concern Protection (Acoustic Amphibian Surveys); 4 SAR MA NASO/NALFF - Species and Habitat of Concern Protection (ODU Tick Study); 4 SAR MA NASO/NALFF - Species and Habitat of Concern Protection (CNU Snake Study)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

- Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: Alternate Funding Sources not accounted for in EPRWeb, funding not utilized re-aligned to fund other approved projects.

- Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

5900

(FY16) 6.4. Is the INRMP action on schedule? *

Yes

No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes

Partially

No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

2. 60191NR203 : CWA MA NASO/NALFF - Mitigation Site Monitoring

FY16 EPRWeb Total Spent

\$0.00

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

CWA MA NASO/NALFF - Mitigation Site Monitoring (Aeropines)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

- Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: See FY15 Projects for FY16 executed \$.

- Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

\$1000

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes

No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes

Partially

No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

3. 60191NR209 : CWA MA NASO/NALFF - Soil & Water Conservation - Erosion Control

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

Reporting Unit Metrics Q&A Report: NAS OCEANA

4. 60191NR202 : CWA MA NASO/NALFF - Wetland Mapping Inventory

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1. What is the current status of the INRMP action? *

Comment: Project was not funded with CN O&MN funding. Installation found funding to accomplish the NASO USACE Jurisdictional Determination 5yr renewal. NALFF still needs to be completed in FY17.

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: CN O&MN Unfunded. Installation found funding to accomplish (source not provided to EV).

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

1750

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

5. 60191NR218 : EO 13112 MA NASO/NALFF - Invasive Species

FY16 EPRWeb Total Spent

\$0.00

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

- Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

- Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

6. 60191NR204 : MBTA MA NASO/NALFF - Migratory & Breeding Bird Surveys

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes

No

(FY16) 6.0.a. Please enter the name(s)

MBTA MA NASO/NALFF - Migratory & Breeding Bird Surveys (Annual BASH - USDA)

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1. What is the current status of the INRMP action? *

Comment: AirOps Funds this effort thru their BASH Program Agreement with USDA. Data is provided to the INRM.

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: Funded by AirOps for USDA BASH Biologist

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

20000

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

7. 60191NR231 : MSFCA MA NASO – Nearshore Environment Assessments

FY16 EPRWeb Total Spent

\$0.00

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

MSFCA MA NASO - Nearshore Environment and Climate Change Assessments (Climate Change)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

- Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

- Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

Comment: Climate Change

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

8. 60191NR221 : MSFCA MA NASO/NALFF - Fisheries, Ditches & Streams

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

Reporting Unit Metrics Q&A Report: NAS OCEANA

9. 60191NR232 : SIKES MA NASO/NALFF - Conservation Law Enforcement

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

- Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

Comment: Conservation Law enforcement/Resource Protection

- None
 Flora
 Fauna
 Habitat
 At Sea
 INRMP-Planned Developments, Updates, & Revisions
 Listed Species
 Wetlands
 Invasives
 Soil
 Forestry
 Outdoor Recreation
 Training
 Other NR Requirements (Misc)

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

10. 60191NR224 : SIKES MA NASO/NALFF - Equipment Maintenance & Repair

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

11. 60191NR223 : SIKES MA NASO/NALFF - Equipment Storage Structures

FY16 EPRWeb Total Spent

\$0.00

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

12. 60191NR226 : SIKES MA NASO/NALFF - INRMP

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY16 EPRWeb Total Spent

\$8,465.00

FY16 RU Share of Total Spent

\$8,465.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

SIKES MA NASO/NALFF - INRMP (GIS Support)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

Reporting Unit Metrics Q&A Report: NAS OCEANA

13. 60191NR228 : SIKES MA NASO/NALFF - Natural Resources Staff Certification Requirements

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: NAVFAC ML Funded the these requirements with another funding EPR/JON, but did not notify INRM of funding source.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

6967

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

6967

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

- Yes
- Partially
- No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

14. 60191NR220 : SIKES MA NASO/NALFF – Nuisance Wildlife Inventory, Assessment & Removal

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

15. 60191NR222 : SIKES MA NASO/NALFF - Outdoor Recreation Program Requirements

FY16 EPRWeb Total Spent

\$0.00

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

16. 60191NR219 : SIKES MA NASO/NALFF - Wildlife Emergency Response

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

Reporting Unit Metrics Q&A Report: NAS OCEANA

17. 60191NR206 : SWCA MA NASO/NALFF - Forest Management

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

- Yes
- Partially
- No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

18. 60191NR216 : SWCA MA NASO/NALFF - Habitat Management - Prescribed Fire

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

19. UC-60191NR213 : Agriculture

FY16 EPRWeb Total Spent

\$0.00

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

CWA MA NASO/NALFF – Agricultural Monitoring

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: funded via Ag funds

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

25333.33

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

25333.33

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

Comment: Agriculture, Soils, and Clean Water Act

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

FY15 Projects

Instructions: This section is for projects planned in the installations/site(s) INRMP for award or emergent in FY15 only. Projects completed in FY15 and reported as complete in FY15 do not need to be entered. Select a project from the list below (created in the Action Builder) to begin answering questions. To Add new projects, delete existing projects or modify the percentage allocated (share of the project) to this Reporting Unit (RU), click the Blue 'Add/Manage Projects' button. Select the red 'X' to delete a project, if a project doesn't apply to the Reporting Unit or is not a project that occurred during the current reporting period. If this is an incomplete list, change the 'Action Plan Year' to "2015", use the filters to find any missing projects, check the appropriate check boxes, and click the Blue 'Add Projects' to add additional INRMP actions (projects), e.g. emergent projects, unfunded efforts, or actions that do not require funding, and begin answering questions. Users can also create non-EPRWeb projects by clicking the Green 'Create Project' button.

1. 60191NR205 : 4 SAR MA NASO/NALFF - Species and Habitat of Concern Protection

FY15 EPRWeb Total Spent

\$2,000.00

FY15 RU Share of Total Spent

\$2,000.00

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.0 Does the action have an alternative name?

Yes
 No

(FY15) 6.0.a. Please enter the name(s)

4 SAR MA NASO/NALFF - Species and Habitat of Concern Protection (Bald Eagle)

(FY15) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY15) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: Habitat Mapping, 1 of 2 Aerial Surveys, and 1 of 2 Eagle Banding efforts Completed in FY16, Invoice Information Not Available at time of INRMP Metrics.

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

Yes
 Partially
 No

(FY15) 6.5.g. Please select the goal(s) that this action supports.

(FY15) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

2. 60191NR203 : CWA MA NASO/NALFF - Mitigation Site Monitoring

FY15 EPRWeb Total Spent

\$12,267.61

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY15 RU Share of Total Spent

\$12,267.61

(FY15) 6.0 Does the action have an alternative name?

Yes
 No

(FY15) 6.0.a. Please enter the name(s)

CWA MA NASO/NALFF - Mitigation Site Monitoring (Aeropines)

(FY15) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY15) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: Approximately, \$1000 was expended by NAVFAC LANT to finish writing report and submitting it to the regulatory agency.

Yes
 No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

\$1000.00

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

Yes
 Partially
 No

(FY15) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.5.o. Please select the objective(s) that this action supports.

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

3. 60191NR218 : EO 13112 MA NASO/NALFF - Invasive Species

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY15 EPRWeb Total Spent

\$0.00

FY15 RU Share of Total Spent

\$0.00

(FY15) 6.0 Does the action have an alternative name?

Yes
 No

(FY15) 6.0.a. Please enter the name(s)

(FY15) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: See FY14 Project for FY16 Execution info.

- Yes
- No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

- Yes
- Partially
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.5.g. Please select the goal(s) that this action supports.

(FY15) 6.5.o. Please select the objective(s) that this action supports.

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

Reporting Unit Metrics Q&A Report: NAS OCEANA

4. 60191NR232 : SIKES MA NASO/NALFF - Conservation Law Enforcement

FY15 EPRWeb Total Spent

\$39,927.55

FY15 RU Share of Total Spent

\$39,927.55

(FY15) 6.0 Does the action have an alternative name?

Yes

No

(FY15) 6.0.a. Please enter the name(s)

SIKES MA NASO/NALFF - Conservation Law Enforcement (Program Needs Assessment)

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- On-Hold

(FY15) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: FY16 executed amount = \$13, 041.10

- Yes
- No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

- Yes
 Partially
 No

(FY15) 6.5.g. Please select the goal(s) that this action supports.

(FY15) 6.5.o. Please select the objective(s) that this action supports.

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

Comment: Conservation Law Enforcement/Resource Protection

- None
 Flora
 Fauna
 Habitat
 At Sea
 INRMP-Planned Developments, Updates, & Revisions
 Listed Species
 Wetlands
 Invasives
 Soil
 Forestry
 Outdoor Recreation
 Training
 Other NR Requirements (Misc)

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

5. 60191NR206 : SWCA MA NASO/NALFF - Forest Management

FY15 EPRWeb Total Spent

\$15,000.00

FY15 RU Share of Total Spent

\$15,000.00

(FY15) 6.0 Does the action have an alternative name?

Yes

No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.0.a. Please enter the name(s)

SWCA MA NASO/NALFF - Forest Management (Urban Forest Inventory)

(FY15) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY15) 6.2. How much progress has been made in implementing the action?

- 0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: Project was funded at the same time as 5 other projects and funding was allocated to a single EPR for ease of contract funding management. FY16 Executed Amount = \$24,068.01

- Yes
 No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

Yes
 Partially
 No

(FY15) 6.5.g. Please select the goal(s) that this action supports.

(FY15) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

6. 60191NR216 : SWCA MA NASO/NALFF - Habitat Management - Prescribed Fire

FY15 EPRWeb Total Spent

\$20,774.81

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY15 RU Share of Total Spent

\$20,774.81

(FY15) 6.0 Does the action have an alternative name?

Yes
 No

(FY15) 6.0.a. Please enter the name(s)

SWCA MA NASO/NALFF - Habitat Management - Prescribed Fire (Management Plan)

(FY15) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY15) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: Project was funded at the same time as 5 other projects and funding was allocated to a single EPR for ease of contract funding management. FY16 Executed Amount = \$24,068.01

Yes
 No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

Yes
 Partially
 No

(FY15) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.5.o. Please select the objective(s) that this action supports.

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

7. 60191NR231 : MSFCA MA NASO – Nearshore Environment Assessments

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY15 EPRWeb Total Spent

\$0.00

FY15 RU Share of Total Spent

\$0.00

(FY15) 6.0 Does the action have an alternative name?

Yes

No

(FY15) 6.0.a. Please enter the name(s)

32442MH103 CHS and EFH MA Owls Creek Nearshore Habitat Assessment

(FY15) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started

Action Underway

Action Completed

On-Hold

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: Project funding was lumped under a different EPR for ease of contract management. FY16 amount executed = \$48,435.10

- Yes
- No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

- Yes
- Partially
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY15) 6.5.g. Please select the goal(s) that this action supports.

(FY15) 6.5.o. Please select the objective(s) that this action supports.

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

Comment: Nearshore

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

FY14 Projects

Instructions: This section is for projects planned in the installations/site(s) INRMP for award or emergent in FY14 only. Projects completed in FY14 and reported as complete in FY14 do not need to be entered. Select a project from the list below (created in the Action Builder) to begin answering questions. To Add new projects, delete existing projects or modify the percentage allocated (share of the project) to this Reporting Unit (RU), click the Blue 'Add/Manage Projects' button. Select the red 'X' to delete a project, if a project doesn't apply to the Reporting Unit or is not a project that occurred during the current reporting period. If this is an incomplete list, change the 'Action Plan Year' to "2014", use the filters to find any missing projects, check the appropriate check boxes, and click the Blue 'Add Projects' to add additional INRMP actions (projects), e.g. emergent projects, unfunded efforts, or actions that do not require funding, and begin answering questions. Users can also create non-EPRWeb projects by clicking the Green 'Create Project' button.

1. 60191NR205 : 4 SAR MA NASO/NALFF - Species and Habitat of Concern Protection

FY14 EPRWeb Total Spent

\$106,620.90

FY14 RU Share of Total Spent

\$106,620.90

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY14) 6.0 Does the action have an alternative name?

Yes
 No

(FY14) 6.0.a. Please enter the name(s)

4 SAR MA NASO/NALFF - Species and Habitat of Concern Protection

(FY14) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY14) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY14) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: Funding Lumped into a single EPR for ease of contract Management. FY16 executed = \$ 16,159.13.

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY14) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY14) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY14) 6.5. Does this action meet the goals and objectives of the INRMP?

Yes
 Partially
 No

(FY14) 6.5.g. Please select the goal(s) that this action supports.

(FY14) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY14) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY14) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

2. 60191NR218 : EO 13112 MA NASO/NALFF - Invasive Species

FY14 EPRWeb Total Spent

\$219,791.53

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY14 RU Share of Total Spent

\$219,791.53

(FY14) 6.0 Does the action have an alternative name?

Yes
 No

(FY14) 6.0.a. Please enter the name(s)

EO 13112 MA NASO/NALFF - Invasive Species (Phragmites, Kudzu, Alligator weed, Asian spiderwort, Golden bamboo)

(FY14) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY14) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY14) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: EPR lumping for ease of contract management. FY16 executed amount = \$47,225.50

Yes
 No

(FY14) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY14) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY14) 6.5. Does this action meet the goals and objectives of the INRMP?

Yes
 Partially
 No

(FY14) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY14) 6.5.o. Please select the objective(s) that this action supports.

(FY14) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY14) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

3. 60191NR221 : MSFCA MA NASO/NALFF - Fisheries, Ditches & Streams

Reporting Unit Metrics Q&A Report: NAS OCEANA

FY14 EPRWeb Total Spent

\$24,941.45

FY14 RU Share of Total Spent

\$24,941.45

(FY14) 6.0 Does the action have an alternative name?

Yes

No

(FY14) 6.0.a. Please enter the name(s)

MSFCA MA NASO/NALFF - Fisheries, Ditches & Streams (NALFF Inventory/Assessment)

(FY14) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started

Action Underway

Action Completed

On-Hold

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY14) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY14) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: EPR consolidation for ease of contract management. FY16 executed amount = \$1,058.97.

- Yes
- No

(FY14) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY14) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY14) 6.5. Does this action meet the goals and objectives of the INRMP?

- Yes
- Partially
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

(FY14) 6.5.g. Please select the goal(s) that this action supports.

(FY14) 6.5.o. Please select the objective(s) that this action supports.

(FY14) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY14) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

FY13 Projects

Instructions: This section is for projects planned in the installations/site(s) INRMP for award or emergent in FY13 only. Projects completed in FY13 and reported as complete in FY13 do not need to be entered. Select a project from the list below (created in the Action Builder) to begin answering questions. To Add new projects, delete existing projects or modify the percentage allocated (share of the project) to this Reporting Unit (RU), click the Blue 'Add/Manage Projects' button. Select the red 'X' to delete a project, if a project doesn't apply to the Reporting Unit or is not a project that occurred during the current reporting period. If this is an incomplete list, change the 'Action Plan Year' to "2013", use the filters to find any missing projects, check the appropriate check boxes, and click the Blue 'Add Projects' to add additional INRMP actions (projects), e.g. emergent projects, unfunded efforts, or actions that do not require funding, and begin answering questions. Users can also create non-EPRWeb projects by clicking the Green 'Create Project' button.

Satisfaction Index

Focus Area Score **0.80**

Please answer the following general questions associated with INRMP Actions. Questions followed by an asterisk * are mandatory and must be completed before the datacall can be approved and submitted to DoD.

6.8. Do the goals and objectives of the INRMP/Natural Resources Program support other conservation partnerships/initiatives? *

- Yes
- No

6.9. Which conservation partnerships/initiatives are supported?

- American Land Trust
- Chesapeake Bay Initiative
- Coastal America
- Environmental Security Technology Certification Program (ESTCP)
- Flat-tailed Horned Lizard Rangewide (sic) Management Strategy
- Gulf of Coastal Plain Ecosystem Partnership
- Gulf of Mexico Initiative
- Joint Ventures
- Land Conservation Cooperatives (LCCs)
- Longleaf Pine Initiative
- Longleaf Alliance
- Mojave Desert Initiative
- National Military Fish and Wildlife Association (NMFWA)
- National Ocean Council (NOC) Regional Planning Bodies
- Oahu Conservation Partnership
- Partners in Amphibian and Reptile Conservation (PARC)
- Partners in Flight
- Other, please list

Reporting Unit Metrics Q&A Report: NAS OCEANA

6.10. To what level does the Natural Resources Program/INRMP meet or exceed USFWS expectations? *

- Dissatisfied
- Minimally satisfied
- Somewhat satisfied
- Completely satisfied
- More than satisfied

6.11. To what level are Natural Resources Program executions meeting State Fish and Wildlife Agency conservation management expectations? *

- Dissatisfied
- Minimally satisfied
- Somewhat satisfied
- Completely satisfied
- More than satisfied

6.12. To what level are Natural Resource program executions meeting NOAA/NMFS conservation management expectations, if applicable? *

- N/A Does not apply
- Dissatisfied
- Minimally satisfied
- Somewhat satisfied
- Completely satisfied
- More than satisfied

6.13. To what extent has the INRMP/Natural Resources program successfully supported other mission areas? *

- Not supported
- Minimally supported
- Satisfactorily supported
- Well supported
- Very well supported

6.14. Are Cooperative Agreements used to execute natural resources program requirements?

Comment: Old Dominion University Tick Study; Christopher Newport University Snake Study; William & Mary College Center for Conservation Biology Bald Eagle Research and Osprey Banding; etc.

- Yes
- No

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6.15. Describe any obstacles to INRMP implementation.

Inadequate field support staffing levels. Inability to acquire ammunition and other explosive devices associated with animal control activities. Lack of funding. Acceptable Risk determinations to not promote, not fund, re-assign funding, or not pursue funding for installation/activity identified projects (POM/EPRweb submitted funds requests). Government Vehicle Reductions causing: an inability for staff to respond or conduct field work in remote areas of the installations requiring 4x4 vehicles for safe and efficient travel and hauling (staff will now either not be able to accomplish certain tasks as usual or they will have less time to accomplish tasks because people are going to have to be shuttled to and from work sites); and an inability to haul equipment to work sites (CN funding is now required to pay to have PWD transportation haul equipment from one site to another so NR can accomplish INRMP required work).

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

6. Findings

Obligated = Total Reported Obligated Funds to support the project in the line item FY.

Spent = Total Reported Spent Funds to support the project in the current FY.

Not all inhouse fees utilized by NAVFAC MIDLANT Core EV2/CNRMA EV staff to support Projects identified in this datacall have been reported.

Per NAVFAC MIDLANT Core EV2/CNRMA they fund the majority of their in-house labor with excess funds throughout the region. Also, CNRMA would not issue project orders which complicated the FY funding reporting process. At this time NAVFAC MIDLANT CORE EV2/CNRMA does not specifically tie in-house cost to a specific EPR #. As such, guidance from NAVFAC MIDLANT EV2/CNRMA regarding reporting in the INRMP Metrics datacall, is that for contracts managed by MIDLANT/CNRMA EV2 staff, only contract award amount is to be reported.

NAVFAC LANT provided inhouse funding spent in FY15 on projects and contracts they managed for the FY15 INRMP Metrics Datacall.

Not all conservation initiatives submitted by the installation into EPRweb in POMs 14, 16 and 18 were promoted past the NAVFAC MIDLANT Core/CNRMA to NAVFAC HQ and CNIC (e.g., Agriculture and Forestry Program EPRs). In some cases project frequencies or budgets were altered from what the installation submitted without further justification and detailed updated budget. Budget reductions for the projects resulted in the inability to implement the programs as originally intended.

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6. Recommendations

Need to find other funding sources that can help fund projects that do not receive CNIC funding.

Need to utilize end of year funds to fund unfunded projects, which will require SOWs and other paperwork to be prepared in advance of end of year funding availability.

Need to resolve Ammunition Purchasing issues.

CNRMA should authorize project purchase orders to help with tracking of total project (cradle to grave) costs. Better tracking of project costs will help to ensure accuracy of future planning budgets.

If an EPR submission/exhibit is proposed to be altered from what the installation originally entered, then a detailed budget and project justification should be submitted to the installation to ensure that the proposed changes meet the installation's intended purpose for the exhibit before the exhibit is adjusted.

Provide Government vehicles that allow the Natural Resources (NR) program to conduct full range of services. All vehicles should be 4wheel drive and have a minimum engine size of 8 cylinders. At least one vehicle must be capable of safely hauling a large trailer and tractor (several thousand pounds).

7 - Support of Installation Mission

Focus Area Score **0.87**

Focus Area Purpose: Evaluate the level to which existing natural resources requirements support the installation's ability to sustain the current operational mission, ensuring no net loss of mission capability.

NOTE: As always, this focus area is to be completed by the Regional Commander/Commanding Officer (CO) or his/her designee with the responsibility for Title 10 installation assets and resources. Natural Resource Manager(s) are available to facilitate and support this process.

Comment on this Focus Area and associated Questions Select this link below each question if you would like to elaborate on the answer provided. This is also a good way to document the assumptions made by all partners that contributed to the answer.

7.1. To what level do natural resources program support the installation's operational mission? *

- The installation is fully mission-capable because the NR Program fully supports current and future missions.
- Partially mission-capable
- Not mission-capable

7.2. The Natural Resource program effectively considers current and potential future mission sustainment. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

7.3. What is the level of coordination between natural resources staff and other site(s) departments and military staff? *

- No coordination
- Minimal coordination
- Satisfactory coordination
- Effective coordination
- Highly effective and successful coordination

Reporting Unit Metrics Q&A Report: NAS OCEANA

7.4. To what extent has the INRMP successfully supported other mission areas? *

- Mission not supported
- Mission minimally supported
- Mission satisfactorily supported
- Mission well supported and fully capable
- Mission enhanced, well supported and fully capable

7.5. To what extent does the NR Program and INRMP minimize possible constraints imposed by natural resources regulatory requirements?

- Effectly minimizes mission constraints
- Partially minimizes
- Has not minimized constraints
- Does not address constraints

7.6. To what extent has there been a net loss of training lands or mission-related operational/training activities? *

- Mission is fully impeded; training activities cannot be conducted due to regulatory requirements
- Mission/Training activities are somewhat impeded with workarounds due to regulatory requirements
- Neutral
- No loss occurred
- Mission has seen benefits

7.7. Please provide examples of how the INRMP or Natural Resources program has resulted in any mission impacts

Due to NR Survey findings confirming the presence of protected species on the installation projects and mission requirements have been delayed or had to be reschedule for a time that was not as convenient to the military mission schedule to avoid and/or minimize impacts to protected resources. Airfield Height Obstruction Tree Clearing delayed due to Northern long-eared bat confirmed presence and wetland permitting & mitigation requirements. These are more a funding and time issue than a lack of programmatic support.

7.8. Please provide examples of how the INRMP or Natural Resources program actions have resulted in [mission benefits](#).

The INRMP has provided sufficient information to aid the installation planners to make more informed decisions regarding proposed activities on the installation. The Natural Resources Program has provided substantial benefits to the moral and welfare of the military and non-military tenants, staff, and community associated with the installation through the hunting and educational trail programs. The Natural Resources program has increased awareness of threats to human health and safety (venomous snakes, poisonous plants, bear safety, etc.) thru the creation and distribution of wildlife brochures and providing training upon request to staff and tenant commands. The Natural Resources program worked with AirOps and Real-estate to update the Agricultural Lease agreements to help support the BASH program.

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Regional Commander / Commanding Officer Signature

In the Regional Commander / Commanding Officer Section, this is a simple form to track who your Regional Commander / Commanding Officer is and that they have seen your results. It is not required that they physically type in their name and rank below.

Enter then name of your Regional Commander / Commanding Officer.

Richard J. Meadows

Enter then rank of your Regional Commander / Commanding Officer.

Captain

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

7. Findings

The Natural Resources (NR) program has benefited the mission by ensuring compliance with appropriate Federal and State Requirements. The NR program has coordinated with the appropriate authorities and commands to identify requirements and has actively pursued and obtained permits such as USFWS Migratory Bird and Eagle Harassment, VDGIF Kill, VDEQ Wetland, and USACE Wetland Permits. They have also coordinated all mitigation requirement oversights to keep the military mission in full operation. They have conducted various other projects such as nuisance wildlife and invasive species control that reduces blockages and damage to our stormwater infrastructure which helps to minimize the installation's flooding issues, which also contributes to human health and safety as well as continued military operations. The NR program has continued to restore Dune Habitat which has promoted conservation initiatives, and has ensured realistic training environments for our military personnel. The NR program has provided recreational opportunities to our military (active and retired), staff, spouses/family, and friends that have

Reporting Unit Metrics Q&A Report: NAS OCEANA

boosted the morale and welfare of our warfighters, families and supporters, while managing wildlife populations for mission safety, disease control and conservation. The NR program has also provided Conservation Law-enforcement support to the installation. The NR team's efforts to educate the tenants on the installation and in the public (outside the installation boundaries) has led to a superior crew of 100+ volunteers supporting the NR program to ensure conservation and mission readiness (dune restoration, hunting and fishing area maintenance, etc.). The NR manager has taken the lead in collecting information from tenants and installation support personnel to submit consolidated NAS Oceana responses to datacalls, permit reporting, and to apply for awards & grants. These datacalls and permit reports are not always NR program datacalls, but NR has a component to the information collection. The NR manager is recognized for her leadership and technical expertise not only on the installation but within the entire Conservation Community. She routinely helps to support regional and other installation NR managers and she supports National DoD programs and NGO programs (DoD Partners in Flight Steering Committee Representative, DoD Partners in Flight BASH Working Group Member, National Military Fish & Wildlife Service BASH Working Group Immediate Past-Chairman, and SE Hampton Roads Invasive Species Management Partnership Coordinator).

The NR team utilizes staff, contractors, volunteers, partnerships, and reach-back support to implement the INRMP. Even though all current Navy NR billets (FTEs) are filled, there appears to be a bona fide need for one additional Natural Resources and one additional Conservation Law Enforcement FTEs to fully implement the INRMP to meet all laws, regulations, and policies (see focus areas 3 and 5 of these INRMP metrics for additional details). One program area associated with the INRMP showing the largest staffing deficiency and lacking clear programmatic details/instruction is the Conservation Law Enforcement Program. Scores in the team adequacy focus area will not improve until the team is adequately staffed.

The Conservation law-enforcement program needs to be better defined and staffed in accordance with DoD Instruction for the Conservation Law-enforcement Program and the Sikes Act. The installation has documented actual and/or attempted wildlife poaching, wildlife killing, illegal introduction of non-native species, baiting, hunting without proper approvals, and cultural resources damage and/or theft. The installation has an active hunting program and is considering implementing an active fishing program. 1 Conservation Law-enforcement officer is not adequate to cover 11+ installations. Cross trained NR, EC, and CR staff is not law-enforcement and all they can do is identify and notify. Installation security officers are not trained to accomplish conservation law-enforcement; however, they do assist upon request. In FY15, the installation planned and awarded, with contract support from NAVFAC MIDLANT EV22 staff, a Conservation Law enforcement Program Needs Assessment. The assessment was finalized in FY16 and is undergoing installation internal coordination prior to further escalation. The integrated BASH program with USDA, Air Operations, and Natural Resources continues to implement wildlife population and habitat management, which provides for improved operations and safety.

The installation staff works with INRMP partners to identify natural resources programmatic needs for the installation. The installation staff develops project justifications, estimated costs to implement the programmatic needs, and enters this information into the appropriate systems for DoD budgeting purposes. Various installation submitted projects identified during the POM funding planning cycles, which are critical to both Natural Resources and Military Mission requirements, were not approved/funded and should be approved/funded. For Example, the Installation identified funding requirements to install BMPs and monitoring needs associated with agricultural leases to support conservation initiatives to reduce run-off of pesticides and soil erosion/sedimentation into waterways and stormwater systems; however, region project reviewers determined the requirement was not needed/did not have a regulatory requirement and did not promote the projects in previous years (POMs 12-14), and reduced the funding (POM16-18) in current and future years to the point that these initiatives cannot be implemented with the revised CNIC budgeted request. CNRMA Instructions for hunting and fishing programs were dated and cancelled last quarter FY16 and 1st quarter FY17. Installation instructions are now needed.

The Natural Resources program demonstrates good overall sensitivity to and awareness of mission needs and environmental issues and strives to improve communication with the command and associated tenants.

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The efforts of the NR team have not gone unrecognized. The installation won the Tree City USA award for the 22nd consecutive year for employing superior Urban Forestry management. In FY16 the installation NR team also won the Team, CNO Environmental Award for Natural Resources Conservation.

7. Recommendations

Natural Resources program staffing levels continue to be a limiting factor to completing/complying with INRMP objectives and requirements. Scores in the team adequacy focus area will not improve until the team is adequately staffed.

CNRMA, Hire a full time Natural Resources Specialist and a full time Biological Science Technician to support the mission of NW Annex and its tenant commands.

CNRMA. Hire a full time GS-11 Natural Resources Specialist to support the PWD Oceana Natural Resources Program. CNRMA, Stand up an official Conservation Law-enforcement Program that provides the requirements (Personnel, equipment, training, etc.) identified in the FY15 funded Conservation Law Enforcement Program Assessment of Need documentation. The Conservation Officers should coordinate directly with the installation Natural and Cultural Resources Managers.

Various projects identified during the POM 14, POM 16 & POM 18 funding planning cycles, which are critical to both Natural Resources and military mission requirements or provide a substantial conservation benefit to the installation and surrounding ecosystems, were not approved and/or funded as the installation requested and should be approved/funded should resources become available.

NAVFAC MIDLANT CORE/CNRMA, approve installation/activity submitted POM Conservation Exhibits that are submitted into the EPR system

(including those that are not a regulatory requirement). If NAVFAC MIDLANT

CORE/CNRMA reviewers do not agree with installation submitted estimated costs, methodologies, or frequencies of occurrence; then NAVFAC MIDLANT CORE should submit a revised detailed estimate of cost, methodologies or frequency of occurrence with justification and explanation for the recommended changes to the installation for consideration and verification that it meets the installation's intended purpose and need.

CNIC & CNRMA, fund approved EPR projects. If CNIC funding is not initially available/budgeted for an approved project, provide assistance to the installation in locating funds to implement the projects from other sources (Ag., Forestry, QRP, Legacy, inkind services, range funds, end of year funds, funded projects that can't be executed, other sources, etc.).

Installation/NAVFAC MIDLANT PWD Oceana and CNRMA/NAVFAC MIDLANT CORE, continue to coordinate with the appropriate military and civilian personnel at all levels (installation, MIDLANT, LANT, regulatory, etc.) to accomplish mission goals. Strive to improve coordination and information sharing at all levels (both up and down the chain of command).

Installation, create an installation level instruction to cover the hunting and fishing programs for the installation. Due to current staffing shortages consider creating a single instruction that is jointly signed by the NASO and NSAHR COs, since the programs for both commands are currently managed by the same Installation Natural Resources Manager. Remove reference in the INRMP to the CNRMA Hunting and Fishing Instructions once an installation instruction is finalized, since the CNRMA instruction has been cancelled.

Success Stories

Enter the title of the story in the box to the right, then:

1. Click on the blue "Add Story" button to create a record.
2. Click on the record/row of the story and completely fill-out the success story form.
3. Add any supporting document or image files.
4. Click the green "Save" button in the form.

1. Christopher Newport University Snake Study

Source

Date

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

Background discussion.

The objective of the study is to investigate the color variation of garter snakes at several locations across southern Virginia. Color variation can be utilized to determine species differences that could result in new or sub-class species identifications.

Enter summary of the success.

Project is still on going. Results from the Study are provided to the Navy at no cost to the Navy other than access coordination. Project provides data necessary to maintain INRMP object to maintain species inventory data and INRMP goals for ecosystem management and partnerships.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

2. CNO Environmental Award – Natural Resources Team

Source

Reporting Unit Metrics Q&A Report: NAS OCEANA

Date

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

Background discussion.

In FY16, the Installation NR Team won the Chief of Naval Operation FY2015 Environmental Award for significant achievements in the Natural Resources Conservation Team Category.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter summary of the success.

In FY16, the Installation NR Team won the Chief of Naval Operation FY2015 Environmental Award for significant achievements in the Natural Resources Conservation Team Category.

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

3. Eagle Nesting & Roosting Cooperative Ecosystems Studies Unit Agreement

Reporting Unit Metrics Q&A Report: NAS OCEANA

Source

Date

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

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Background discussion.

Bald Eagle has been delisted from the ESA, but is still protected under the BAGEPA and the MBTA. The installation has never had a nesting or roosting eagle survey nor a suitable nesting habitat evaluation completed. In FY15 the installation entered into a CESU Partnership with the College of William & Mary's Center for Conservation Biology to conduct such work. Survey and mapping efforts began in FY16.

Enter summary of the success.

Project is still ongoing but is already contributing to data gaps used for Installation, State, and National data repositories. Data is being utilized for project planning on and off the installation.

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

Reporting Unit Metrics Q&A Report: NAS OCEANA

4. Multi-Agency Migratory Bird Treaty Act Training Course

Source

Date

4/12/2016

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

Background discussion.

Installation helped to coordinate and host the Navy Funded USFWS Migratory Bird Conservation Training Course. At NASO a field trip was completed that demonstrated the Aviation and Construction Military Missions in conjunction with Migratory Bird Management Implementation Requirements.

Enter summary of the success.

Event pulled together regulators, natural resources managers, NEPA planners, lawyers, etc. from a variety of agencies and branches of DoD. Event provided a mechanism to clarify requirements, allow open candid discussions and answer questions regarding Migratory Bird management requirements. The most important this was that the course provided real-time opportunities for individuals to observe actual military missions and how migratory bird management in needed and being conducted to all military missions to continue without a net loss in training & operations.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

5. Old Dominion University Tick Study

Source

Reporting Unit Metrics Q&A Report: NAS OCEANA

Date

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

Background discussion.

Partnership with Old Dominion University to identify tick species in the region and associated zoonotic diseases.

Reporting Unit Metrics Q&A Report: NAS OCEANA

Enter summary of the success.

Project is still ongoing but is already contributing to data gaps used for Installation, State, and National data repositories. Data is being utilized for project planning on and off the installation. Study has already identified at least one previously unknown species to the area, it has confirmed the expansion of a species territory from previously know boundaries, it has also confirmed the likely miss identification of one zoonotic disease for another in the local medical facilities.

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

6. Tree City USA Award

Reporting Unit Metrics Q&A Report: NAS OCEANA

Source

Date

4/28/2016

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

Reporting Unit Metrics Q&A Report: NAS OCEANA

Background discussion.

Installation received the Tree City USA Award for the 22nd consecutive year due to their Urban Forest Management efforts.

Enter summary of the success.

Installation received the Tree City USA Award for the 22nd consecutive year due to their Urban Forest Management efforts.

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

Summary

List the top three accomplishments for the Natural Resources Program during this reporting period. Please include a statement regarding how these accomplishments support the mission of the installation or other activities. This information may be used to brief program successes up to leadership. See detailed examples provided, [here](#).

1. As a result of this year's annual review, have any additional actions, such as management recommendations related to regulatory drivers (ACOE permits, EFH Issues, etc.), been identified that should be considered for incorporation into the INRMP? *

Yes
 No

1.a. Please explain in detail.

Northern Long Eared Bat Vegetation Management. No Tree Removal During Popping Season (Jun-Jul).

2. In addition to any findings submitted in the previous 7 Focus Areas, please provide any additional or general findings.

3. In addition to any recommendations submitted in the previous 7 Focus Areas, please provide any additional or general recommendations.

Reporting Unit Metrics Q&A Report: NAS OCEANA

4. List the top accomplishment for the Natural Resources Program during this reporting period. *

Providing real-time/life military mission and migratory bird management requirements experiences for students and instructors attending the multi-agency migratory bird conservation training course. (Via a collaboration with the installation and HQ NR programs, installation Air Ops program, USDA-WS, USACE and USFWS.

5. List the second accomplishment for the Natural Resources Program during this reporting period. *

Completing the 1st Nesting Eagle Survey of the installations and associated buffer via a partnership with the College of William and Mary's Center for Conservation Biology.

6. List the third accomplishment for the Natural Resources Program during this reporting period. *

Supporting disease vector research via partnerships with Old Dominion University and City of Virginia Beach.

Agriculture

Agriculture Program Status

Objective: This purpose of this section of the Natural Resources Conservation Metrics data call is to gather required information associated with the status of the Agriculture Program. Responses to the questions in this section are not scored as a part of the Natural Resources Conservation Metrics data call. These questions have been added here to collect information that will support the Defense Environmental Program Annual Report to Congress (DEPARC) and Office of the Secretary of Defense Environmental Management Review (EMR). By combining these questions with responses to the Metric's seven (7) focus areas, Natural Resources Managers are faced with fewer annual data calls.

Is there an active agriculture out-lease program on this site? *

Yes
 No

What are the driving factors for having an Ag Lease on this site?

Airfield Vegetation Height Management. Bird/Animal Aircraft Strike Hazard Minimization. Conservation Funding Revenue. Local Community Economic Benefits.

1. How many active leases are currently associated with this site?

Comment: NASO = 2; NALFF = 3. The NR program manages 5 Ag leased properties. There are technically 7 ag-leases with the additional 2 sites being located in NC. These 2 sites are managed strictly by Real-estate and have not been coordinated with Natural Resources for management. One property was purchased with the desire to create a new OLF several years ago. The other lease was associated with a tower communication site's land maintenance. Both sites are going through the property disposal process.

Reporting Unit Metrics Q&A Report: NAS OCEANA

2. What is the total number # of leased acres?

Comment: Acres were reduced partially thru the year by approximately 93 acres. Removed from 1 NASO lease for a Solar PV Array Renewable Energy Project.

1409

3. What is the Annual lease income?

Comment: Reduced by \$6,841.25 for the lease reduction for the PV Array Project at NASO. NRM was not notified of any additional lease reductions that may have occurred.

156350

4. What are the Annual expenses?

Comment: NAVFAC MIDLANT Support for minimum requirements.

38,000

5. Do any leases involve in-kind payments?

Yes

No

5.a What are the number of in-kind leases?

Comment: Leases include maintaining major ditches and security perimeters which reduces the installation's ground-maintenance costs.

5

Reporting Unit Metrics Q&A Report: NAS OCEANA

6. What are the leases for?

- Crop Production
- Hay
- Grazing
- Other
- Honey Production
- Honey Bee Rearing

7. What is the primary land use where agriculture out-leasing occurs? Select all that apply.

- Airfield clear/buffer zone
- Antenna area
- ESQD Arc
- Outlying landing field
- Weapons storage
- Other, please list

8. Are additional lands available for AG out-leasing?

- Yes
- No

8.a What is the number of additional acres available?

Comment: Final Acreage is pending implementation of Airfield Obstruction Management Plan Vegetation Conversions and Permitting. Estimated from 5 to 100+.

100

9. Is there an apiary program?

Comment: Our farmer do and are authorized to utilize beens to pollinate their crops; however, we do not specifically have an apiary for bee, wax, or honey production. We are interested in learning more about this process and if it would be feasible on our lands.

- Yes
- No

Reporting Unit Metrics Q&A Report: NAS OCEANA

9.a Is the apiary activity part of the AG out-lease program?

Yes
 No

10. How many personnel are funded through agriculture out-lease funds?

1

11. Primary installation agriculture program POC.

Markham, Jack - jack.markham@navy.mil

Forestry

Forestry Program Status

Objective: This purpose of this section of the Natural Resources Conservation Metrics data call is to gather required information associated with the status of the Forestry Program. Responses to the questions in this section are not scored as a part of the Natural Resources Conservation Metrics data call. These questions have been added here to collect information that will support the Defense Environmental Program Annual Report to Congress (DEPARC) and Office of the Secretary of Defense Environmental Management Review (EMR). By combining these questions with responses to the Metric's seven (7) focus areas, Natural Resources Managers are faced with fewer annual data calls.

1. Does the site have forest cover? *

Yes
 No

1.a What is the total number of forested acres on this site?

3575

Reporting Unit Metrics Q&A Report: NAS OCEANA

2. Is there an active forestry program on this site?

Comment: Currently, no actively managed commercial forest program, but the program was managed decades earlier in such a manner. We conduct select timber harvests and allow the timber to regenerate naturally. There is a proposal to reinstate a more traditional commercial forest program in support of the Airfield Obstruction Management Plan; however, given the listing of the NLEB and potential Wetland Conversion requirements we are pending an Updated EA and Regulatory Consultations with USFWS and USACE. The Commercial Forestry Program currently consists of Commercial Value and Urban Forest Inventories, Disease Inspections, After Storm Inspections, and Firewood Program. OC = ~2275; FN = ~1300. This will decrease and increase given the status of implementing the Airfield Obstruction Management Plan.

Yes
 No

3. What is the total number of acres currently under active forest management?

4. Is there a commercial forest program?

Yes
 No

5. What was the annual program revenue over the past fiscal year?

6. Where any trees harvested during the past fiscal year?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

6.a How many acres of forest were harvested during the past fiscal year?

6.b What was the method of harvest?

- Clearcut
- Seed Tree Cut
- Shelterwood Cut
- Select Cutting
- Group Selection
- Single Tree Selection
- Commercial Thinning

7. What were the annual program expenses during the past fiscal year?

8. Was there a planting during the past fiscal year?

- Yes
- No

8.a What were the number of acres regenerated through planting over the past fiscal year?

Reporting Unit Metrics Q&A Report: NAS OCEANA

8.b What species were planted?

9. Did natural regeneration occur last fiscal year?

Yes
 No

9.a How many acres are naturally regenerated?

Comment: 99%. We are assuming this question means cleared areas not currently considered forest but is naturally being allowed to become forest? If not 99% of our forest is currently managed for natural regeneration (not active planting). Decades earlier when the program was managed as a commercial forestry program a mix of planting and natural regeneration. Currently, natural regeneration is the primary method utilized; however, the program does conduct regeneration via planting in several mitigation sites (~150 acres), and also trees are planted in association with our urban forest management program. The installation used to maintain it's own tree nursery; however that program was shut down (apparently due to fare market concerns).

400

10. Does the site have longleaf pine (Pinus palustris)?

Yes
 No

Reporting Unit Metrics Q&A Report: NAS OCEANA

10.a What is the number of acres of longleaf pine (*Pinus palustris*)?

Comment: Our Stands of Long-leaf Pine are not monocultures, so providing an exact estimate of acreage is a little difficult. NAS Oceana: Non-Urban/Commercial Forest Inventory = ~17.15 Acres mixed species stands (1117-1451 longleaf pine trees, saw-timber) reported; Metrics Originally = Reported 2 acres; and Urban Forest Inventory = TBD. In the past two FYs we have only spent funding on: identifying the presence of this species of concern on the installations via our Natural Heritage and Non-Urban Forest Inventories; and controlling invasive plant species (kudzu and phragmites) on or adjacent to the sites. We have not taken any specific management actions to manage specifically for longleaf pine, except to avoid clearing of such sites. In FY15, we awarded a project to update our prescribed and wildland fire management plan and our urban forest inventory. The fire plan will include some options to specifically benefit the regeneration of Longleaf pine, if we can obtain fire prescriptions that will allow us to burn, then we will implement management action in future years (not anticipated to occur until FY17 or later). Until we are in a position to apply prescribed fire our management of these sites will continue to be natural regeneration, control Invasive Species, control disease outbreaks, and advise planning to avoid conducting longleaf pine tree clearing activities . We have obligated between 2012 and 2015 over \$746K on the following contracts: Non-Urban/Commercial Forest Inventories, Invasive Plant Species Inventory, Invasive Plant Control, Natural Heritage Inventories, Prescribed/Wildland Fire Plan Updates, and Urban Forest Inventories? Each of these contracts were associated with ~10,302 acres of Navy Property (Oceana, Dam Neck Annex, and Fentress), of which it appears only 20-30 acres (Oceana and Dam Neck Annex) included long-leaf pine.

17

11. What are the primary commercial species managed?

12. Is prescribed burning used?

Yes
 No

12.a What is the number of acres burned in the past year?

Reporting Unit Metrics Q&A Report: NAS OCEANA

13. How many personnel are funded through forestry funds?

14. Primary site forestry program POC.

Summary Score

1 - Ecosystem Integrity	0.88
Ecosystems	0.76
Encroachment	1.00
2 - Listed Species Critical Habitat	0.82
Threatened and Endangered Species	0.63
Unoccupied Critical Habitat	1.00
3 - Recreation Use and Access	0.88
4 - Sikes Act Cooperation	0.81
5 - Team Adequacy	0.82
6 - INRMP Implementation	0.37
FY16 Projects	0.37
Satisfaction Index	0.80
7 - Support of Installation Mission	0.87

Introduction

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Welcome to the Annual Navy Natural Resources Conservation Metrics!

This site has been designed to help guide you step-by step through a series of questions that will inform decision- makers on the status of your Natural Resources program. Data is being collected for fiscal year 2016. Questions followed by an asterisk * are mandatory and must be completed before the data call can be approved and forwarded to DoD. The [User Guide and Training Brief](#) can be found here. The FY16 DoD Environmental Data call memorandum can be found [here](#).

Note:

Please click "Save" located at the bottom of each page to add your draft answers to the database. After you save if you leave or are logged out of the system, your answers will be retained the next time you log in. Click on the buttons at the top to jump to a different section.

Getting Started...

Please add all participants and attendees that were involved in the Annual Navy Natural Resources Conservation Metrics. The drop down list includes all people currently using the CN Web system and those entered using the blue 'Add Personnel to List' button. If the person you need to add is not in the pull down list, click the blue 'Add Personnel to List' button and fill out the required fields, indicated by an asterisk.

Note: The Navy Lead is the Navy POC responsible for the completion of the Metrics for this installation/site.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1. Aherron, Michael
Virginia Department of Forestry
757-510-6456
mike.aherron@dof.virginia.gov

Is this person the Navy Lead?

Yes
 No

2. Austin, Taylor
NAVFACML EV22
757-341-0446
taylor.s.austin@navy.mil

Is this person the Navy Lead?

Yes
 No

3. Boettcher, Ruth
Virginia Department of Game and Inland Fisheries
757-709-0766
ruth.boettcher@dgif.virginia.gov

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Is this person the Navy Lead?

Yes
 No

4. Chamberlain, Terry
NAVFAC ML PWD-Oceana
757-433-3437
terry.n.chamberlain@navy.mil

Is this person the Navy Lead?

Yes
 No

5. Engelmeyer, Todd
Virginia Department of Game and Inland Fisheries
804-829-6580
todd.engelmeyer@dgif.virginia.gov

Is this person the Navy Lead?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

6. Hicks, Linda
NAVFAC ML PWD-Hampton Roads
757-836-1862
linda.hicks1@navy.mil

Is this person the Navy Lead?

Yes
 No

7. Meadows, Richard
CNRMA - NASO

richard.j.meadows@navy.mil

Is this person the Navy Lead?

Yes
 No

8. Nystrom, Sarah
U.S. Fish and Wildlife Service
804-824-2413
sarah_nystrom@fws.gov

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Is this person the Navy Lead?

Yes
 No

9. O'Brien, David
NOAA
301-427-8325
david.o'brien@noaa.gov

Is this person the Navy Lead?

Yes
 No

10. Olexa, Tom
NAVFAC ML PWD-Yorktown
757-887-7521
thomas.olexa@navy.mil

Is this person the Navy Lead?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

11. Russell, Kyle
757-462-5351
Kyle.B.Russell@navy.mil

Is this person the Navy Lead?

Yes
 No

12. Turner, Chris
North Carolina Wildlife Resources Commission
252-221-9961
chris.turner@ncwildlife.org

Is this person the Navy Lead?

Yes
 No

13. Vincelette, Chad
CNRMA - NASO

chad.vincelette@navy.mil

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Is this person the Navy Lead?

Yes
 No

14. Waligora, Sharon
NAVFAC ML PWD-Little Creek
757-462-5350
sharon.waligora@navy.mil

Is this person the Navy Lead?

Yes
 No

15. Waller, Blake
NAVFACML EV22
757-341-2109
blake.waller@navy.mil

Is this person the Navy Lead?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

16. Wright, Michael
NAVFAC ML PWD-Oceana
757-433-3461
michael.f.wright@navy.mil

Is this person the Navy Lead?

Yes
 No

INRMP Status

Navy INRMP Status Check

Objective: This purpose of this section of the Natural Resources Conservation Metrics data call is to gather required information associated with the Natural Resources program, specifically the status of Integrated Natural Resources Management Plans (INRMP). These questions have been added here to collect information that will support the Defense Environmental Program Annual Report to Congress (DEPARC) and Office of the Secretary of Defense Environmental Management Review (EMR). By combining these questions with responses to the Metric's seven (7) focus areas, Natural Resources Managers are faced with fewer annual data calls. Questions followed by an asterisk * are mandatory and must be completed before the data call can be approved and forwarded to DoD.

1. Is an INRMP necessary for this installation/site(s)? *

Yes
 No

2. Is there currently a compliant INRMP that covers this/these installation/site(s)? *

Yes
 No
 INRMP - Under Revision
 INRMP Under Development (First Version)

2.a. Enter the name of First Compliant INRMP

Integrated Natural Resources Management Plan Naval Air Station Oceana, Dam Neck Annex and Naval Air Station Oceana, South Virginia Beach Annex (Camp Pendleton)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.b. Date of First Compliant INRMP (Usually Dated 2001/2002) Format: MM/DD/YYYY

9/24/2008

2.c. What type of NEPA Documentation was done for the first compliant INRMP?

EA / FONSI

EIS / ROD

NEPA document is currently under development

2.d. When was the NEPA completed for the first compliant INRMP? Format: MM/DD/YYYY

9/7/2006

2.e Name of the most current INRMP that covers this/these installation/site(s) *

Integrated Natural Resources Management Plan Naval Air Station Oceana Dam Neck Annex

2.e.1 Date of the most current INRMP that covers this/these installation/site(s). Format: MM/DD/YYYY

This date records when the Regional Commander/Commanding Officer endorsed (signed) the most recent INRMP (with valid NEPA coverage) and/or completed a review for operation and effect.

*

6/9/2015

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.f. Select the species where the INRMP was used to exempt critical habitat designation under ESA Section 4(a)(3)(B)(i) on this/these site(s). Select all that apply. Leave blank if not applicable. See i-note for bug work around. Please gauge your responses for this reporting period only.

3. Has a 5-year INRMP review for operation and effect been completed for the most recent INRMP?

- Yes
 No
 N/A
 In Progress

Enter the date that the 5-year INRMP review was completed. Format: MM/DD/YYYY

6/9/2015

3.a. If a 5-year INRMP review for operation and effect been completed, did the review result in an addendum/appendix, update or revision of the INRMP?

- Addendum / Amendment
 Update
 Revision

3.b. What is the expected completion date of the Addendum/Amendment, Update, Revision? Format: MM/DD/YYYY

8/25/2015

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

3.c. If a 5-year INRMP review for operation and effect has not been completed; please explain why a review for operation and effect has not been completed?

3.d. Was the Mutual DoD & USFWS Guidelines for Streamlined Review of INRMP Updates to secure FWS approval and state approval for updated INRMPs used?

Yes
 No

3.d.1 Did using the guidelines expedite the process?

Yes
 No

3.d.2. Why not?

IF IT HAS BEEN MORE THAN 3 YEARS SINCE A REVIEW FOR OPERATION AND EFFECT, ADMINISTRATIVE PROCESS SHOULD BE UNDERWAY IN CASE THE INRMP NEEDS TO BE UPDATED/REVISED.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4. Has USFWS concurrence been received on the most recent INRMP or review for operation and effect?

- Yes
 No
 In Progress

4.a. If question 4. is "Yes" or "In Progress", which USFWS Region(s) are applicable? (Choose all that apply)

- Northeast

4.b List the Field Office, if applicable, that did or will sign concurrence documentation

- Virginia Field Office - Gloucester, VA

4.c.If question 4. is "Yes", what is the date of concurrence? Format: MM/DD/YYYY

1/15/2015

4.d. If question 4. is "No", what is the reason for the delay?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4.e Was an ESA Section 7 Consultation completed with USFWS for the INRMP?

Comment: As part of the original INRMP/NEPA process. We will an updated consultation via their Online Application (IPAC) and email processes for the Operation and Effect review.

- Yes
 No
 N/A
 In Progress

4.f. Which USFWS field office do you regularly conduct ESA Section 7 consultations with typically?

- Virginia Field Office - Gloucester, VA

4.g. Did the Threatened and Endangered Species Listing and Recovery personnel participate in the INRMP review, update or revisions?

- Yes
 No
 N/A

5. Has NOAA Fisheries (NMFS) concurrence been received on the most recent INRMP or review for operation and effect?

- Yes
 No
 N/A

5.a. If question 5. is "Yes", which NOAA Fisheries (NMFS) Region(s) are involved? (Choose all that apply)

- Greater Atlantic

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

5.b Select the Local Office, if applicable, that did or will sign concurrence documentation.

Virginia Field Office - Gloucester Point, VA

5.c. If question 5. is "Yes", what is the date of concurrence? Format: MM/DD/YYYY

5/29/2015

5.d. If question 5. is "No", what is the reason for the delay?

5.e Was an ESA Section 7 Consultation completed with NOAA Fisheries (NMFS) for the INRMP?

Yes

No

N/A

5.f. Did the Threatened and Endangered Species Listing and Recovery personnel participate in the INRMP review, update or revisions?

Comment: They were provided the INRMP, but did not provide further comment.

Yes

No

N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

6. Has State fish and wildlife agency(ies) concurrence been received on the most recent INRMP or review for operation and effect?

- Yes
 No
 In Progress
 N/A

6.a. If question 6. is "Yes", which State fish and wildlife agency(ies)? (Choose all that apply)

- Virginia Department of Game and Inland Fisheries - Henrico, VA

6.a. If question 6. is "In Process", which State fish and wildlife agency(ies)? (Choose all that apply)

6.b. If question 6. is "Yes", what is the date of concurrence? Format: MM/DD/YYYY

2/26/2015

6.c. If question 6. is "No", what is the reason for the delay?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

7. If this/these site(s) is/are located on lands affected by tribal treaty rights or other known rights; were Federally-recognized Tribe(s) consulted with to develop or revise the Integrated Natural Resource Management Plan?

Comment: We have coordinated the INRMP with the NAVFAC MIDLANT Cultural Resources Manager. A Cultural affiliations study was awarded in 2013 for the MIDLANT installations to determine which tribes may have an affiliation interests over MIDLANT Naval Property (excluding NOSCs). The 1st Federally recognized tribe in VA is located in New Kent County, the Pamunkey. There are at least 11 tribes in VA, many of which are seeking and may receive Federal Recognition. There are 40+ tribes with interest in MIDLANT installations, many are not federally recognized, but are state recognized. Once tribes are identified with interest over this installation's property, coordination will be conducted regarding the INRMP with those tribes and will be coordinated thru the NAVFAC MIDLANT EV2 Cultural Resources program manager.

Yes
 No
 N/A

8. Are migratory birds, specifically birds of conservation concern, adequately addressed in the INRMP for this installation to support the mission and needed NEPA analyses?

Comment: INRMP Provides Species Lists indentifying Confirmed Present and Potential to Occur Species. It also identified T&E, and Breeding Bird of Conservation, and other special status associated with these species. The INRMP does not provide population level information associated with each Migratory Bird of concern on the installation. If a project has the potential to impact a species of concern additional funding is requested associated with that species for any population analyses the NEPA documentation may require.

Yes
 No

9. If the INRMP was updated/revised did the INRMP require new or supplementation NEPA?

Comment: Each INRMP project undergoes environmental review to ensure compliance with updates to EV laws and regulations. No new or supplementation EAs or EISs have been completed since the 2008 revision of the INRMP. The NAVFAC MIDLANT NEPA department has determined that these projects are covered by NEPA documentation already in existance. Discussions have been initiated regarding NEPA and newly designated federally listed species that do or have potential to occur on the installation.

Yes
 No

9.a. If so, what was the type of NEPA?

CATEX
 EA / FONSI
 EIS / ROD

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

9.b. When was the NEPA completed? Format: MM/DD/YYYY

10. Has the Regional Commander / Installation Commanding Officer concurrence been received on the most recent INRMP or review for operation and effect?

Yes
 No
 In Progress

10.a. If question 10. is "Yes", what is the date of concurrence? Format: MM/DD/YYYY

6/9/2015

10.b. If question 10. is "No", what is the reason for the delay?

11. If the Regional Commander has final authority over whether this/these site(s)' INRMP is compliant has the Regional Commander concurred with/signed the most recent INRMP or review for operation and effect?

Yes
 No
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

11.a. If question 11. is "Yes", what is the date of concurrence? Format: MM/DD/YYYY

11.b. If question 11. is "No", what is the reason for the delay?

12. Please select (all that apply) and upload these documents. *

- New or Current INRMP
- INRMP NEPA documentation
- 5-year operation & effect review letter(s)
- Signed Correspondence with Regulatory Partners
- Annual review briefs to Commanding Officer or Regional Commander
- INRMP Waiver Letter
- Final INRMP not available

12.1 Please upload the following documents where applicable: INRMP *

13||Dam Neck Annex INRMP 2015

12.2 Please upload the following documents where applicable: INRMP NEPA documentation *

Comment: See Appendix A of INRMP.

13||Dam Neck Annex INRMP 2015

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

12.3 Please upload the following documents where applicable: 5-year operation & effect review letter(s) *

Comment: See Signature Pages in Front of INRMP and INRMP Appendicies B. (Note Often we do not receive a letter, but just the returned signed signature pages. If a letter with comments is received, other than the signature page it is inserted into the Appendix.)

13||Dam Neck Annex INRMP 2015

12.4 Please upload the following documents where applicable: Other Signed Correspondence with Regulatory Partners *

Comment: See INRMP Appendicies A, B, E, F, and M.

13||Dam Neck Annex INRMP 2015

12.5 Please upload the following documents where applicable: Annual review briefs to Commanding Officer and/or Regional Commander *

Comment: See INRMP Appendix M.

13||Dam Neck Annex INRMP 2015

12.6 Please upload the following documents where applicable: INRMP Waiver Letter *

13. Please confirm if you uploaded or sent any INRMP Related document(s). *

- Uploaded to Conservation Website Document Library
- Uploaded through Army Safe Website
- Sending / Sent by US Mail
- Not Uploaded / Sent

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Army SAFE – Safe Access File Exchange

<https://safe.amrdec.army.mil/SAFE/>

US Mail

Naval Facilities Engineering Command Headquarters

Attn: Tom Mayes – EV2

1322 Patterson Ave. SE, Suite 1000

Washington Navy Yard, DC

20374-5065

Goals and Objectives

Please enter all Goals and Objectives as listed in the INRMP for this/these site(s). Enter Goals in the Goals Tab and the Objectives in the Objective tab. Enter Goals first so they can be linked to recommendations.

Please enter a short or abbreviated Goal and Objective name when creating them. To create a new Goal or Objective, click on the appropriate tab button and then click the blue 'Manage Goals' and 'Manage Objectives' buttons. You will be able to add the full text of the Goal or Objective later by clicking on the row with the shore name.

Goals

Enter or review, as appropriate, the Reporting Unit's Goals as documented in the current INRMP.

1. Implement an ecosystem based natural resources program that provides for conservation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations.

Please enter the full description of the Goal:

Please describe any Key Considerations or Issues associated with this Goal.

2. Implement an adaptive management based natural resources program that provides for the identification and assessment of military mission operations and facility requirements, analysis and assessment of risks to natural resources, completion of needs assessment surveys, monitoring and preparation of the needs assessment results, updating natural resources inventories to ensure information is current, reanalysis and reassessment of risks to natural resources, and incorporation of adjustments into the overall NRP, as necessary (DoD 2013).

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Please enter the full description of the Goal:

Please describe any Key Considerations or Issues associated with this Goal.

3. Implement an ecosystem management program that maintains and improves the sustainability and native biodiversity of ecosystems, considers ecological units and timeframes, supports sustainable human activities, develops a vision of ecosystem health, develops priorities and reconciling conflicts, develops coordinated approaches to work toward ecosystem health, relies on the best science and data available, uses goals and objectives to monitor and evaluate outcomes, uses adaptive management, and implements activities through existing installation plans and programs.

Please enter the full description of the Goal:

Please describe any Key Considerations or Issues associated with this Goal.

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4. Utilize existing tools to assess the potential impacts of climate change to natural resources. Identify significant natural resources that are likely to remain on DoD lands or that may in the future occur on DoD lands due to climate change. When not in conflict with mission objectives, take steps to implement adaptive management to ensure the long-term sustainability of those resources that are anticipated to be impacted by climate change.

Please enter the full description of the Goal:

Please describe any Key Considerations or Issues associated with this Goal.

Objectives

Enter or review, as appropriate, the Installation/site(s) Objectives as documented in the current INRMP. Associate Objectives with goals as appropriate.

1. Remove feral animals from the environment.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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2. Develop partnerships with state and federal natural resources agencies, local colleges and universities, and local conservation groups.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

3. Interact with the surrounding community to develop positive and productive community involvement, participation, and educational opportunities

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

4. Utilize planting techniques that encourages root growth.

Select the INRMP Goal that this Objective applies to.

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Enter full description of Objective.

Enter Key Considerations if applicable.

5. Maintain sufficient number of and training of professional NR management and NR law enforcement personnel.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

6. Protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with Navy BASH Program requirements

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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7. Discourage ponding of water within areas in proximity to helipad and flight zones to minimize attracting migratory birds and other wildlife, and to minimize the BASH potential.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

8. Implement habitat enhancement and maintain habitat diversity for migratory bird species, consistent with BASH Program requirements. Recommendations for habitat enhancement should be made to attract birds and other wildlife away from the flight operations areas.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

9. Maintain Migratory Bird Depredation Permits (if applicable) from the USFWS and VDGIF Kill Permits to allow harassment or harm to migratory birds and other species as part of Navy BASH Program requirements, and to maintain helipad and flight zone safety.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter full description of Objective.

Enter Key Considerations if applicable.

10. Procure and maintain BASH response equipment (i.e., propane cans, electronic scare devices, calls).

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

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Enter Key Considerations if applicable.

11. Conduct initial BASH training workshop for staff members with refresher training as needed.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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12. Review locations of bird and bat boxes/platforms to determine if any of these should be removed to reduce BASH risks.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

13. Review each project proposed on the Installation for BASH concerns and provide guidance for reducing or avoiding BASH concerns.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

14. Review Installation plans and proposed actions to ensure consistency with the Virginia Coastal Zone Management Program and help to obtain a consistency determination when required.

Select the INRMP Goal that this Objective applies to.

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Enter full description of Objective.

Enter Key Considerations if applicable.

15. Review plans for projects that have the potential to impact wetlands against NASO DNA wetland delineation maps, and assist the proponent of an action in applying for and obtaining all required state and federal wetlands permits.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter Key Considerations if applicable.

16. Develop site-specific plans on an as-needed basis for wetland mitigation sites within fallow agricultural fields located in the southern portion of the Installation.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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17. Continue to monitor all mitigation sites for potential problems and infestations of common reed.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

18. Coordinate common reed control treatments and monitor in identified infestation areas.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

19. Reassess conditions in the Southeast Redwing Lake Wetlands SIA to determine if sewage and runoff are impacting wetlands. Work with NAVFAC Mid-Atlantic personnel to correct the issue, if necessary.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter full description of Objective.

Enter Key Considerations if applicable.

20. Continue to monitor the Lovetts Marsh wetland mitigation site, and implement additional hardwood control and water level manipulations as required to achieve goals.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter Key Considerations if applicable.

21. Contact the USACE Norfolk District Office, to pursue obtaining mitigation credit for removal of pine in the Interdunal Swale, Dune, and Freshwater Marsh SIA.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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22. Coordinate timber harvesting or salvage operations with the NAVFAC Regional Forester as required.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

23. Coordinate with the NAVFAC Regional Forester to assess impacts of any proposed MILCON projects on forest and, where practicable, arrange timber sales.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

24. Continue implementing controlled burning to reduce fuel loads and enhance wildlife habitat in accordance with the Installation's most current Prescribed Burn and Smoke Management Plan.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter full description of Objective.

Enter Key Considerations if applicable.

25. Update the Prescribed Burn and Smoke Management Plan (2010) annually to reflect accomplishments and set new goals.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter Key Considerations if applicable.

26. Maintain firebreaks and fire lines for each burn unit as needed.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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27. Monitor forest stands to control southern pine beetle and other insect and disease outbreaks.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

28. Continue to maintain vegetation within portions of the northern and southern areas of the Installation through a combination of mowing and controlled burning to provide a variety of grassland and scrub-shrub habitats.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

29. Implement mowing restrictions as recommended by VDGIF if a canebrake rattlesnake is observed on the Installation.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter full description of Objective.

Enter Key Considerations if applicable.

30. Continue to use prescribed fire to manage portions of the fallow agricultural fields in the southern portion of the Installation to control woody vegetation and promote a mix of native warm season grasses and forbs.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter Key Considerations if applicable.

31. Continue to cooperate with VDGIF to set annual hunting seasons and bag limits at the Installation, and continue to collect, summarize, and report deer harvest data annually to VDGIF to help assess deer population levels and herd condition.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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32. Conduct annual inspections and maintenance of bat, bluebird, and wood duck boxes prior to 01 February each year, and monitor nesting activity throughout the nesting season.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

33. Develop a plan to install up to 10 wood duck boxes at Lovetts Marsh and the MACS 24 wetland mitigation site. GPS locate the new nest boxes, and update the nest box location on Figure 3-5 and on the monitoring sheet in Appendix H.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

34. Develop and implement a redistribution plan for wood duck boxes. GPS new locations, correct the GIS data layer for nest box locations, and update the nest box data log (Figure 3-5 and Appendix H).

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter full description of Objective.

Enter Key Considerations if applicable.

35. Conduct periodic inspections of the beach access walkways, nature trail/floating boardwalk and wildlife viewing platforms to ensure appropriate utilization.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter Key Considerations if applicable.

36. Continue to monitor and treat common reed, alligator weed, and other invasive plants as needed.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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37. Have appropriate NR staff attend annual CLE refresher courses.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

38. Coordinate with and obtain the required permits from the appropriate state and federal agencies for any Installation activities with the potential to impact marine resources.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

39. Monitor interdunal swale wetlands for impacts. Install vehicle exclusion fencing and use signage in select areas to prevent trespassing.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter full description of Objective.

Enter Key Considerations if applicable.

40. Conduct a habitat assessment and species inventory of the nearshore environment.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter Key Considerations if applicable.

41. Continue to conduct daily sea turtle surveys from 15 May through 31 August following the sea turtle monitoring protocol and BO in Appendix F.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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42. Continue to maintain a database of all marine animal strandings that occur at NASO DNA, and report these to the Virginia Aquarium and Marine Science Center

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

43. Continue to coordinate annual sea turtle track and nest identification training for beach patrol personnel.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

44. Schedule updated rare, threatened, and endangered species surveys with concurrence from VDCR-DNH, continue to routinely monitor state rare species and significant natural ecosystems, and assist in the identification of marine resources as needed.

Select the INRMP Goal that this Objective applies to.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter full description of Objective.

Enter Key Considerations if applicable.

45. Continue to protect the Dune and Swale SIA by restricting training vehicle access across the dunes to the designated training route.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter Key Considerations if applicable.

46. Provide all beach patrol vehicles with updated copies of the 13 July 2011 BO on the BBNWR Sea Turtle Management Program and 2012 BO update, which identifies proper monitoring and management protocol for sea turtles observed at the Installation

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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47. Document and map annual dune restoration efforts and designate additional areas that require protection.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

48. Arrange a consultation with the VDCR-DNH if changes in land use or management practices for the SIAs located within this management unit are contemplated to obtain recommendations for minimizing impacts to these resources.

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Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

49. Initiate a long-term monitoring plan to assess the effectiveness of the dune protection program.

Select the INRMP Goal that this Objective applies to.

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Enter full description of Objective.

Enter Key Considerations if applicable.

50. Coordinate with the Disaster Preparation Team to install sand fencing and Christmas trees to stabilize and restore dunes.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter Key Considerations if applicable.

51. Install signs and fencing to restrict unauthorized access to the dunes and identify additional areas where fencing and signs are needed to block vehicle access roads that dissect the dune system and cause degradation, and coordinate installation with the Disaster Preparation Team.

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

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52. Complete the Environmental Checklist (see Appendix A), as needed, for those natural resources management actions that may affect a regulated or other Navy

Select the INRMP Goal that this Objective applies to.

Enter full description of Objective.

Enter Key Considerations if applicable.

1 - Ecosystem Integrity

Focus Area Score **0.90**

Per DoD Instruction 4715 and OPNAV Manual 5090 the goal of ecosystem management is to ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Ecosystems are functioning units of nature consisting of complex networks of relationships between land, water, and living resources and are subjected to various stressors ranging from human impacts to climate change, and as such, need to be managed in a way that allows for mitigation, adaptation, and long-term sustainability on a regional basis. The intent of this module is to define the ecosystems that occur on the installation/sites. The information will assess the integrity of these ecosystems and inform the annual Navy Natural Resource Conservation Metrics and reporting requirements.

Ecosystem classifications have been preloaded under the Ecosystem Integrity button. The list of ecosystems is comprised of (1) terrestrial ecosystems identified in Nature Serve's, "[Ecological Systems of the United States: A Working Classification of US Terrestrial Systems](#)" and (2) marine ecosystems identified in [NOAA's Coastal and Marine Ecological Classification Standard](#). For additional information on these classification schemes, go directly to the Nature Serve's [ecosystem online reference](#) or [view a list](#) of terrestrial ecosystems by Land Cover Classes, Biogeographic Divisions, and Ecological Systems. Additionally, go directly to the [CMECS Catalogue of Units](#), view their [Standard](#) or [view a list](#) of marine ecosystems, which only includes the Benthic Biotic, Surface Geology, and Water Column components of the classification scheme. Locally-defined ecosystems may be added to capture specific INRMP details and program management.

All questions followed by an asterisk * are mandatory and must be completed before the datacall can be approved and forwarded to DoD.

To start populating ecosystem information, click the gray 'Ecosystem' button on the upper right side of the screen.

Ecosystems

Focus Area Score **0.79**

Please validate (add/delete) the list of ecosystems below, add as necessary if none are listed, and ensure that they are correct. To **ADD** an ecosystem to the site/installation click the [blue](#) 'Select EcoSystems' button in the upper left. If you need an ecosystem that is not listed contact Tom Mayes (tom.mayes@navy.mil) or Tammy Conkle (Tamara.Conkle@navy.mil). Click on an Ecosystem row to view or update answers about each Ecosystem.

1. Altered Vegetation and Conifer Plantation

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

41.62

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1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

2. Atlantic Coastal Plain Embayed Region Tidal Freshwater Marsh

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

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1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

3. Atlantic Coastal Plain Small Brownwater River Floodplain Forest

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

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1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

4. Central Atlantic Coastal Plain Maritime Forest

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

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1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

5. Central Atlantic Coastal Plain Sandy Beach

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

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1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

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1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

6. Forest

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

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1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

7. Freshwater Ponds and Lakes

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

8. Marine Nearshore

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

9. Marine Oceanic

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

10. Northern Atlantic Coastal Plain Dune & Swale

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

11. Northern Atlantic Coastal Plain Maritime Forest

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

12. Scrubland

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

13. Southern Atlantic Coastal Plain Dune & Maritime Grassland

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

14. Southern Atlantic Coastal Plain Large River Floodplain Forest

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

15. Southern Atlantic Coastal Plain Nonriverine Swamp & Wet Hardwood Forest

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

16. Urban, High Density

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

17. Herbaceous

1.1. Has the ecosystem been identified in the INRMP? *

Yes
 No

1.2. If the ecosystem has been identified in the INRMP, to what degree are the INRMP goals and objectives being achieved? *

Fully Achieved
 Somewhat Achieved
 Not Achieved

1.3. What is the level of effect Natural Resources management actions have had on desired outcomes within the installation/site? *

Actions have had a positive effect on conditions
 Actions have had a limited effect on conditions
 Actions have not been effective

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

1.4. To what extent is the ecological system on the site(s) fragmented due to land or water conversion during the reporting period? *

- Ecosystem fragmentation is the result of five (5) of the phenomena
- Ecosystem fragmentation is the result of four (4) of the phenomena
- Ecosystem fragmentation is the result of three (3) of the phenomena
- Ecosystem fragmentation is the result of two (2) of the phenomena
- Ecosystem fragmentation is the result of one (1) of the phenomena
- No fragmentation

1.5. To what degree is the ecological system vulnerable to stressors? *

- Completely Vulnerable
- Severely Vulnerable to Stress
- Highly Vulnerable to Stress
- Moderately Vulnerable to Stress
- Slightly Vulnerable to Stress
- Not Vulnerable to Stress

1.6. Is the ecosystem effectively managed to sustain viable populations of species? *

- Not effectively managed
- Minimally effective management
- Moderately effective management
- Effectively managed

1.7. How does the ecosystem's condition within the site(s) compare to the condition outside the site(s)? *

- Condition is worse on the site(s)
- Condition is similar both on and off the site(s)
- Condition is better on the site(s)

1.8. How many acres of this ecosystem have been identified on the installation?

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1.9. How many acres of this ecosystem were conserved, enhanced or restored this past fiscal year?

Encroachment

Focus Area Score

1.00

An Encroachment Action Plan (EAP) is the primary tool and process which results in the identification, quantification, mitigation, and prevention of the potential encroachment challenges to an installation or a range. NAVFAC provides planning, environmental, legal, real estate support, and program management oversight for the Commander, Navy Installations Command (CNIC) Encroachment Management program. Per OPNAVINST 11010.40, Navy natural resources managers shall coordinate with mission component commands, COs of Navy installations, range COs, range complex coordinators, enhanced readiness teams, community plans and liaison officers and others with roles and responsibilities for encroachment identification, quantification, mitigation, and prevention.

1.10. Are conservation easements, or buffers, in place to provide an ecosystem integrity benefit on the site(s)? *

Comment: Yes = buffers and/or easements are in place to provide benefits. Riparian buffers are in place. Coordination with adjacent land owners has also been implemented to enhance buffers adjacent to the installation. NR team is looking to better utilize REPI funding to meet Conservation and Mission Goals and Objectives. NR program is looking to enhance existing buffer easements to better enhance/meet conservation needs.

No = opportunity exists, but easements/buffers have not been pursued

Yes

N/A = no opportunity, development is immediately adjacent to installation

1.11. How many miles of shoreline habitat are conserved, enhanced or restored this fiscal year? (miles)

2

1.12. How many acres of aquatic habitat are conserved, enhanced or restored this fiscal year? (acres)

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Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

1. Findings

Several Ecosystems will be altered in upcoming years to support mission requirements to reduce frequency interference due to vegetation height obstructions. An updated Prescribed and Wildland Fire Management Plan is being developed in support of enhancing Ecosystem integrity, supporting military mission & safety requirements, and supporting species of concern conservation. INRMP does not specifically discuss each of these ecosystems, INRMP just supplies a map identifying these ecosystems. INRMP does not identify stressors and threats to these ecosystems.

1. Recommendations

Continue efforts to document and enhance ecosystem integrity, ensuring to document ecosystem conversions that occur due to military mission requirements. Obtain new/updated Vegetation Community Layers after conversion requirements have been implemented. Prior to implementation of Ecosystem conversion and Prescribed/Wildland Fire Management Plan Implementation ensure coordination has been completed with USFWS, State Wildlife Agencies, and USACE. INRMP needs to be updated to discuss each of these ecosystems. INRMP needs to identify stressors and threats to these ecosystems. INRMP needs to identify health indicators for these ecosystems (in FY14, USFWS recommended utilizing Dead or Stressed Trees as an indicator of Wetland Forest Health). INRMP needs to identify the level of importance of each ecosystem within the Ecoregion (need to clearly define, is this watershed, or other scale designation) and how the installation's portion of this community/ecosystem contributes to the overall community (is this a noncontiguous/isolated parcel less than 10% of the total community type in the ecoregion; is this the only known occurrence of this community type in the ecoregion; etc.). Utilize the most current Vegetation Community/Ecosystem layers for the installation to target species specific surveying efforts.

2 - Listed Species Critical Habitat

Focus Area Score **0.84**

Listed Species & Critical Habitat

Focus Area Purpose: Evaluates the extent to which federally listed species have been identified and the INRMP provides conservation benefits to these species and their habitats.

Supplemental Information: The intent of this Focus Area is to identify the federally listed species that occur on a Navy installation, as well as assess if an INRMP provides the conservation benefits necessary to preclude designation of critical habitat for a particular species. In addition, information is collected about Proposed and Candidate Species and also about State, Local and other Species of interest. The USFWS has defined criteria to determine if an INRMP provides adequate special management or protection. These criteria must be detailed in the INRMP to demonstrate that designation of critical habitat is not necessary and that the installation is implementing the necessary measures to protect and conserve the habitat. The list of available species is derived from USFWS and NMFS data sources tracking the status of species worldwide plus those entered by navy users. Species are automatically placed into the correct table based upon species population code and its status. If a species status changes over the year users will not need to manually move the species from one type of table to the other, i.e. Threatened and Endangered, Proposed and Candidate, and State, Local, and other.

Instructions: Please create and or review the site(s) list of species for each of the three groups of species statuses and ensure that they are correct. To **ADD** a species to the site select a species status tab button, click the blue 'Select Species button', type the filters you wish to filter on and click the blue 'Filter Results' button for the filtered species list. Clicking the blue Common Name of a species will take you to ECOS's web site for the selected species. Clicking the row of the species population applicable to the site(s) and pressing the blue 'Save Selected Species' button will add the species to the site(s) list of species. Note you do not need to be in any specific species status tab, the system will automatically place the species correctly. Also from the blue 'Select Species' button on each of the three specific species status tabs you can view more about the species, delete it from the site(s) and also manage which sites the species resides using the blue 'Manage' button.

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Select the name of the preloaded species to answer the questions for the current reporting period. To propose adding a species that is not in the database list or to propose a change or delete a species from the list click the main menu 'Species' then the submenu 'Search / Update'; from there you can propose all the above.

Please answer the questions for each of the species selected from the preloaded list for each of the three species status tab buttons. Questions are tailored to the species status. Last, please answer the questions in the 'Unoccupied Critical Habitat' tab button.

Questions followed by an asterisk * are mandatory and must be completed before the datacall can be approved and forwarded to DoD.

Federal Status Codes

(E) Endangered. A species in danger of extinction throughout all or a significant portion of its range.

(T) Threatened. A species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

(C) Candidate. A species under consideration for official listing for which there is sufficient information to support listing.

SAE, E(S/A) Endangered due to similarity of appearance. A species that is endangered due to similarity of appearance with another listed species and is listed for its protection. Species listed as E(S/A) are not biologically endangered or threatened and are not subject to Section 7 consultation.

SAT, T(S/A) = threatened due to similarity of appearance. A species that is threatened due to similarity of appearance with another listed species and is listed for its protection. Species listed as T(S/A) are not biologically endangered or threatened and are not subject to Section 7 consultation.

(EXPE, XE) Experimental essential population. A species listed as experimental and essential.

(EXPN, XN) Experimental non-essential population. A species listed as experimental and non-essential. Experimental, nonessential populations of endangered species (e.g., red wolf) are treated as threatened species on public land, for consultation purposes, and as species proposed for listing on

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private land.

(PE) Proposed endangered. Species proposed for official listing as endangered.

(PT) Proposed threatened. Species proposed for official listing as threatened.

(PEXPE, PXE) Proposed experimental population, essential. Species proposed for official listing as experimental and essential.

(PEXPN, PXN) Proposed experimental population, non-essential. Species proposed for official listing as experimental and non-essential.

PSAE, PE (S/A) Proposed endangered, due to similarity of appearance. Species proposed for official listing as endangered due to similarity of appearance with another listed species.

PSAT, PT (S/A) Proposed threatened, due to similarity of appearance. Species proposed for official listing as threatened due to similarity of appearance with another listed species.

(EE) Emergency Endangered - A temporary (240) day listing for emergency purposes when species is at significant, immediate risk.

(SC) Species of Concern - Species that have not been petitioned or been given E, T, or C status but have been identified as important to monitor.

(RT) Resolved Taxon - Species that have been petitioned for listing and for which a Not Warranted 12 month finding or Not Substantial 90-day finding has been published in the Federal Register. Also includes species that have been removed from the candidate list.

(UR) Under Review - Species that have been petitioned for listing and for which a 90 day finding has not been published or for which a 90 day substantial has been published but a 12 Month finding have not yet been published in the Federal Register. Also includes species that are being reviewed through the candidate process, but the CNOR has not yet been signed.

(NL) Not Listed.

State Codes

(SE) State listed as Endangered – Species is in imminent danger of extinction within the state.

(ST) State listed as Threatened - State population listed as Threatened

(StC) State Candidate – Candidate species for listing at the state level

(SCD) State Candidate (Delisting) - Candidate species for de-listing at the state level

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(SSC) State Species of Special Concern - Species identified by any state that have not been petitioned or been given E, T, or C status but have been identified as important to monitor.

Other Codes

(TER-E) Territory listed as Endangered – Species is in imminent danger of extinction within the territory.

(TER-T) Territory listed as Threatened – Species population is listed as threatened within the territory.

(TER-C) Territory Candidate – Species population is listed as a Candidate species for listing within the territory.

(TER-D) Territory Candidate (Delisting) – Species population is listed as a candidate species for De-listing within the territory.

(TER-SC) Territory Species of Special Concern – Species identified by any territory that have not been petitioned or been given E, T, or C status but have been identified as important to monitor.

[\(BCC\) Birds of Conservation Concern](#)

[IUCN Red List](#)

Threatened and Endangered Species

Focus Area Score

0.84

Please validate (add/delete) the list of species below, add as necessary if none are listed, and ensure that they are correct. To **ADD** a species to the site/installation, select a species tab button, then click the [blue](#) 'Select Species' button in the upper left. Click on a species row to view or update answers about each species.

1. Atlantic sturgeon :: *Acipenser oxyrinchus oxyrinchus*

2.1. Have surveys been completed for this species on the site(s)? *

- Yes
- No
- Extirpated
- Not Warranted

2.1.a. What is date when surveys were completed? Format: (MM/DD/YYYY)

2.1.b. Why are surveys not required for this species?

- Only transits nearshore waters
- Only transits migratory flyway
- Occasional sighting during migration
- Occasional sighting based on seasonal conditions
- Other

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2.2. Do existing surveys provide adequate data on habitat conditions on the site(s)? *

- Yes
 No
 Not Warranted

2.3. Do existing surveys provide adequate data on population presence and numbers on the site(s)? *

- Yes
 No
 Not Warranted

2.4. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species? *

- None
 Minimal
 Moderate
 Good
 Excellent
 N/A

PLEASE GAUGE YOUR RESPONSES FOR THIS REPORTING PERIOD ONLY.

2.5. Has critical habitat been proposed for the species during the reporting period on the site(s) (per Federal Register [FR] Final Rule)? *

- Yes
 No
 N/A (Critical habitat designation was not proposed)
 CH determination currently under review

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.5.a. Did the Navy respond?

Yes
 No

2.5.b. Please upload response to document library.

2.6. Has the critical habitat been designated for this species during the reporting period on the site(s)? *

Yes
 No
 N/A (Critical habitat has not been designated)

2.6.a. If critical habitat was proposed for this species but has not been designated during the reporting period on the site(s), under which provision of the ESA (Sec. 4) was exemption/exclusion granted? *

National Security (Exclusion) (4(b)(2))
 INRMP (Exemption) (4(a)(3)(B))
 N/A (Critical habitat designation was not proposed)

2.6.b. Why not? *

National Security (Exclusion)
 INRMP (Exemption)
 N/A (Critical habitat designation was not proposed)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.6.c. Date critical habitat was designated? Format: (MM/DD/YYYY)

2.6.d. Effective date of critical habitat? Format: (MM/DD/YYYY)

2.6.e. Acreage of critical habitat designated?

2.7. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the INRMP? *

Yes
 No
 N/A

2.8. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the EPRWeb? *

Yes
 No
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.9. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No

2.10. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices. *

Comment: Confirmation is based off of dead stranding accounts on the installation. The species is known to live/occur in the nearshore environment associated with the installation. The bulk of the habitat is not owned by the Navy but is utilized by the Navy. Formal Marine Surveys are underway that will also confirm presence/absence and provide habitat condition data; however population numbers cannot be derived from this data.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

2. Hawksbill sea turtle :: *Eretmochelys imbricata*

2.1. Have surveys been completed for this species on the site(s)? *

Yes
 No
 Extirpated
 Not Warranted

2.1.a. What is date when surveys were completed? Format: (MM/DD/YYYY)

8/31/2016

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.1.b. Why are surveys not required for this species?

- Only transits nearshore waters
- Only transits migratory flyway
- Occasional sighting during migration
- Occasional sighting based on seasonal conditions
- Other

2.2. Do existing surveys provide adequate data on habitat conditions on the site(s)? *

- Yes
- No
- Not Warranted

2.3. Do existing surveys provide adequate data on population presence and numbers on the site(s)? *

- Yes
- No
- Not Warranted

2.4. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species? *

- None
- Minimal
- Moderate
- Good
- Excellent
- N/A

PLEASE GAUGE YOUR RESPONSES FOR THIS REPORTING PERIOD ONLY.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.5. Has critical habitat been proposed for the species during the reporting period on the site(s) (per Federal Register [FR] Final Rule)? *

- Yes
 No
 N/A (Critical habitat designation was not proposed)
 CH determination currently under review

2.5.a. Did the Navy respond?

- Yes
 No

2.5.b. Please upload response to document library.

2.6. Has the critical habitat been designated for this species during the reporting period on the site(s)? *

- Yes
 No
 N/A (Critical habitat has not been designated)

2.6.a. If critical habitat was proposed for this species but has not been designated during the reporting period on the site(s), under which provision of the ESA (Sec. 4) was exemption/exclusion granted? *

- National Security (Exclusion) (4(b)(2))
 INRMP (Exemption) (4(a)(3)(B))
 N/A (Critical habitat designation was not proposed)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.6.b. Why not? *

- National Security (Exclusion)
 INRMP (Exemption)
 N/A (Critical habitat designation was not proposed)

2.6.c. Date critical habitat was designated? Format: (MM/DD/YYYY)

2.6.d. Effective date of critical habitat? Format: (MM/DD/YYYY)

2.6.e. Acreage of critical habitat designated?

2.7. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the INRMP? *

- Yes
 No
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.8. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the EPRWeb? *

Yes
 No
 N/A

2.9. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Comment: BA was submitted in FY16; however, BO with CR was not received until FY17. Question will be updated to Yes during FY17 metrics. Note: Installation is already implementing the CR thru a verbal agreement with VIMS (this started in July of FY16 before the BO-CR was issued).

Yes
 No

2.10. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices. *

Comment: Not Nesting, but known to occur in nearshore environment. Strandings on installation are possible. There was one potential cold stunned stranding of a hawksbill but official records could not confirm the occurrence.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

3. Kemp's ridley sea turtle :: *Lepidochelys kempii*

2.1. Have surveys been completed for this species on the site(s)? *

Yes
 No
 Extirpated
 Not Warranted

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.1.a. What is date when surveys were completed? Format: (MM/DD/YYYY)

8/31/2016

2.1.b. Why are surveys not required for this species?

- Only transits nearshore waters
- Only transits migratory flyway
- Occasional sighting during migration
- Occasional sighting based on seasonal conditions
- Other

2.2. Do existing surveys provide adequate data on habitat conditions on the site(s)? *

- Yes
- No
- Not Warranted

2.3. Do existing surveys provide adequate data on population presence and numbers on the site(s)? *

- Yes
- No
- Not Warranted

2.4. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species? *

- None
- Minimal
- Moderate
- Good
- Excellent
- N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

PLEASE GAUGE YOUR RESPONSES FOR THIS REPORTING PERIOD ONLY.

2.5. Has critical habitat been proposed for the species during the reporting period on the site(s) (per Federal Register [FR] Final Rule)? *

- Yes
 No
 N/A (Critical habitat designation was not proposed)
 CH determination currently under review

2.5.a. Did the Navy respond?

- Yes
 No

2.5.b. Please upload response to document library.

2.6. Has the critical habitat been designated for this species during the reporting period on the site(s)? *

- Yes
 No
 N/A (Critical habitat has not been designated)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.6.a. If critical habitat was proposed for this species but has not been designated during the reporting period on the site(s), under which provision of the ESA (Sec. 4) was exemption/exclusion granted? *

- National Security (Exclusion) (4(b)(2))
 INRMP (Exemption) (4(a)(3)(B))
 N/A (Critical habitat designation was not proposed)

2.6.b. Why not? *

- National Security (Exclusion)
 INRMP (Exemption)
 N/A (Critical habitat designation was not proposed)

2.6.c. Date critical habitat was designated? Format: (MM/DD/YYYY)

2.6.d. Effective date of critical habitat? Format: (MM/DD/YYYY)

2.6.e. Acreage of critical habitat designated?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.7. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the INRMP? *

Yes
 No
 N/A

2.8. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the EPRWeb? *

Yes
 No
 N/A

2.9. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Comment: BA was submitted in FY16; however, BO with CR was not received until FY17. Question will be updated to Yes during FY17 metrics. Note: Installation is already implementing the CR thru a verbal agreement with VIMS (this started in July of FY16 before the BO-CR was issued).

Yes
 No

2.10. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices. *

Comment: Confirmed to Nest on Installation. Confirmed Strandings on Installation.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

4. Leatherback sea turtle :: *Dermochelys coriacea*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.1. Have surveys been completed for this species on the site(s)? *

- Yes
 No
 Extirpated
 Not Warranted

2.1.a. What is date when surveys were completed? Format: (MM/DD/YYYY)

8/31/2016

2.1.b. Why are surveys not required for this species?

- Only transits nearshore waters
 Only transits migratory flyway
 Occasional sighting during migration
 Occasional sighting based on seasonal conditions
 Other

2.2. Do existing surveys provide adequate data on habitat conditions on the site(s)? *

- Yes
 No
 Not Warranted

2.3. Do existing surveys provide adequate data on population presence and numbers on the site(s)? *

- Yes
 No
 Not Warranted

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.4. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species? *

- None
- Minimal
- Moderate
- Good
- Excellent
- N/A

PLEASE GAUGE YOUR RESPONSES FOR THIS REPORTING PERIOD ONLY.

2.5. Has critical habitat been proposed for the species during the reporting period on the site(s) (per Federal Register [FR] Final Rule)? *

- Yes
- No
- N/A (Critical habitat designation was not proposed)
- CH determination currently under review

2.5.a. Did the Navy respond?

- Yes
- No

2.5.b. Please upload response to document library.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.6. Has the critical habitat been designated for this species during the reporting period on the site(s)? *

- Yes
 No
 N/A (Critical habitat has not been designated)

2.6.a. If critical habitat was proposed for this species but has not been designated during the reporting period on the site(s), under which provision of the ESA (Sec. 4) was exemption/exclusion granted? *

- National Security (Exclusion) (4(b)(2))
 INRMP (Exemption) (4(a)(3)(B))
 N/A (Critical habitat designation was not proposed)

2.6.b. Why not? *

- National Security (Exclusion)
 INRMP (Exemption)
 N/A (Critical habitat designation was not proposed)

2.6.c. Date critical habitat was designated? Format: (MM/DD/YYYY)

2.6.d. Effective date of critical habitat? Format: (MM/DD/YYYY)

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2.6.e. Acreage of critical habitat designated?

2.7. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the INRMP? *

Yes
 No
 N/A

2.8. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the EPRWeb? *

Yes
 No
 N/A

2.9. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Comment: BA was submitted in FY16; however, BO with CR was not received until FY17. Question will be updated to Yes during FY17 metrics. Note: Installation is already implementing the CR thru a verbal agreement with VIMS (this started in July of FY16 before the BO-CR was issued).

Yes
 No

2.10. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices. *

Comment: Confirmed Strandings on Installation. Species has not been confirmed to nest on site.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

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5. Loggerhead sea turtle :: *Caretta caretta*

2.1. Have surveys been completed for this species on the site(s)? *

- Yes
 No
 Extirpated
 Not Warranted

2.1.a. What is date when surveys were completed? Format: (MM/DD/YYYY)

8/31/2016

2.1.b. Why are surveys not required for this species?

- Only transits nearshore waters
 Only transits migratory flyway
 Occasional sighting during migration
 Occasional sighting based on seasonal conditions
 Other

2.2. Do existing surveys provide adequate data on habitat conditions on the site(s)? *

- Yes
 No
 Not Warranted

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.3. Do existing surveys provide adequate data on population presence and numbers on the site(s)? *

- Yes
 No
 Not Warranted

2.4. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species? *

- None
 Minimal
 Moderate
 Good
 Excellent
 N/A

PLEASE GAUGE YOUR RESPONSES FOR THIS REPORTING PERIOD ONLY.

2.5. Has critical habitat been proposed for the species during the reporting period on the site(s) (per Federal Register [FR] Final Rule)? *

- Yes
 No
 N/A (Critical habitat designation was not proposed)
 CH determination currently under review

2.5.a. Did the Navy respond?

- Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.5.b. Please upload response to document library.

2.6. Has the critical habitat been designated for this species during the reporting period on the site(s)? *

- Yes
 No
 N/A (Critical habitat has not been designated)

2.6.a. If critical habitat was proposed for this species but has not been designated during the reporting period on the site(s), under which provision of the ESA (Sec. 4) was exemption/exclusion granted? *

- National Security (Exclusion) (4(b)(2))
 INRMP (Exemption) (4(a)(3)(B))
 N/A (Critical habitat designation was not proposed)

2.6.b. Why not? *

- National Security (Exclusion)
 INRMP (Exemption)
 N/A (Critical habitat designation was not proposed)

2.6.c. Date critical habitat was designated? Format: (MM/DD/YYYY)

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2.6.d. Effective date of critical habitat? Format: (MM/DD/YYYY)

2.6.e. Acreage of critical habitat designated?

2.7. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the INRMP? *

Yes
 No
 N/A

2.8. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the EPRWeb? *

Yes
 No
 N/A

2.9. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Comment: BA was submitted in FY16; however, BO with CR was not received until FY17. Question will be updated to Yes during FY17 metrics. Note: Installation is already implementing the CR thru a verbal agreement with VIMS (this started in July of FY16 before the BO-CR was issued).

Yes
 No

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2.10. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices. *

Comment: Nests on site. Strandings also confirmed on site. Species is known to occur in nearshore environment.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

6. Northern Long-Eared Bat :: *Myotis septentrionalis*

2.1. Have surveys been completed for this species on the site(s)? *

- Yes
- No
- Extirpated
- Not Warranted

2.1.a. What is date when surveys were completed? Format: (MM/DD/YYYY)

11/16/2015

2.1.b. Why are surveys not required for this species?

- Only transits nearshore waters
- Only transits migratory flyway
- Occasional sighting during migration
- Occasional sighting based on seasonal conditions
- Other

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.2. Do existing surveys provide adequate data on habitat conditions on the site(s)? *

- Yes
 No
 Not Warranted

2.3. Do existing surveys provide adequate data on population presence and numbers on the site(s)? *

- Yes
 No
 Not Warranted

2.4. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species? *

- None
 Minimal
 Moderate
 Good
 Excellent
 N/A

PLEASE GAUGE YOUR RESPONSES FOR THIS REPORTING PERIOD ONLY.

2.5. Has critical habitat been proposed for the species during the reporting period on the site(s) (per Federal Register [FR] Final Rule)? *

- Yes
 No
 N/A (Critical habitat designation was not proposed)
 CH determination currently under review

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.5.a. Did the Navy respond?

Yes
 No

2.5.b. Please upload response to document library.

2.6. Has the critical habitat been designated for this species during the reporting period on the site(s)? *

Yes
 No
 N/A (Critical habitat has not been designated)

2.6.a. If critical habitat was proposed for this species but has not been designated during the reporting period on the site(s), under which provision of the ESA (Sec. 4) was exemption/exclusion granted? *

National Security (Exclusion) (4(b)(2))
 INRMP (Exemption) (4(a)(3)(B))
 N/A (Critical habitat designation was not proposed)

2.6.b. Why not? *

National Security (Exclusion)
 INRMP (Exemption)
 N/A (Critical habitat designation was not proposed)

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2.6.c. Date critical habitat was designated? Format: (MM/DD/YYYY)

2.6.d. Effective date of critical habitat? Format: (MM/DD/YYYY)

2.6.e. Acreage of critical habitat designated?

2.7. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the INRMP? *

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No
<input checked="" type="checkbox"/>	N/A

2.8. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the EPRWeb? *

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No
<input checked="" type="checkbox"/>	N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.9. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Comment: No Tree Clearing from 01 Jun to 31 Jul, during pupping season.

Yes
 No

2.10. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices. *

Comment: Confirmed via acoustic monitoring.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

7. Piping Plover :: *Charadrius melodus*

2.1. Have surveys been completed for this species on the site(s)? *

Yes
 No
 Extirpated
 Not Warranted

2.1.a. What is date when surveys were completed? Format: (MM/DD/YYYY)

8/29/2016

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.1.b. Why are surveys not required for this species?

- Only transits nearshore waters
- Only transits migratory flyway
- Occasional sighting during migration
- Occasional sighting based on seasonal conditions
- Other

2.2. Do existing surveys provide adequate data on habitat conditions on the site(s)? *

- Yes
- No
- Not Warranted

2.3. Do existing surveys provide adequate data on population presence and numbers on the site(s)? *

- Yes
- No
- Not Warranted

2.4. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species? *

- None
- Minimal
- Moderate
- Good
- Excellent
- N/A

PLEASE GAUGE YOUR RESPONSES FOR THIS REPORTING PERIOD ONLY.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.5. Has critical habitat been proposed for the species during the reporting period on the site(s) (per Federal Register [FR] Final Rule)? *

- Yes
 No
 N/A (Critical habitat designation was not proposed)
 CH determination currently under review

2.5.a. Did the Navy respond?

- Yes
 No

2.5.b. Please upload response to document library.

2.6. Has the critical habitat been designated for this species during the reporting period on the site(s)? *

- Yes
 No
 N/A (Critical habitat has not been designated)

2.6.a. If critical habitat was proposed for this species but has not been designated during the reporting period on the site(s), under which provision of the ESA (Sec. 4) was exemption/exclusion granted? *

- National Security (Exclusion) (4(b)(2))
 INRMP (Exemption) (4(a)(3)(B))
 N/A (Critical habitat designation was not proposed)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.6.b. Why not? *

- National Security (Exclusion)
 INRMP (Exemption)
 N/A (Critical habitat designation was not proposed)

2.6.c. Date critical habitat was designated? Format: (MM/DD/YYYY)

2.6.d. Effective date of critical habitat? Format: (MM/DD/YYYY)

2.6.e. Acreage of critical habitat designated?

2.7. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the INRMP? *

- Yes
 No
 N/A

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2.8. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the EPRWeb? *

Yes
 No
 N/A

2.9. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Comment: Not Official BO CRs, but controlling Coyote & Fox populations has been recommended by the team and partners. We had a potential piping plover nest this year that may have been predated by coyotes.

Yes
 No

2.10. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices. *

Comment: Confirmed in Migration and Breeding Season. No nests have been confirmed. One potential nest, may have been predated before confirmation could be obtained.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

8. Red knot :: *Calidris canutus rufa*

2.1. Have surveys been completed for this species on the site(s)? *

Yes
 No
 Extirpated
 Not Warranted

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.1.a. What is date when surveys were completed? Format: (MM/DD/YYYY)

8/29/2016

2.1.b. Why are surveys not required for this species?

- Only transits nearshore waters
- Only transits migratory flyway
- Occasional sighting during migration
- Occasional sighting based on seasonal conditions
- Other

2.2. Do existing surveys provide adequate data on habitat conditions on the site(s)? *

- Yes
- No
- Not Warranted

2.3. Do existing surveys provide adequate data on population presence and numbers on the site(s)? *

- Yes
- No
- Not Warranted

2.4. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species? *

- None
- Minimal
- Moderate
- Good
- Excellent
- N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

PLEASE GAUGE YOUR RESPONSES FOR THIS REPORTING PERIOD ONLY.

2.5. Has critical habitat been proposed for the species during the reporting period on the site(s) (per Federal Register [FR] Final Rule)? *

- Yes
 No
 N/A (Critical habitat designation was not proposed)
 CH determination currently under review

2.5.a. Did the Navy respond?

- Yes
 No

2.5.b. Please upload response to document library.

2.6. Has the critical habitat been designated for this species during the reporting period on the site(s)? *

- Yes
 No
 N/A (Critical habitat has not been designated)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.6.a. If critical habitat was proposed for this species but has not been designated during the reporting period on the site(s), under which provision of the ESA (Sec. 4) was exemption/exclusion granted? *

- National Security (Exclusion) (4(b)(2))
 INRMP (Exemption) (4(a)(3)(B))
 N/A (Critical habitat designation was not proposed)

2.6.b. Why not? *

- National Security (Exclusion)
 INRMP (Exemption)
 N/A (Critical habitat designation was not proposed)

2.6.c. Date critical habitat was designated? Format: (MM/DD/YYYY)

2.6.d. Effective date of critical habitat? Format: (MM/DD/YYYY)

2.6.e. Acreage of critical habitat designated?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.7. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the INRMP? *

Yes
 No
 N/A

2.8. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the EPRWeb? *

Yes
 No
 N/A

2.9. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No

2.10. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices. *

Comment: Species has not been confirmed within the last 5 years to be on site; however, there has been documentation that indicates the species has historically been observed on the installation. Does not breed on site. Potential and previous migrant species.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

9. Roseate tern :: *Sterna dougallii dougallii*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.1. Have surveys been completed for this species on the site(s)? *

- Yes
 No
 Extirpated
 Not Warranted

2.1.a. What is date when surveys were completed? Format: (MM/DD/YYYY)

8/29/2016

2.1.b. Why are surveys not required for this species?

- Only transits nearshore waters
 Only transits migratory flyway
 Occasional sighting during migration
 Occasional sighting based on seasonal conditions
 Other

2.2. Do existing surveys provide adequate data on habitat conditions on the site(s)? *

- Yes
 No
 Not Warranted

2.3. Do existing surveys provide adequate data on population presence and numbers on the site(s)? *

- Yes
 No
 Not Warranted

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.4. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species? *

- None
- Minimal
- Moderate
- Good
- Excellent
- N/A

PLEASE GAUGE YOUR RESPONSES FOR THIS REPORTING PERIOD ONLY.

2.5. Has critical habitat been proposed for the species during the reporting period on the site(s) (per Federal Register [FR] Final Rule)? *

- Yes
- No
- N/A (Critical habitat designation was not proposed)
- CH determination currently under review

2.5.a. Did the Navy respond?

- Yes
- No

2.5.b. Please upload response to document library.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.6. Has the critical habitat been designated for this species during the reporting period on the site(s)? *

- Yes
 No
 N/A (Critical habitat has not been designated)

2.6.a. If critical habitat was proposed for this species but has not been designated during the reporting period on the site(s), under which provision of the ESA (Sec. 4) was exemption/exclusion granted? *

- National Security (Exclusion) (4(b)(2))
 INRMP (Exemption) (4(a)(3)(B))
 N/A (Critical habitat designation was not proposed)

2.6.b. Why not? *

- National Security (Exclusion)
 INRMP (Exemption)
 N/A (Critical habitat designation was not proposed)

2.6.c. Date critical habitat was designated? Format: (MM/DD/YYYY)

2.6.d. Effective date of critical habitat? Format: (MM/DD/YYYY)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.6.e. Acreage of critical habitat designated?

2.7. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the INRMP? *

Yes
 No
 N/A

2.8. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the EPRWeb? *

Yes
 No
 N/A

2.9. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No

2.10. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices. *

Comment: Confirmed during migration. Does not breed/nest on installation. Last confirmed (single bird in mixed tern flock) in FY2016.

Confirmed
 Potentially
 Offsite within 5 mi of installation
 Offsite not within 5 mi of installation
 Confirmed in nearshore waters
 Within 5 miles nearshore waters

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

10. Shortnose sturgeon :: *Acipenser brevirostrum*

2.1. Have surveys been completed for this species on the site(s)? *

- Yes
 No
 Extirpated
 Not Warranted

2.1.a. What is date when surveys were completed? Format: (MM/DD/YYYY)

2.1.b. Why are surveys not required for this species?

- Only transits nearshore waters
 Only transits migratory flyway
 Occasional sighting during migration
 Occasional sighting based on seasonal conditions
 Other

2.2. Do existing surveys provide adequate data on habitat conditions on the site(s)? *

- Yes
 No
 Not Warranted

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.3. Do existing surveys provide adequate data on population presence and numbers on the site(s)? *

- Yes
 No
 Not Warranted

2.4. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species? *

- None
 Minimal
 Moderate
 Good
 Excellent
 N/A

PLEASE GAUGE YOUR RESPONSES FOR THIS REPORTING PERIOD ONLY.

2.5. Has critical habitat been proposed for the species during the reporting period on the site(s) (per Federal Register [FR] Final Rule)? *

- Yes
 No
 N/A (Critical habitat designation was not proposed)
 CH determination currently under review

2.5.a. Did the Navy respond?

- Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.5.b. Please upload response to document library.

2.6. Has the critical habitat been designated for this species during the reporting period on the site(s)? *

- Yes
 No
 N/A (Critical habitat has not been designated)

2.6.a. If critical habitat was proposed for this species but has not been designated during the reporting period on the site(s), under which provision of the ESA (Sec. 4) was exemption/exclusion granted? *

- National Security (Exclusion) (4(b)(2))
 INRMP (Exemption) (4(a)(3)(B))
 N/A (Critical habitat designation was not proposed)

2.6.b. Why not? *

- National Security (Exclusion)
 INRMP (Exemption)
 N/A (Critical habitat designation was not proposed)

2.6.c. Date critical habitat was designated? Format: (MM/DD/YYYY)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.6.d. Effective date of critical habitat? Format: (MM/DD/YYYY)

2.6.e. Acreage of critical habitat designated?

2.7. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the INRMP? *

Yes
 No
 N/A

2.8. If a previously designated critical habitat exemption/exclusion exists for this species on the site(s), are critical habitat management projects clearly identified in the EPRWeb? *

Yes
 No
 N/A

2.9. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.10. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices. *

Comment: The species is known to live/occur in the nearshore environment associated with the installation. The bulk of the habitat is not owned by the Navy but is utilized by the Navy. Formal Marine Surveys are underway that will also confirm presence/absence and provide habitat condition data; however population numbers cannot be derived from this data.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

Proposed and Candidate Species

Please validate (add/delete) the list of species below, add as necessary if none are listed, and ensure that they are correct. To **ADD** a species to the site/installation, select a species tab button, then click the [blue](#) 'Select Species' button in the upper left. Click on a species row to view or update answers about each species.

1. Green sea turtle :: *Chelonia mydas*

2.11. Does the ecosystem management approach outlined in the INRMP provide conservation benefits to this species?

Yes
 No
 N/A

2.11.a. Do you have a plan to address this? (If no, explain why not in the comments)

Yes
 No

2.11.a.1. When will this species be addressed?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.12. Please select an ecosystem(s)/habitat(s) that is/are associated with this species.

Southern Atlantic Coastal Plain Dune & Maritime Grassland

2.13. Please identify the mission type(s) impacted by the species.

Comment: Datacall Station did not have a drop down list for selection: Equipment Testing & Evaluation, LCAC Training, Amphibious Vehicle Training, EOD training, Physical Fitness Training, Elements Condition Training, etc.

2.14. Briefly describe the type of potential impact this species could have if it were to be listed.

No additional impacts from what is already applied on the installation due to other listed sea turtle species that are confirmed to occur on the installation.

2.15. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.16. Does the Navy have 95% or more of the total management burden for this species?

- Yes
- No

State, Local, and other Species

Please validate (add/delete) the list of species below, add as necessary if none are listed, and ensure that they are correct. To **ADD** a species to the site/installation, select a species tab button, then click the [blue](#) 'Select Species' button in the upper left. Click on a species row to view or update answers about each species.

1. [Unnamed] star-grass :: *Hypoxis sessilis*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

2. American Halfchaff Sedge :: *Lipocarpha maculata*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

3. Bald eagle :: *Haliaeetus leucocephalus*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

4. Beach, Virginian pinweed :: *Lechea maritima virginica*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

5. Black-fruited spike-rush :: *Eleocharis melanocarpa*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

6. Bluejack oak :: *Quercus incana*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

7. Bog Rush :: *Juncus biflorus*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

8. Carolina yelloweyed grass :: *Xyris caroliniana* Walter

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

9. Comet Darner :: *Anax longipes*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

10. Dune marsh elder :: *Iva imbricata*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

11. Early whitetop fleabane :: *Erigeron vernus*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

12. Fasciculate beaksedge :: *Rhynchospora fascicularis*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

13. Furtive Forktail :: *Ischnura prognata*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

14. Greater siren :: *Siren lacertina*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

15. Hairy fimbry :: *Fimbristylis puberula*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

16. King Rail :: *Rallus elegans*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

17. Long Beach seedbox :: *Ludwigia brevipes*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

18. Longleaf pine :: *Pinus palustris*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

19. Marsh rabbit :: *Sylvilagus palustris*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

20. Monarch butterfly :: *Danaus plexippus plexippus*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

21. Pungo white-footed mouse :: *Peromyscus leucopus easti*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

22. Rafinesque's big-eared bat :: *Plecotus rafinesquii*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
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- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

23. Roundhead rush :: *Juncus crassifolius*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

24. S-banded Tiger Beetle :: *Cicindela trifasciata*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

25. spoonleaf sundew :: *Drosera intermedia*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
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- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
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- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
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- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

26. Tall horned beaksedge :: *Rhynchospora macrostachya*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
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- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
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- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
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- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
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- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

27. White-margined Burrower Bug :: Species *Sehirus cinctus*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
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- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

28. Wright's beaksedge :: *Rhynchospora wrightiana*

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.17. What is the current status of the species?

- (SE) State listed as Endangered
- (ST) State listed as Threatened
- (StC) State Candidate
- (SCD) State Candidate (Delisting)
- (SCC) State Species of Special Concern
- (TER-E) Territory listed as Endangered
- (TER-T) Territory listed as Threatened
- (TER-C) Territory Candidate
- (TER-D) Territory Candidate (Delisting)
- (TER-SC) Territory Species of Special Concern
- (BCC) Birds of Conservation Concern
- IUCN Red List
- SAE, E(S/A) Endangered due to similarity of appearance
- SAT, T(S/A) = threatened due to similarity of appearance
- (EXPE, XE) Experimental essential population
- (EXPN, XN) Experimental non-essential population
- (PEXPE, PXE) Proposed experimental population, essential
- (PEXPN, PXN) Proposed experimental population, non-essential
- PSAE, PE (S/A) Proposed endangered, due to similarity of appearance
- PSAT, PT (S/A) Proposed threatened, due to similarity of appearance
- (EE) Emergency Endangered
- (SC) Species of Concern
- (RT) Resolved Taxon
- (UR) Under Review
- (NL) Not Listed
- Other (add to comments)

2.18. Does the Navy manage 95% or more of this species population?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.19. Estimate this installation's total management responsibility for the population of this species.

2.20. Have surveys been completed for this species on the site(s)?

Yes
 No

2.21. Do existing surveys provide adequate data on habitat conditions on the installation?

Yes
 No

2.22. Do existing surveys provide adequate data on population presence and numbers on the installation?

Yes
 No

2.23. To what extent are quantifiable goals, objectives, and monitoring requirements in place to address the conservation needs of the species?

None
 Minimal
 Moderate
 Good
 Excellent
 N/A

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2.24. Have any conservation recommendations pertaining to this species been identified during the reporting period that should be considered for incorporation in the INRMP?

- Yes
- No
- N/A

2.25. What is the level of concern with regard to impacts to military readiness/mission capabilities with the management of the species?

- High
- Medium
- Low

2.26. Provide a location status for this species from the choices provided below. See i-Note if your selection window clips the choices.

- Confirmed
- Potentially
- Offsite within 5 mi of installation
- Offsite not within 5 mi of installation
- Confirmed in nearshore waters
- Within 5 miles nearshore waters

2.27. Provide any other comments below:

Unoccupied Critical Habitat

Focus Area Score

2.28. Has unoccupied critical habitat for any federally listed species been designated on the site(s)? *

- Yes
- No
- N/A (Critical habitat designation was not proposed)

2.28.a. For which species?

2.29. Have management projects/actions addressing unoccupied critical habitat been clearly identified in the INRMP? *

- Yes
- No
- N/A

2.30. Have management projects/actions addressing unoccupied critical habitat been clearly identified in the EPRWeb? *

- Yes
- No
- N/A

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2. Findings

Northern long-eared bats were confirmed on the installation via acoustic monitoring efforts. Mist netting efforts did not capture NLEBs; however, the 1st documented SE Rafineque's big eared bat was captured via mist netting and acoustic survey efforts. For Sturgeon species, Nearshore environment surveys began in FY16; however, will not be completed until FY17 that will provide habitat data and presence/absence data but not population data. The majority of Nearshore environment is not owned by the Navy but the Navy conducts activities or has influence over the area. Monarch butterfly is still under 12 month review for listing proposal status by USFWS. USFWS is proposing a number of pollinator species for listing consideration. INRMP information regarding the above referenced species needs to be updated (update notices have been added to INRMP Updates section, but need to be incorporated into the body of the document).

The installation obtained a salvage permit for Sturgeon that have stranded on the installation. The installation is prepared and submitted its 1st Programmatic Biological Assessment to USFWS & VDGIF regarding Sea Turtle Management (BO received FY17). NASO partners with VA Army National Guard by conducting Daily Sea Turtle Nest/Crawl Patrols during nesting season on beaches adjacent to NASO Dam Neck Annex property.

2. Recommendations

Update the INRMP body text to reflect current status of species and provide more specific goals, objectives, and conservation criteria as depicted in the INRMP Updates Log at the front of the document.

Obtain USFWS/VDGIF Training and Permits associated with the implementation of the installation's Sea Turtle Program. Formalize, either via Cooperative Agreement, MOA or MOU, the Sea Turtle Beach/Sand Sea Turtle Nest Monitoring verbal agreement.

3 - Recreation Use and Access

Focus Area Score **0.88**

Focus Area Purpose: Evaluate the availability and adequacy of public recreational use opportunities, such as fishing and hunting, and access for handicapped and disabled persons, given security and safety requirements for the installation.

Comment on this Focus Area and associated Questions: Select this link below each question if you would like to elaborate on the answer provided. This is also a good way to document the assumptions made by all partners that contributed to the answer.

3. Are there Natural Resources related recreational opportunities on the reporting unit?

- Yes
- No: Landscape doesn't support recreational opportunities
- N/A: Not available due to mission, security, safety, or environmental constraints

3.1. Does the INRMP adequately identify outdoor recreational activities? *

- Not Adequately Addressed
- Minimally Addressed
- Moderately Addressed
- Completely Addressed

3.1.a. Please indicate the type(s) of outdoor recreation activities addressed in the INRMP and offered on the installation.

- Hunting
- Fishing
- Trapping
- Hiking
- Archery
- Wildlife watching
- Fresh watersports
- Marine watersports
- Day use-picnic
- Camping

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

3.1.b. Where mission, security, safety, and environmental constraints allow, the INRMP indicates use and access areas on the installation. *

Yes
 No
 N/A

3.2. If recreational opportunities are available, are they offered to the public? *

Yes
 No
 N/A (recreational opportunities are not available due to landscape or security constraints)

3.3. If recreational opportunities are available, are they offered to military or DoD civilian personnel? *

Yes
 No
 N/A (recreational opportunities are not available due to landscape or security constraints)

3.4. If recreational opportunities are available, are they accessible by disabled veterans/Americans? *

Yes
 No
 N/A (recreational opportunities are not available due to landscape or security constraints)

3.5. Are fees collected for outdoor recreational opportunities? *

Yes
 No
 N/A (recreational opportunities do not include hunting and fishing, and/or the collection of fees)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

3.5.a. How much was collected during the reporting period?

Comment: See NAS Oceana Metrics for this information as the Sikes Act account is a shared program amongst several installations, but is managed by the NASO NRM.

3.6. Are recreational facilities in good condition? *

- Yes
 No
 N/A (recreational opportunities are not available due to landscape or security constraints)

3.7. Are sustainable harvest goals in the INRMP effective for the management of the species' population? *

- Not Effective
 Minimal Effectiveness
 Moderate Effectiveness
 Effective
 Highly Effective
 N/A = (recreational opportunities do not include hunting and fishing)

3.8. To what extent did the installation develop and provide public outreach/educational awareness, e.g. environmental educational opportunities, natural resource field trips/tours, pamphlets? *

- No Public Outreach Provided
 Low Outreach
 Moderate Outreach
 Good Outreach
 Excellent Outreach
 N/A

3.9. Is there an active conservation law enforcement program (CLEP) on the installation? *

- Yes
 No
 N/A (INRMP or Natural Resources Program does NOT identify Conservation Law Enforcement as part of the program.
 Recreational opportunities do not include hunting and fishing)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

3.10. How many total work-hours per year are dedicated to law enforcement? (Includes full-time and part-time personnel)

Comment: See NAS Oceana Metrics for Details 1 Officer, shared resource.

3.11. Does the law enforcement program include federal (Non-Navy Civilian), state, or local or contractor personnel? (Select all that apply)

- Federal (Non-Navy Civilian)
- State
- Local
- Contractor
- Military

3.12. Please describe the funding sources used by the Law Enforcement Program.

Comment: See NAS Oceana Metrics for Details 1 Officer, shared resource.

- O&MN
- O&MNR
- MIS
- GWOT
- OPN
- ER,N
- RDT&EN
- Other

3.13. Are Law Enforcement personnel routinely supporting other programs? (Ex. Cultural Resources)

- Yes
- No

3.14. Do you have any inter-jurisdictional agreements for conservation law enforcement with other military departments, Federal, tribal, state or local law enforcement, or land management agencies?

Comment: See NAS Oceana Metrics for Details 1 Officer, shared resource.

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

3.15 Have conservation law enforcement officers completed the FLETC Land Management Police Training Program or equivalent?

Comment: See NAS Oceana Metrics for Details 1 Officer, shared resource.

Yes
 No
 N/A

3.16. Is a Conservation Law Enforcement Plan included in your INRMP and/or ICRMP?

Comment: Yes and no. There is currently verbiage; however, in FY16 and update CLEP Needs assessment was completed by an independent contractor who coordinated with applicable CLE agencies (State & Federal). The updated plan will be added to the INRMP once the ICO has been adequately briefed on its results.

Yes
 No

3.17. Please provide a brief description of the installation's Conservation Law Enforcement Program.

See NAS Oceana Metrics for Details 1 Officer, shared resource.

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

3. Findings

Currently there is no educational outreach coordinator. Outreach is subject to limited availability of Natural Resources Staff. Outreach was supplied through classroom training, public speaking, phone conversation, and handouts. (i.e., hunting, fishing, wildlife interactions, snakes, etc.).

The regional conservation law enforcement program is understaffed to adequately cover the needs of 11+ installations with regards to Natural, Cultural, and other Environmental Resources Law enforcement Coverage/Protection/Management/etc. At 2013 INRMP Metrics review the VDGIF biologist associated with the NWS Yorktown INRMP provided a real life example on an Army installation in VA where he, installation security, state and federal wildlife agents conducted an intense study to determine the level of conservation law enforcement infractions occurring on the base, within one month. They found that in one month they observed and addressed numerous conservation law enforcement infractions on just a portion
In 2014 USFWS indicated that there is no way 1 officer can adequately service a range of resources that covers 11+ installations. The Navy did indicate that resource specialists in Natural and Cultural resources (though limited as well in numbers) are cross trained to identify issues and when issues are observed the Conservation Officer is notified and he responds. The FY15 study Assessment of Needs study for Conservation Law-Enforcement Program was completed in FY16 and is pending official review by ICO prior to inclusion in the INRMP.

The Virginia Feral Hog Action Team is coordinated by VDGIF and the Navy NRM is an active member of the team. Feral Swine are not a recreational hunting program species in VA. Feral swine once occupied NASO DNA; however, thru proactive measures they have not been documented on the installation since the early 2000s.

Regional Hunting Instruction was cancelled 4th quarter FY16 and Regional Fishing Instruction was cancelled 1st quarter FY17.

3. Recommendations

Continue to support hunting, fishing and educational outreach programs.

Hire an Outreach Coordinator for the region.

Create an adequately staffed and more robust Conservation Law Enforcement Program.

Consider funding a project to determine the level of Conservation Law Enforcement infractions occurring on the installation.

Update recreational fishing program management practices.

Create an installation Hunting and Fishing .Continue to stay active in CWD management and avoidance.

Continue to stay active in Feral Swine Management and Removal.

Follow up with VDGIF regarding hunting trail maintenance program.

4 - Sikes Act Cooperation

Focus Area Score

0.81

Focus Area Purpose: Determine to what degree USFWS, State Fish and Wildlife Agency and, when appropriate, NOAA Fisheries Service (NMFS), partnerships are cooperative and result in effective INRMP development, review for operation and effect, and mutual agreement.

Comment on this Focus Area and associated Questions Select this link below each question if you would like to elaborate on the answer provided. This is also a good way to document the assumptions made by all partners that contributed to the answer.

4. Select which Sikes Act partners work with this installation/site(s)? *

- USFWS
- State
- NOAA Fisheries Service

4.1. Was USFWS invited to participate in the annual INRMP/Natural Resources Program review? *

- Yes
- No

4.1.a. By what method was the agency invited to participate in the annual INRMP/Natural Resources Program review?

- Telephone call
- Electronic mail
- Official letter
- Other

4.1.b. Did the agency respond to the invitation to participate in the annual INRMP/Natural Resources Program review? *

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4.1.c. How many attempts were made to invite the agency to participate in the annual INRMP/Natural Resources Program review?

0-3
 4-6
 7-10
 >10

4.1.d. Did the agency participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

4.1.e. If the agency participated in the annual INRMP/Natural Resources Program review, was it recognized as a review for operation and effect? *

Yes
 No

4.1.f. If the agency did not participate in the annual review, what type of correspondence was received from the agency to inform the site(s) that they were not able to participate?

Telephone call
 Electronic mail
 Official letter
 Other

4.1.g. If the agency did not participate in the annual INRMP/Natural Resources Program review, was a separate meeting held/correspondence sent as a review for operation and effect?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4.1.g.a. What date? Format: MM/DD/YYYY

4.1.h. Was a report of the previous year's annual INRMP/Natural Resources Program review submitted to the agency during this reporting period? *

Yes
 No

4.2. Was the state invited to participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

4.2.a. By what method was the agency invited to participate in the annual INRMP/Natural Resources Program review?

Telephone call
 Electronic mail
 Official letter
 Other

4.2.b. Did the agency respond to the invitation to participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4.2.c. How many attempts were made to invite the agency to participate in the annual INRMP/Natural Resources Program review?

0-3
 4-6
 7-10
 >10

4.2.d. Did the agency participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

4.2.e. If the agency participated in the annual INRMP/Natural Resources Program review, was it recognized as a review for operation and effect? *

Yes
 No

4.2.f. If the agency did not participate in the annual review, what type of correspondence was received from the agency to inform the site(s) that they were not able to participate?

Telephone call
 Electronic mail
 Official letter
 Other

4.2.g. If the agency did not participate in the annual INRMP/Natural Resources Program review, was a separate meeting held/correspondence sent as a review for operation and effect?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4.2.g.1. What date? Format: MM/DD/YYYY

4.2.h. Was a report of the previous year's annual INRMP/Natural Resources Program review submitted to the agency during this reporting period? *

Yes
 No

4.3. Was the NOAA Fisheries Service invited to participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

4.3.a. By what method was the agency invited to participate in the annual INRMP/Natural Resources Program review?

Telephone call
 Electronic mail
 Official letter
 Other

4.3.b. Did the agency respond to the invitation to participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4.3.c. How many attempts were made to invite the agency to participate in the annual INRMP/Natural Resources Program review?

0-3
 4-6
 7-10
 >10

4.3.d. Did the agency participate in the annual INRMP/Natural Resources Program review? *

Yes
 No

4.3.e. If the agency participated in the annual INRMP/Natural Resources Program review, was it recognized as a review for operation and effect? *

Yes
 No

4.3.f. If the agency did not participate in the annual review, what type of correspondence was received from the agency to inform the site(s) that they were not able to participate?

Telephone call
 Electronic mail
 Official letter
 Other

4.3.g. If the agency did not participate in the annual INRMP/Natural Resources Program review, was a separate meeting held/correspondence sent as a review for operation and effect?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4.3.g.1. What date? Format: MM/DD/YYYY

4.3.h. Was a report of the previous year's annual INRMP/Natural Resources Program review submitted to the agency during this reporting period? *

Yes
 No

4.4. The USFWS, state fish and wildlife agency, and when appropriate NOAA Fisheries Service, are familiar with and have reviewed the INRMP. *

Yes (All that apply) - These partners are familiar with and have reviewed the site(s)' INRMP.
 Two or more partners are familiar with and have reviewed the site(s)' INRMP.
 One or more partners are familiar with and have reviewed the site(s)' INRMP.
 No - Partners did not review the site(s)' INRMPs or INRMP updates, nor did they participate in other regular communications.

4.5. The USFWS, state fish and wildlife agency and, when appropriate, NOAA Fisheries Service are engaged in the INRMP development and implementation. *

The sites(s) engaged the USFWS, state fish and wildlife agency and, when appropriate, NOAA Fisheries Service and these efforts are well documented.
 The site(s) engaged the USFWS, state fish and wildlife agency and, when appropriate, NOAA Fisheries Service and these efforts are not documented.
 Partners were non-responsive to site(s) communications and/or are not familiar with the INRMP.
 The site(s) did not engage the USFWS, state fish and wildlife agency or NOAA Fisheries Service; therefore these partners did not review INRMPs or INRMP updates, nor did they participate in other regular communications.

4.6. What is the level of collaboration/cooperation between Sikes Act partners? *

None
 Minimal collaboration/cooperation
 Satisfactory collaboration/cooperation
 Effective collaboration/cooperation
 Highly effective collaboration/cooperation

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4.7. How well are site(s) natural resource management goals and objectives aligned with conservation goals of Sikes Act partners, e.g. USFWS/NOAA Fisheries Service regional goals and State Fish and Wildlife Agency regional goals (e.g. State Wildlife Action Plans ([SWAPs](#)))? *

- Not aligned
- Somewhat aligned
- Completely aligned

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4. Findings

INRMP was made compliant in June 2015 having received all required agency signatures for O&E review.

Coordination was maintained throughout the year with USFWS Region 5, VDGIF and NOAA-NMFS. The team (VDGIF, USFWS, NOAA-NMFS and NAVY) attempts to meet at least once a year to discuss Natural Resources Management concerns, updates, and opportunities. For the 2nd year USDA-WS was invited as an active participant in this coordinate meeting effort. For the 1st year State Fisheries Biologists, Sea Turtle Program Coordinator, and Foresters were also invited to participate. For the 1st time the USFWS Wildland Fire Coordinator was invited to participate. The USFWS Fisheries biologist that used to coordinate with the installation has retired and a new person had not been selected as of the INRMP Metrics meeting invitation.

During FY16 Partners Meeting a number of partnership opportunities and recommendations were discussed.

VDGIF would like to see the installation participate in the State's Annual Piping Plover Breeding Survey effort, the 2018 Colonial Waterbird Survey Effort, and possibly the State's Breeding Bird Atlas program. VDGIF announced that the Agency Strategic Plan will be coming out for review and recommends the Navy participate in that process. VDGIF reports that hunting program has been losing about 3-3.5% of the hunting population since 1980s, which is resulting in resources and population control reductions. VDGIF would like to see the Navy promote and further participation in the State's Hunter Apprentice Programs. VDGIF would like the Navy to continue its efforts to control nutria and mentioned that VDGIF now has a conservation canine that is trained to find and remove nutria (they also obtain additional trained dogs via contract).

VDOF would like to see the installation increase efforts for invasive species monitoring and control along forest edges and within forest. Japanese stilt grass was identified as a target invasive species for control. Another species of particular concern was the Emerald Ash Bore, it is likely in our area, but not confirmed (targets bottom-land areas).

NMFS Final Critical habitat determination for Atlantic Sturgeon estimated to be announced June 2017; however, it is not anticipated that this installation will be impacted by this determination.

USFWS staff is down to 2 people in Permits from 6. Rusty patched bumble bee is proposed for listing and may pop up in iPAC as a historical record for our area, but it is not currently known to occur on installation. USFWS would like the installation to promote positive pollinator projects and partnerships. A fairly substantial list of invertebrate/pollinator species is anticipated to be issued for USFWS T&E listing review (petitioned and USFWS Initiated species).

4. Recommendations

VDOF recommends treating Emerald Ash Bore beetle infestations immediately upon observation, as an infestation will be 100% fatal to the bottomland forest trees.

Increase efforts and better promote existing projects that support pollinator species.

Continue Partnership Efforts.

In addition to the required INRMP signatory agency partners, continue to invite the VDOF, USDA, and other partners that contribute to the success of the INRMP.

5 - Team Adequacy

Focus Area Score

0.82

Focus Area Purpose: Assess the adequacy of the natural resources team (professionally trained natural resources management and/or installation support personnel) in accomplishing INRMP/Natural Resources Program goals and objectives at each installation.

Comment on this Focus Area and associated Questions Select this link below each question if you would like to elaborate on the answer provided. This is also a good way to document the assumptions made by all partners that contributed to the answer.

5.1. Is there a Navy professional Natural Resources Manager designated by the Regional Commander/Installation Commanding Officer? *

Yes
 No

5.2. Is there an on-site Navy professional Natural Resources Manager? *

Yes
 No

5.3. Is there adequate installation staff assigned or available to properly implement the INRMP/Natural Resources Program goals and objectives? *

Sufficient
 Insufficient
 None

5.3.a. How many staff members are available?

3

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

5.3.b. How many staff members are required?

5

5.4. How well do higher echelon offices support the installation natural resources program? (e.g. reach back support for execution, policy support, etc.) *

- No Support
- Minimal Support
- Satisfactory Support
- Well Supported
- Very Well Supported

5.5. The team is enhanced by the use of contractors. *

- Disagree
- Somewhat Agree
- Neutral
- Agree
- Strongly Agree
- N/A (no contractor support)

5.6. The team is enhanced by the use of volunteers. *

- Disagree
- Somewhat Agree
- Neutral
- Agree
- Strongly Agree
- N/A (No volunteer support)

5.7. The Natural Resources team is adequately trained to implement the goals and objectives of the INRMP.

- Professionals received adequate supplemental training
- Professionals have not received adequate training
- Professionals have not received any training

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

5. Findings

When staff have not been adequately trained to cover a subject matter of concern, if a question arises regarding compliance concerns then other Navy, USFWS, State or other agency subject matter experts are consulted.

NASO Installation natural resources (NR) staff are aiding to support short staffing at the regional level and other local installations.

Note: NAS Oceana NR personnel (1 Natural Resources Specialist and 2 Biological Science Technicians) help support the Hampton Roads area bases and are assigned to specifically handle (Oceana, Dam Neck Annex, Fentress, and Northwest Annex). One of these technicians is dual hatted supporting the region as a conservation law-enforcement officer and BST at ~11 installations.

Because of staffing levels at the installation and an attempt to maintain consistence of the programs throughout the region, NAVFAC MIDLANT CORE EV22 manages the Agricultural and Forestry programs for the installation. Regional staffing levels are not adequate to cover needs such as a professional forester, outreach coordinator, and individuals well versed in developing cooperative agreements, grants, and associated contracts.

Installation program enlists the support of over 20 regular gratuitous service program (GSP) supporters in order to accomplish its INRMP goals and objectives. At times the base signs upwards of 100 GSPs in a given year.

NAVFAC MIDLANT EV22 is attempting to implement previous recommendations to staff their program with multiple media specialist with the hiring of: 1 Natural Resources and Cultural Resources Supervisor; 1 Agriculture & Forestry Program Manager; 1 Marine Environment Program Manager; 1 T&E/INRMP Program Manager; 1 BASH/Nuisance Wildlife Program Manager and 1 Wetlands Program Manager. NAVFAC MIDLANT EV22, NAVFAC MIDLANT EV4 and Installation Staff do not agree on some INRMP identified projects/program management criteria (e.g., Agricultural mngt, Forest mngt., Vegetation Community Layer update frequency, nuisance wildlife inventory frequency, etc.) .

Proper coordination amongst varying levels of Navy Staff could improve.

5. Recommendations

Need to ensure installation Forestry Management Team includes at least one staff member that meets the OPNAVINST M-5090.1 standard to be designated as a professional certified forester (either meets and has obtained Society of American Forester Certification requirements or has received a professional forester certification by the State in which work is being conducted). Need to hire or train current staff to be well versed in cooperative agreement, grant, and contract development/acquisitions processes. Need to adequately staff the region and installations for Conservation Law Enforcement, Biological Science Technician, and Natural Resources Manager Support.

Hire NR staff to sit at the Region that specialize in each of the program areas relevant to INRMPs (i.e. forestry, agriculture, T&E species, wetlands, permits, fire, invasive species, BASH, etc.) and better define the roles and responsibilities between region and installation staff (keeping in mind existing Position Descriptions). Need to coordinate staffing and roles & responsibilities planning and implementation with NAVFAC MIDLANT EV2 and installation environmental program directors and installation natural resources managers prior to execution of such plans.

6 - INRMP Implementation

Focus Area Score **0.32**

Focus Area Purpose: Evaluates the execution of actions, to include projects, taken to meet goals/objectives outlined in the INRMP.

Supplemental Information: The intent of this Focus Area is to assess how well actions are being implemented to execute the goals and objectives of the INRMP. Actions can include projects submitted via EPRWeb, as well as activities executed with alternative funds, not programmed through EPRWeb, or carried out by the use of volunteers or cooperative partnerships with other entities.

For each project or action executed, or partnership forged, or initiative engaged with, during the reporting period for the installation, the following questions are asked to evaluate INRMP action implementation. Note: For EPRWeb projects, the data such as project number, project title, funding source, and total obligated are pre-populated with data from EPRWeb. The user has the ability to edit the percentage applicable to this Reporting Unit (RU) if less than 100%.

Questions followed by an asterisk * are mandatory and must be completed before the datacall can be approved and forwarded to DoD.

FY16 Projects

Focus Area Score **0.32**

Instructions: This section is for projects planned in the installations/site(s) INRMP for award or emergent in FY16 only. Select a project from the list below (created in the Action Builder) to begin answering questions. To Add new projects, delete existing projects or modify the percentage allocated (share of the project) to this Reporting Unit (RU), click the Blue 'Add/Manage Projects' button. Select the red 'X' to delete a project, if a project doesn't apply to the Reporting Unit or is not a project that occurred during the current reporting period. If this is an incomplete list, use the filters to find any missing projects, check the appropriate check boxes, and click the Blue 'Add Projects' to add additional INRMP actions (projects), e.g. emergent projects, unfunded efforts, or actions that do not require funding, and begin answering questions. Users can also create non-EPRWeb projects by clicking the Green 'Create Project' button.

1. 32442NR229 : 2 BO MA NASO DNA - Threatened & Endangered Species Survey – Sea Turtle

FY16 EPRWeb Total Spent
\$2,869.05

FY16 RU Share of Total Spent
\$2,869.05

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(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

- Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: FY16 Obligated & Spent funds = \$6,111.00. Not all items purchased have been received, so, not sure of final invoiced amounts.

- Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

6111

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

2. 32442NR205 : 4 SAR MA NASO DNA - Species and Habitat of Concern Protection

FY16 EPRWeb Total Spent

\$19,424.00

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY16 RU Share of Total Spent

\$19,424.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

DNA - Species and Habitat of Concern Protection (Dune Restoration, Pollinator Habitat Enhancement, & Invasive Species Removal); DNA - Species and Habitat of Concern Protection (Amphibian Acoustic Monitoring); DNA - Species and Habitat of Concern Protection (Shorebird Surveys); DNA - Species and Habitat of Concern Protection (Tree Planting); ODU Tick & Disease Study

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: In FY16 obligated \$64,022.00 . \$2000.00 was funded by ODU. \$6,500 was funded via NPLD. \$54,738 was spent in FY17 not FY16.

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

3. 32442NR215 : CHS MA NASO DNA - Dune and Beach Restoration

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Comment: See 32442NR205, the Pollinator Habitat enhancement project allowed for this project to also be completed.

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4. 32442NR226 : CHS MA NASO DNA - INRMP

FY16 EPRWeb Total Spent

\$4,232.00

FY16 RU Share of Total Spent

\$4,232.00

(FY16) 6.0 Does the action have an alternative name?

Yes

No

(FY16) 6.0.a. Please enter the name(s)

CHS MA NASO DNA - INRMP (GIS Support)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

- Yes
- Partially
- No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

5. 32442NR203 : CWA MA NASO DNA - Mitigation Site Monitoring

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

6. 32442NR209 : CWA MA NASO DNA - Soil & Water Conservation - Erosion Control

FY16 EPRWeb Total Spent

\$0.00

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

7. 32442NR202 : CWA MA NASO DNA - Wetland Mapping Inventory

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes

No

(FY16) 6.0.a. Please enter the name(s)

CWA MA NASO DNA - Wetland Mapping Inventory (5yr Review); CWA MA NASO DNA - Wetland Mapping Inventory (10 yr Inventory)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started

Action Underway

Action Completed

Prior Year Emergent/Executed

Emergent/Accelerated and Executed this FY

Action Considered Accepted Risk/Funding Not Available

Funding Requested but not received

Funding Received but not executable

On-Hold

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: Installation funded \$1,750 for inhouse NAVFAC EV 22 support to complete the review. Funding source was not provided to NRM.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

1750

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

1750

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

8. 32442NR216 : EO 13112 MA NASO DNA – Habitat Management -Prescribed Fire

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

- Yes
- Partially
- No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

9. 32442NR218 : EO 13112 MA NASO DNA - Invasive Species

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes

No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.0.a. Please enter the name(s)

EO 13112 MA NASO DNA - Invasive Species (Phragmites, Alligator weed, and Asian spiderwort); EO 13112 MA NASO DNA - Invasive Species (Phragmites, Alligator weed, Asian spiderwort, Asiatic sand sedge, Pampas grass, and Japanese stilt grass)

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: Yes and no. Project continued based off of previous year funding; however, the project to begin control of additional species was not awarded.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

10. 32442NR206 : FRC MA NASO DNA - Forest Management

FY16 EPRWeb Total Spent

\$0.00

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
- No

(FY16) 6.3.a. Is this action an emergent action?

- Yes
- No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

11. 32442NR204 : MBTA MA NASO DNA - Migratory & Breeding Bird Surveys

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes

No

(FY16) 6.0.a. Please enter the name(s)

Annual Survey Requirements; 3-5 year Inventory

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started

Action Underway

Action Completed

Prior Year Emergent/Executed

Emergent/Accelerated and Executed this FY

Action Considered Accepted Risk/Funding Not Available

Funding Requested but not received

Funding Received but not executable

On-Hold

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: See EPR 32442NR205, the shorebird surveys conducted under this EPR also met requirements of this EPR.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

12. 32442NR221 : MSFCA MA NASO DNA - Fisheries, Ditches & Streams

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes

No

(FY16) 6.0.a. Please enter the name(s)

Inventory; Implementation

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

- Yes
- Partially
- No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

13. 32442NR231 : MSFCA MA NASO DNA – Nearshore Environment Assessments

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes

No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.0.a. Please enter the name(s)

Nearshore Environment Assessment; Climate Change Assessment

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: Nearshore Environment Assessment funding See FY15 project tab for funding spent in FY16. The Climate Change Assessment portion of this project was not funded.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

Comment: Nearshore

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

14. 32442NR222 : MSFCA MA NASO DNA - Outdoor Recreation Program Requirements

FY16 EPRWeb Total Spent

\$0.00

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

15. 32442NR224 : SIKES MA NASO DNA - Equipment Maintenance & Repair

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

16. 32442NR223 : SIKES MA NASO DNA - Equipment Storage Structures

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

- Yes
- Partially
- No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

17. 32442NR220 : SIKES MA NASO DNA – Nuisance Wildlife Inventory, Assessment and Removal

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes

No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.0.a. Please enter the name(s)

Inventory; Control

(FY16) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- Prior Year Emergent/Executed
- Emergent/Accelerated and Executed this FY
- Action Considered Accepted Risk/Funding Not Available
- Funding Requested but not received
- Funding Received but not executable
- On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

- 2013
- 2014
- 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

- 2017
- 2018
- 2019
- 2020

(FY16) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

18. 32442NR232 : SIKES MA NASO DNA - Resource Protection Agreement

FY16 EPRWeb Total Spent

\$0.00

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

Assessment; Agreement/Personnel & Equipment Support

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Comment: See FY15 projects for FY16 spent funds associated with Assessment. Agreement/Personnel & Equipment Support has not been funded.

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

(FY16) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

Comment: Conservation Law Enforcement / Protected Resource Protection

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

19. 32442NR219 : SIKES MA NASO DNA - Wildlife Emergency Response

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY16 EPRWeb Total Spent

\$0.00

FY16 RU Share of Total Spent

\$0.00

(FY16) 6.0 Does the action have an alternative name?

Yes
 No

(FY16) 6.0.a. Please enter the name(s)

(FY16) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 Prior Year Emergent/Executed
 Emergent/Accelerated and Executed this FY
 Action Considered Accepted Risk/Funding Not Available
 Funding Requested but not received
 Funding Received but not executable
 On-Hold

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.1.a. If awarded in a prior year, select the year in which the action was awarded.

2013
 2014
 2015

(FY16) 6.1.b. Select the year that this action was originally planned for in your INRMP.

2017
 2018
 2019
 2020

(FY16) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY16) 6.3. Was the Action Programmed in EPRWeb?

Yes
 No

(FY16) 6.3.a. Is this action an emergent action?

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If no, explain why you believe EPRWeb's amount shown is incorrect in the comments box. If EPRWeb shows zero and funding was spent, select No.

Yes
 No

(FY16) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY16) 6.3.b.2. Enter the correct Expended (invoiced) year to date here:

(FY16) 6.4. Is the INRMP action on schedule? *

Comment: Support was provided, but resources continue to be depleted without ability to restock.

Yes
 No

(FY16) 6.5. Does this action meet the goals and objectives of the INRMP? *

Yes
 Partially
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY16) 6.5.g. Please select the goal(s) that this action supports.

(FY16) 6.5.o. Please select the objective(s) that this action supports.

(FY16) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY16) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

FY15 Projects

Instructions: This section is for projects planned in the installations/site(s) INRMP for award or emergent in FY15 only. Projects completed in FY15 and reported as complete in FY15 do not need to be entered. Select a project from the list below (created in the Action Builder) to begin answering questions. To Add new projects, delete existing projects or modify the percentage allocated (share of the project) to this Reporting Unit (RU), click the Blue 'Add/Manage Projects' button. Select the red 'X' to delete a project, if a project doesn't apply to the Reporting Unit or is not a project that occurred during the current reporting period. If this is an incomplete list, change the 'Action Plan Year' to "2015", use the filters to find any missing projects, check the appropriate check boxes, and click the Blue 'Add Projects' to add additional INRMP actions (projects), e.g. emergent projects, unfunded efforts, or actions that do not require funding, and begin answering questions. Users can also create non-EPRWeb projects by clicking the Green 'Create Project' button.

1. 32442NR205 : 4 SAR MA NASO DNA - Species and Habitat of Concern Protection

FY15 EPRWeb Total Spent

\$47,211.34

FY15 RU Share of Total Spent

\$47,211.34

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.0 Does the action have an alternative name?

Yes
 No

(FY15) 6.0.a. Please enter the name(s)

Bald Eagle Nest, Habitat Mapping, and Tracking Surveys

(FY15) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY15) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: FY16 invoiced for the Bald Eagle work was \$0.00 of the FY15 Awarded \$138,471.00; however, 50% of the project was completed (surveying and desktop analysis work) in FY16.

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

0

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

Yes
 Partially
 No

(FY15) 6.5.g. Please select the goal(s) that this action supports.

(FY15) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

2. 32442MH103 : CHS and EFH MA Dam Neck Nearshore Habitat Assessment

FY15 EPRWeb Total Spent

\$485,690.48

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY15 RU Share of Total Spent

\$485,690.48

(FY15) 6.0 Does the action have an alternative name?

Yes
 No

(FY15) 6.0.a. Please enter the name(s)

32442NR231 MSFCA MA NASO DNA Nearshore Environment Assessment

(FY15) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY15) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: In FY16 \$ \$144,504.93 was spent of the total FY15 awarded project.

Yes
 No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

Yes
 Partially
 No

(FY15) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.5.o. Please select the objective(s) that this action supports.

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

Comment: Nearshore

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

3. 32442NR215 : CHS MA NASO DNA - Dune and Beach Restoration

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY15 EPRWeb Total Spent

\$22,899.00

FY15 RU Share of Total Spent

\$22,899.00

(FY15) 6.0 Does the action have an alternative name?

Yes
 No

(FY15) 6.0.a. Please enter the name(s)

(FY15) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: See the FY14 project for details on amounts spent at this was a multi year agreement that utilized FY14, FY15 and FY16 funding from both EPRs 32442NR215 and 32442NR205.

- Yes
- No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

- Yes
- Partially
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.5.g. Please select the goal(s) that this action supports.

(FY15) 6.5.o. Please select the objective(s) that this action supports.

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4. 32442NR216 : EO 13112 MA NASO DNA – Habitat Management -Prescribed Fire

FY15 EPRWeb Total Spent

\$33,893.67

FY15 RU Share of Total Spent

\$33,893.67

(FY15) 6.0 Does the action have an alternative name?

Yes

No

(FY15) 6.0.a. Please enter the name(s)

Plan Development

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY15) 6.2. How much progress has been made in implementing the action?

- 0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: In FY16 \$12,034.03 of the FY15 obligated funds was spent.

- Yes
 No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

- Yes
- Partially
- No

(FY15) 6.5.g. Please select the goal(s) that this action supports.

(FY15) 6.5.o. Please select the objective(s) that this action supports.

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

5. 32442NR218 : EO 13112 MA NASO DNA - Invasive Species

FY15 EPRWeb Total Spent

\$0.00

FY15 RU Share of Total Spent

\$0.00

(FY15) 6.0 Does the action have an alternative name?

Yes

No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.0.a. Please enter the name(s)

Phragmites, Alligator weed, Asian spiderwort Control

(FY15) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY15) 6.2. How much progress has been made in implementing the action?

- 0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: See FY14 EPR 32442NR218 for details. Funding submitted to the FY14 awarded multi-year project does not allow easy tracking of FY14 vs FY15 obligated funding utilization.

- Yes
 No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

Yes
 Partially
 No

(FY15) 6.5.g. Please select the goal(s) that this action supports.

(FY15) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

6. 32442NR206 : FRC MA NASO DNA - Forest Management

FY15 EPRWeb Total Spent

\$13,156.00

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY15 RU Share of Total Spent

\$13,156.00

(FY15) 6.0 Does the action have an alternative name?

Yes
 No

(FY15) 6.0.a. Please enter the name(s)

Urban Forest Inventory and Hazard Tree Assessment

(FY15) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY15) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: In FY16 \$12,034.03 of the FY15 obligated funds was spent.

Yes
 No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

Yes
 Partially
 No

(FY15) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.5.o. Please select the objective(s) that this action supports.

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

7. 32442NR232 : SIKES MA NASO DNA - Resource Protection Agreement

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY15 EPRWeb Total Spent

\$0.00

FY15 RU Share of Total Spent

\$0.00

(FY15) 6.0 Does the action have an alternative name?

Yes

No

(FY15) 6.0.a. Please enter the name(s)

CLEP Needs Assessment

(FY15) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started

Action Underway

Action Completed

On-Hold

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: In FY16 \$13,041.10 of the FY15 obligated funds was spent.

- Yes
- No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

- Yes
- Partially
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.5.g. Please select the goal(s) that this action supports.

(FY15) 6.5.o. Please select the objective(s) that this action supports.

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

Comment: Conservation Law Enforcement/Resource Protection

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

8. 32442NR001 : 1 CR MA NASO DNA Threatened & Endangered Species Survey – Sea Turtle Lighting Assessments

FY15 EPRWeb Total Spent

\$59,017.28

FY15 RU Share of Total Spent

\$59,017.28

(FY15) 6.0 Does the action have an alternative name?

Yes

No

(FY15) 6.0.a. Please enter the name(s)

Sea Turtle Lighting Assessment and Biological Assessment

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.1. What is the current status of the INRMP action? *

- Action Awarded but not started
- Action Underway
- Action Completed
- On-Hold

(FY15) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY15) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: In FY16 \$9,320.50 was spent of the FY15 obligated funding.

- Yes
- No

(FY15) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY15) 6.3.b.2. Enter the correct Expended (invoiced) here:

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.5. Does this action meet the goals and objectives of the INRMP?

- Yes
- Partially
- No

(FY15) 6.5.g. Please select the goal(s) that this action supports.

(FY15) 6.5.o. Please select the objective(s) that this action supports.

(FY15) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY15) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

FY14 Projects

Instructions: This section is for projects planned in the installations/site(s) INRMP for award or emergent in FY14 only. Projects completed in FY14 and reported as complete in FY14 do not need to be entered. Select a project from the list below (created in the Action Builder) to begin answering questions. To Add new projects, delete existing projects or modify the percentage allocated (share of the project) to this Reporting Unit (RU), click the Blue 'Add/Manage Projects' button. Select the red 'X' to delete a project, if a project doesn't apply to the Reporting Unit or is not a project that occurred during the current reporting period. If this is an incomplete list, change the 'Action Plan Year' to "2014", use the filters to find any missing projects, check the appropriate check boxes, and click the Blue 'Add Projects' to add additional INRMP actions (projects), e.g. emergent projects, unfunded efforts, or actions that do not require funding, and begin answering questions. Users can also create non-EPRWeb projects by clicking the Green 'Create Project' button.

1. 32442NR205 : 4 SAR MA NASO DNA - Species and Habitat of Concern Protection

FY14 EPRWeb Total Spent

\$0.00

FY14 RU Share of Total Spent

\$0.00

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY14) 6.0 Does the action have an alternative name?

Yes
 No

(FY14) 6.0.a. Please enter the name(s)

Baseline Bat Surveys

(FY14) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY14) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

(FY14) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: In FY16 \$5,413.69 was spent of the original FY14 obligated funding.

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY14) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY14) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY14) 6.5. Does this action meet the goals and objectives of the INRMP?

Yes
 Partially
 No

(FY14) 6.5.g. Please select the goal(s) that this action supports.

(FY14) 6.5.o. Please select the objective(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY14) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY14) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

2. 32442NR215 : CHS MA NASO DNA - Dune and Beach Restoration

FY14 EPRWeb Total Spent

\$0.00

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY14 RU Share of Total Spent

\$0.00

(FY14) 6.0 Does the action have an alternative name?

Yes
 No

(FY14) 6.0.a. Please enter the name(s)

CESU Agreement with the National Aquarium

(FY14) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started
 Action Underway
 Action Completed
 On-Hold

(FY14) 6.2. How much progress has been made in implementing the action?

0-25%
 26-50%
 51-75%
 76-99%
 Complete

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY14) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: FY16 Obligated \$54,738.00 (majority O&MN funds about \$6,500 was NPLD funds) for FY17 portion of FY14 awarded agreement. In FY16 \$29,359.00 was obligated associated with the FY16 event of the FY14 awarded agreement.

Yes
 No

(FY14) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY14) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY14) 6.5. Does this action meet the goals and objectives of the INRMP?

Yes
 Partially
 No

(FY14) 6.5.g. Please select the goal(s) that this action supports.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY14) 6.5.o. Please select the objective(s) that this action supports.

(FY14) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY14) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

3. 32442NR218 : EO 13112 MA NASO DNA - Invasive Species

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

FY14 EPRWeb Total Spent

\$0.00

FY14 RU Share of Total Spent

\$0.00

(FY14) 6.0 Does the action have an alternative name?

Yes

No

(FY14) 6.0.a. Please enter the name(s)

Control of Phragmites, Alligator weed, and Asian spiderwort

(FY14) 6.1. What is the current status of the INRMP action? *

Action Awarded but not started

Action Underway

Action Completed

On-Hold

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY14) 6.2. How much progress has been made in implementing the action?

- 0-25%
- 26-50%
- 51-75%
- 76-99%
- Complete

(FY14) 6.3.b. Is the EPRWeb Total Spent amount shown correct? If EPRWeb shows zero and funding was spent, select No.

Comment: In FY16 \$23,612.75 of the FY14 & 15 obligated funds was spent associated with the FY14 awarded multi-year contract.

- Yes
- No

(FY14) 6.3.b.1. Enter the correct Total Spent Amount here:

(FY14) 6.3.b.2. Enter the correct Expended (invoiced) here:

(FY14) 6.5. Does this action meet the goals and objectives of the INRMP?

- Yes
- Partially
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

(FY14) 6.5.g. Please select the goal(s) that this action supports.

(FY14) 6.5.o. Please select the objective(s) that this action supports.

(FY14) 6.6. Which Natural Resources Program Area most benefitted from the INRMP action? (If other, please describe in the comments)

- None
- Flora
- Fauna
- Habitat
- At Sea
- INRMP-Planned Developments, Updates, & Revisions
- Listed Species
- Wetlands
- Invasives
- Soil
- Forestry
- Outdoor Recreation
- Training
- Other NR Requirements (Misc)

(FY14) 6.7. If the INRMP action provided an ecosystem integrity benefit, select the ecosystem benefitted.

FY13 Projects

Instructions: This section is for projects planned in the installations/site(s) INRMP for award or emergent in FY13 only. Projects completed in FY13 and reported as complete in FY13 do not need to be entered. Select a project from the list below (created in the Action Builder) to begin answering questions. To Add new projects, delete existing projects or modify the percentage allocated (share of the project) to this Reporting Unit (RU), click the Blue 'Add/Manage Projects' button. Select the red 'X' to delete a project, if a project doesn't apply to the Reporting Unit or is not a project that occurred during the current reporting period. If this is an incomplete list, change the 'Action Plan Year' to "2013", use the filters to find any missing projects, check the appropriate check boxes, and click the Blue 'Add Projects' to add additional INRMP actions (projects), e.g. emergent projects, unfunded efforts, or actions that do not require funding, and begin answering questions. Users can also create non-EPRWeb projects by clicking the Green 'Create Project' button.

Satisfaction Index

Focus Area Score **0.80**

Please answer the following general questions associated with INRMP Actions. Questions followed by an asterisk * are mandatory and must be completed before the datacall can be approved and submitted to DoD.

6.8. Do the goals and objectives of the INRMP/Natural Resources Program support other conservation partnerships/initiatives? *

- Yes
- No

6.9. Which conservation partnerships/initiatives are supported?

- American Land Trust
- Chesapeake Bay Initiative
- Coastal America
- Environmental Security Technology Certification Program (ESTCP)
- Flat-tailed Horned Lizard Rangewide (sic) Management Strategy
- Gulf of Coastal Plain Ecosystem Partnership
- Gulf of Mexico Initiative
- Joint Ventures
- Land Conservation Cooperatives (LCCs)
- Longleaf Pine Initiative
- Longleaf Alliance
- Mojave Desert Initiative
- National Military Fish and Wildlife Association (NMFWA)
- National Ocean Council (NOC) Regional Planning Bodies
- Oahu Conservation Partnership
- Partners in Amphibian and Reptile Conservation (PARC)
- Partners in Flight
- Other, please list

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

6.10. To what level does the Natural Resources Program/INRMP meet or exceed USFWS expectations? *

- Dissatisfied
- Minimally satisfied
- Somewhat satisfied
- Completely satisfied
- More than satisfied

6.11. To what level are Natural Resources Program executions meeting State Fish and Wildlife Agency conservation management expectations? *

- Dissatisfied
- Minimally satisfied
- Somewhat satisfied
- Completely satisfied
- More than satisfied

6.12. To what level are Natural Resource program executions meeting NOAA/NMFS conservation management expectations, if applicable? *

- N/A Does not apply
- Dissatisfied
- Minimally satisfied
- Somewhat satisfied
- Completely satisfied
- More than satisfied

6.13. To what extent has the INRMP/Natural Resources program successfully supported other mission areas? *

- Not supported
- Minimally supported
- Satisfactorily supported
- Well supported
- Very well supported

6.14. Are Cooperative Agreements used to execute natural resources program requirements?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

6.15. Describe any obstacles to INRMP implementation.

Inadequate field support staffing levels. Inability to acquire ammunition and other explosive devices associated with animal control activities. Lack of funding. Acceptable Risk determinations to not promote, not fund, re-assign funding, or not pursue funding for installation/activity identified projects (POM/EPRweb submitted funds requests). Government Vehicle Reductions causing: an inability for staff to respond or conduct field work in remote areas of the installations requiring 4x4 vehicles for safe and efficient travel and hauling (staff will now either not be able to accomplish certain tasks as usual or they will have less time to accomplish tasks because people are going to have to be shuttled to and from work sites); and an inability to haul equipment to work sites (CN funding is now required to pay to have PWD transportation haul equipment from one site to another so NR can accomplish INRMP required work).

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

6. Findings

Obligated = Total Reported Obligated Funds to support the project in the line item FY.

Spent = Total Reported Spent Funds to support the project in the current FY.

Not all inhouse fees utilized by NAVFAC MIDLANT Core EV2/CNRMA EV staff to support Projects identified in this datacall have been reported.

Per NAVFAC MIDLANT Core EV2/CNRMA they fund the majority of their in-house labor with excess funds throughout the region. Also, CNRMA would not issue project orders which complicated the FY funding reporting process. At this time NAVFAC MIDLANT CORE EV2/CNRMA does not specifically tie in-house cost to a specific EPR #. As such, guidance from NAVFAC MIDLANT EV2/CNRMA regarding reporting in the INRMP Metrics datacall, is that for contracts managed by MIDLANT/CNRMA EV2 staff, only contract award amount is to be reported.

NAVFAC LANT provided inhouse funding spent in FY15 on projects and contracts they managed for the FY15 INRMP Metrics Datacall.

Not all conservation initiatives submitted by the installation into EPRweb in POMs 14, 16 and 18 were promoted past the NAVFAC MIDLANT Core/CNRMA to NAVFAC HQ and CNIC (e.g., Agriculture and Forestry Program EPRs). In some cases project frequencies or budgets were altered from what the installation submitted without further justification and detailed updated budget. Budget reductions for the projects resulted in the inability to implement the programs as originally intended.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

6. Recommendations

Need to find other funding sources that can help fund projects that do not receive CNIC funding.

Need to utilize end of year funds to fund unfunded projects, which will require SOWs and other paperwork to be prepared in advance of end of year funding availability.

Need to resolve Ammunition Purchasing issues.

CNRMA should authorize project purchase orders to help with tracking of total project (cradle to grave) costs. Better tracking of project costs will help to ensure accuracy of future planning budgets.

If an EPR submission/exhibit is proposed to be altered from what the installation originally entered, then a detailed budget and project justification should be submitted to the installation to ensure that the proposed changes meet the installation's intended purpose for the exhibit before the exhibit is adjusted.

Provide Government vehicles that allow the Natural Resources (NR) program to conduct full range of services. All vehicles should be 4wheel drive and have a minimum engine size of 8 cylinders. At least one vehicle must be capable of safely hauling a large trailer and tractor (several thousand pounds).

7 - Support of Installation Mission

Focus Area Score **0.87**

Focus Area Purpose: Evaluate the level to which existing natural resources requirements support the installation's ability to sustain the current operational mission, ensuring no net loss of mission capability.

NOTE: As always, this focus area is to be completed by the Regional Commander/Commanding Officer (CO) or his/her designee with the responsibility for Title 10 installation assets and resources. Natural Resource Manager(s) are available to facilitate and support this process.

Comment on this Focus Area and associated Questions Select this link below each question if you would like to elaborate on the answer provided. This is also a good way to document the assumptions made by all partners that contributed to the answer.

7.1. To what level do natural resources program support the installation's operational mission? *

- The installation is fully mission-capable because the NR Program fully supports current and future missions.
- Partially mission-capable
- Not mission-capable

7.2. The Natural Resource program effectively considers current and potential future mission sustainment. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

7.3. What is the level of coordination between natural resources staff and other site(s) departments and military staff? *

- No coordination
- Minimal coordination
- Satisfactory coordination
- Effective coordination
- Highly effective and successful coordination

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

7.4. To what extent has the INRMP successfully supported other mission areas? *

- Mission not supported
- Mission minimally supported
- Mission satisfactorily supported
- Mission well supported and fully capable
- Mission enhanced, well supported and fully capable

7.5. To what extent does the NR Program and INRMP minimize possible constraints imposed by natural resources regulatory requirements?

- Effectly minimizes mission constraints
- Partially minimizes
- Has not minimized constraints
- Does not address constraints

7.6. To what extent has there been a net loss of training lands or mission-related operational/training activities? *

- Mission is fully impeded; training activities cannot be conducted due to regulatory requirements
- Mission/Training activities are somewhat impeded with workarounds due to regulatory requirements
- Neutral
- No loss occurred
- Mission has seen benefits

7.7. Please provide examples of how the INRMP or Natural Resources program has resulted in any mission impacts

Due to NR Survey findings confirming the presence of protected species on the installation projects and mission requirements have been delayed or had to be reschedule for a time that was not as convenient to the military mission schedule to avoid and/or minimize impacts to protected resources. Examples P-603 and MARFORRES AV training facility projects.

7.8. Please provide examples of how the INRMP or Natural Resources program actions have resulted in [mission benefits](#).

The Natural Resources Program has helped to sustain the integrity of the installation shoreline thru volunteer based dune restoration projects. The INRMP has provided sufficient information to aid the installation planners to make more informed decisions regarding proposed activities on the installation. The Natural Resources Program has provided substantial benefits to the moral and welfare of the military and non-military tenants, staff, and community associated with the installation through the hunting and educational trail programs. The Natural Resources program has increased awareness of threats to human health and safety (venomous snakes, poisonous plants, bear safety, etc.) thru the creation and distribution of wildlife brochures and providing training upon request to staff and tenant commands. NR Program worked with Regulators to be able to continue to train on beach via proactive Sea Turtle, Piping Plover and Marine Mammal Surveying and Coordination Efforts. NR Program was able to conduct surveys and coordination that allowed P-603 to start tree clearing actions before the USFWS 01 Nov recommended time frame for vegetation clearing actions associated with potential Migratory Bird impacts.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Regional Commander / Commanding Officer Signature

In the Regional Commander / Commanding Officer Section, this is a simple form to track who your Regional Commander / Commanding Officer is and that they have seen your results. It is not required that they physically type in their name and rank below.

Enter then name of your Regional Commander / Commanding Officer.

Richard J. Meadows

Enter then rank of your Regional Commander / Commanding Officer.

Captain

Please enter Findings and Recommendations. Findings and Recommendations serve as additional clarification to the answers provided for this Focus Area, and they are encouraged in order to provide a better understanding of existing activities, issues to be addressed, and unique circumstances.

7. Findings

The Natural Resources (NR) program has benefited the mission by ensuring compliance with appropriate Federal and State Requirements. The NR program has coordinated with the appropriate authorities and commands to identify requirements and has actively pursued and obtained permits such as USFWS Migratory Bird and Eagle Harassment, VDGIF Kill, VDEQ Wetland, and USACE Wetland Permits. They have also coordinated all mitigation requirement oversights to keep the military mission in full operation. They have conducted various other projects such as nuisance wildlife and invasive species control that reduces blockages and damage to our stormwater infrastructure which helps to minimize the installation's flooding issues, which also contributes to human health and safety as well as continued military operations. The NR program has continued to restore Dune Habitat which has promoted conservation initiatives, and has ensured realistic training environments for our military personnel. The NR program has provided recreational opportunities to our military (active and retired), staff, spouses/family, and friends that have

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

boosted the morale and welfare of our warfighters, families and supporters, while managing wildlife populations for mission safety, disease control and conservation. The NR program has also provided Conservation Law-enforcement support to the installation. The NR team's efforts to educate the tenants on the installation and in the public (outside the installation boundaries) has led to a superior crew of 100+ volunteers supporting the NR program to ensure conservation and mission readiness (dune restoration, hunting and fishing area maintenance, etc.). The NR manager has taken the lead in collecting information from tenants and installation support personnel to submit consolidated NAS Oceana responses to datacalls, permit reporting, and to apply for awards & grants. These datacalls and permit reports are not always NR program datacalls, but NR has a component to the information collection. The NR manager is recognized for her leadership and technical expertise not only on the installation but within the entire Conservation Community. She routinely helps to support regional and other installation NR managers and she supports National DoD programs and NGO programs (DoD Partners in Flight Steering Committee Representative, DoD Partners in Flight BASH Working Group Member, National Military Fish & Wildlife Service BASH Working Group Immediate Past-Chairman, and SE Hampton Roads Invasive Species Management Partnership Coordinator).

The NR team utilizes staff, contractors, volunteers, partnerships, and reach-back support to implement the INRMP. Even though all current Navy NR billets (FTEs) are filled, there appears to be a bona fide need for one additional Natural Resources and one additional Conservation Law Enforcement FTEs to fully implement the INRMP to meet all laws, regulations, and policies (see focus areas 3 and 5 of these INRMP metrics for additional details). One program area associated with the INRMP showing the largest staffing deficiency and lacking clear programmatic details/instruction is the Conservation Law Enforcement Program. Scores in the team adequacy focus area will not improve until the team is adequately staffed.

The Conservation law-enforcement program needs to be better defined and staffed in accordance with DoD Instruction for the Conservation Law-enforcement Program and the Sikes Act. The installation has documented actual and/or attempted wildlife poaching, wildlife killing, illegal introduction of non-native species, baiting, hunting without proper approvals, and cultural resources damage and/or theft. The installation has an active hunting program and is considering implementing an active fishing program. 1 Conservation Law-enforcement officer is not adequate to cover 11+ installations. Cross trained NR, EC, and CR staff is not law-enforcement and all they can do is identify and notify. Installation security officers are not trained to accomplish conservation law-enforcement; however, they do assist upon request. In FY15, the installation planned and awarded, with contract support from NAVFAC MIDLANT EV22 staff, a Conservation Law enforcement Program Needs Assessment. The assessment was finalized in FY16 and is undergoing installation internal coordination prior to further escalation. The integrated BASH program with USDA, Air Operations, and Natural Resources continues to implement wildlife population and habitat management, which provides for improved operations and safety.

The installation staff works with INRMP partners to identify natural resources programmatic needs for the installation. The installation staff develops project justifications, estimated costs to implement the programmatic needs, and enters this information into the appropriate systems for DoD budgeting purposes. Various installation submitted projects identified during the POM funding planning cycles, which are critical to both Natural Resources and Military Mission requirements, were not approved/funded and should be approved/funded. For Example, the Installation identified funding requirements to install BMPs and monitoring needs associated with agricultural leases to support conservation initiatives to reduce run-off of pesticides and soil erosion/sedimentation into waterways and stormwater systems; however, region project reviewers determined the requirement was not needed/did not have a regulatory requirement and did not promote the projects in previous years (POMs 12-14), and reduced the funding (POM16-18) in current and future years to the point that these initiatives cannot be implemented with the revised CNIC budgeted request. CNRMA Instructions for hunting and fishing programs were dated and cancelled last quarter FY16 and 1st quarter FY17. Installation instructions are now needed.

The Natural Resources program demonstrates good overall sensitivity to and awareness of mission needs and environmental issues and strives to improve communication with the command and associated tenants.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

The efforts of the NR team have not gone unrecognized. The installation won the Tree City USA award for the 16th consecutive year for employing superior Urban Forestry management. In FY16 the installation NR team also won the Team, CNO Environmental Award for Natural Resources Conservation. The NR team was awarded a DoD National Public Lands Day Funding Award for their Volunteer Based Dune Restoration and Invasive Species Control Program.

7. Recommendations

Natural Resources program staffing levels continue to be a limiting factor to completing/complying with INRMP objectives and requirements. Scores in the team adequacy focus area will not improve until the team is adequately staffed.

CNRMA, Hire a full time Natural Resources Specialist and a full time Biological Science Technician to support the mission of NW Annex and its tenant commands.

CNRMA. Hire a full time GS-11 Natural Resources Specialist to support the PWD Oceana Natural Resources Program. CNRMA, Stand up an official Conservation Law-enforcement Program that provides the requirements (Personnel, equipment, training, etc.) identified in the FY15 funded Conservation Law Enforcement Program Assessment of Need documentation. The Conservation Officers should coordinate directly with the installation Natural and Cultural Resources Managers.

Various projects identified during the POM 14, POM 16 & POM 18 funding planning cycles, which are critical to both Natural Resources and military mission requirements or provide a substantial conservation benefit to the installation and surrounding ecosystems, were not approved and/or funded as the installation requested and should be approved/funded should resources become available.

NAVFAC MIDLANT CORE/CNRMA, approve installation/activity submitted POM Conservation Exhibits that are submitted into the EPR system

(including those that are not a regulatory requirement). If NAVFAC MIDLANT

CORE/CNRMA reviewers do not agree with installation submitted estimated costs, methodologies, or frequencies of occurrence; then NAVFAC MIDLANT CORE should submit a revised detailed estimate of cost, methodologies or frequency of occurrence with justification and explanation for the recommended changes to the installation for consideration and verification that it meets the installation's intended purpose and need.

CNIC & CNRMA, fund approved EPR projects. If CNIC funding is not initially available/budgeted for an approved project, provide assistance to the installation in locating funds to implement the projects from other sources (Ag., Forestry, QRP, Legacy, in-kind services, range funds, end of year funds, funded projects that can't be executed, other sources, etc.).

Installation/NAVFAC MIDLANT PWD Oceana and CNRMA/NAVFAC MIDLANT CORE, continue to coordinate with the appropriate military and civilian personnel at all levels (installation, MIDLANT, LANT, regulatory, etc.) to accomplish mission goals. Strive to improve coordination and information sharing at all levels (both up and down the chain of command).

Installation, create an installation level instruction to cover the hunting and fishing programs for the installation. Due to current staffing shortages consider creating a single instruction that is jointly signed by the NASO and NSHR COs, since the programs for both commands are currently managed by the same Installation Natural Resources Manager. Remove reference in the INRMP to the CNRMA Hunting and Fishing Instructions once an installation instruction is finalized, since the CNRMA instruction has been cancelled.

Success Stories

Enter the title of the story in the box to the right, then:

1. Click on the blue "Add Story" button to create a record.
2. Click on the record/row of the story and completely fill-out the success story form.
3. Add any supporting document or image files.
4. Click the green "Save" button in the form.

1. Christmas Tree Recycling & Dune Management Program

Source

Date

1/31/2017

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

Background discussion.

The Natural Resources Program works with Military Staff to promote and implement an annual Christmas Tree Recycling Program. In FY16 200 trees were donated by the public to help build dune habitat to minimize dune erosion and loss of military training lands and to promote wildlife habitat conservation.

Enter summary of the success.

In FY16 200 trees were donated by the public to help build dune habitat to minimize dune erosion and loss of military training lands and to promote wildlife habitat conservation.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

2. CNO Environmental Award – Natural Resources Team

Source

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Date

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

Background discussion.

In FY16, the Installation NR Team won the Chief of Naval Operation FY2015 Environmental Award for significant achievements in the Natural Resources Conservation Team Category.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter summary of the success.

In FY16, the Installation NR Team won the Chief of Naval Operation FY2015 Environmental Award for significant achievements in the Natural Resources Conservation Team Category.

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

3. Dune Restoration Cooperative Ecosystems Studies Unit Agreement

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Source

Date

10/24/2015

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Background discussion.

The installation entered into a CESU agreement/partnership with the National Aquarium to conduct volunteer based dune restoration work, which included planting a variety of native dune plants (pollinator friendly), removing newly identified invasive species, and educating the public on the purpose and need of dune restoration and wildlife habitat conservation to meet the goals of both the military mission and natural resources programs.

Enter summary of the success.

A little over 1/2 a mile of dune habitat was restored at NASO DNA in FY16 by over 100 volunteers made of active & retired duty military, civil service, general public, various organizations, etc. The volunteer effort was part of the installation's National Public Lands Day observation outreach efforts and was awarded DoD NPLD funding to increase the native plant diversity on the installation.

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4. Eagle Nesting & Roosting Cooperative Ecosystems Studies Unit Agreement

Source

Date

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

Background discussion.

Bald Eagle has been delisted from the ESA, but is still protected under the BAGEPA and the MBTA. The installation has never had a nesting or roosting eagle survey nor a suitable nesting habitat evaluation completed. In FY15 the installation entered into a CESU Partnership with the College of William & Mary's Center for Conservation Biology to conduct such work. Survey and mapping efforts began in FY16.

Enter summary of the success.

Project is still ongoing but is already contributing to data gaps used for Installation, State, and National data repositories. Data is being utilized for project planning on and off the installation.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

5. Multi-Agency Migratory Bird Conservation Training Course

Source

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Date

4/12/2016

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

Background discussion.

Installation helped to coordinate and host the Navy Funded USFWS Migratory Bird Conservation Training Course. At NASO-DNA a field trip was completed that demonstrated the LCAC and Amphibious Vehicle Military Missions in conjunction with Migratory Bird Management Implementation Requirements.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Enter summary of the success.

Event pulled together regulators, natural resources managers, NEPA planners, lawyers, etc. from a variety of agencies and branches of DoD. Event provided a mechanism to clarify requirements, allow open candid discussions and answer questions regarding Migratory Bird management requirements. The most important this was that the course provided real-time opportunities for individuals to observe actual military missions and how migratory bird management in needed and being conducted to all military missions to continue without a net loss in training & operations.

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

6. Old Dominion University Tick Study

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Source

Date

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Background discussion.

Partnership with Old Dominion University to identify tick species in the region and associated zoonotic diseases.

Enter summary of the success.

Project is still ongoing but is already contributing to data gaps used for Installation, State, and National data repositories. Data is being utilized for project planning on and off the installation. Study has already identified at least one previously unknown species to the area, it has confirmed the expansion of a species territory from previously known boundaries, and it has also confirmed the likely miss identification of one zoonotic disease for another in the local medical facilities.

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

7. Tree City USA Award

Source

Date

4/28/2016

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Select the appropriate topic(s)

- Awards
- BASH
- Coral Reefs
- Cultural
- Erosion Control
- Fauna
- Flora
- Forestry
- GIS
- Invasive Species
- NR Management
- Policy
- Public Outreach
- Recreation
- Restoration
- T&E Species
- Wetlands
- Other - Please Specify

Background discussion.

Installation received the Tree City USA Award for the 16th consecutive year due to their Urban Forest Management efforts.

Enter summary of the success.

Installation received the Tree City USA Award for the 16th consecutive year due to their Urban Forest Management efforts.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

Select story POC.

Wright, Michael - michael.f.wright@navy.mil

Date that the story was submitted.

Upload any images that depict the story.

Summary

List the top three accomplishments for the Natural Resources Program during this reporting period. Please include a statement regarding how these accomplishments support the mission of the installation or other activities. This information may be used to brief program successes up to leadership. See detailed examples provided, [here](#).

1. As a result of this year's annual review, have any additional actions, such as management recommendations related to regulatory drivers (ACOE permits, EFH Issues, etc.), been identified that should be considered for incorporation into the INRMP? *

Yes
 No

1.a. Please explain in detail.

Northern long-eared bat seasonal vegetation management restrictions. Participation in the State Nesting Piping Plover Survey Reporting Effort.

2. In addition to any findings submitted in the previous 7 Focus Areas, please provide any additional or general findings.

3. In addition to any recommendations submitted in the previous 7 Focus Areas, please provide any additional or general recommendations.

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

4. List the top accomplishment for the Natural Resources Program during this reporting period. *

Providing real-time/life military mission and migratory bird management requirements experiences for students and instructors attending the multi-agency migratory bird conservation training course. (Via a collaboration with the installation and HQ NR programs, installation Air Ops program, USDA-WS, USACE and USFWS.

5. List the second accomplishment for the Natural Resources Program during this reporting period. *

Completing the 1st Nesting Eagle Survey of the installations and associated buffer via a partnership with the College of William and Mary's Center for Conservation Biology.

6. List the third accomplishment for the Natural Resources Program during this reporting period. *

Planting 15,000 plants to stabilize and restore 1/2 mile of dune habitat that supports initiatives to avoid loss of military training & military mission support land while conserving habitat suitable for T&E species and pollinator species, in addition to increasing and enhancing a portion of the region's dunal ecosystem.

Agriculture

Agriculture Program Status

Objective: This purpose of this section of the Natural Resources Conservation Metrics data call is to gather required information associated with the status of the Agriculture Program. Responses to the questions in this section are not scored as a part of the Natural Resources Conservation Metrics data call. These questions have been added here to collect information that will support the Defense Environmental Program Annual Report to Congress (DEPARC) and Office of the Secretary of Defense Environmental Management Review (EMR). By combining these questions with responses to the Metric's seven (7) focus areas, Natural Resources Managers are faced with fewer annual data calls.

Is there an active agriculture out-lease program on this site? *

Yes
 No

What are the driving factors for having an Ag Lease on this site?

1. How many active leases are currently associated with this site?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

2. What is the total number # of leased acres?

3. What is the Annual lease income?

4. What are the Annual expenses?

5. Do any leases involve in-kind payments?

Yes
 No

5.a What are the number of in-kind leases?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

6. What are the leases for?

- Crop Production
- Hay
- Grazing
- Other
- Honey Production
- Honey Bee Rearing

7. What is the primary land use where agriculture out-leasing occurs? Select all that apply.

- Airfield clear/buffer zone
- Antenna area
- ESQD Arc
- Outlying landing field
- Weapons storage
- Other, please list

8. Are additional lands available for AG out-leasing?

- Yes
- No

8.a What is the number of additional acres available?

9. Is there an apiary program?

- Yes
- No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

9.a Is the apiary activity part of the AG out-lease program?

Yes
 No

10. How many personnel are funded through agriculture out-lease funds?

11. Primary installation agriculture program POC.

Forestry

Forestry Program Status

Objective: This purpose of this section of the Natural Resources Conservation Metrics data call is to gather required information associated with the status of the Forestry Program. Responses to the questions in this section are not scored as a part of the Natural Resources Conservation Metrics data call. These questions have been added here to collect information that will support the Defense Environmental Program Annual Report to Congress (DEPARC) and Office of the Secretary of Defense Environmental Management Review (EMR). By combining these questions with responses to the Metric's seven (7) focus areas, Natural Resources Managers are faced with fewer annual data calls.

1. Does the site have forest cover? *

Yes
 No

1.a What is the total number of forested acres on this site?

1143

2. Is there an active forestry program on this site?

Comment: This is a yes and no answer. The installation inventories and manages the forested land on the installation to increase natural habitat conditions associated with the greater ecoregion. The installation does not manage in a traditional commercial forestry practice for the sole source of timber harvesting. The installation's does have commercially viable timber on site and if project clearing of such sites is warranted then the NAVFAC EV 22 forester establishes a value for that timber to be paid back to the forestry program.

Yes
 No

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

3. What is the total number of acres currently under active forest management?

4. Is there a commercial forest program?

Yes
 No

5. What was the annual program revenue over the past fiscal year?

6. Where any trees harvested during the past fiscal year?

Yes
 No

6.a How many acres of forest were harvested during the past fiscal year?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

6.b What was the method of harvest?

- Clearcut
- Seed Tree Cut
- Shelterwood Cut
- Select Cutting
- Group Selection
- Single Tree Selection
- Commercial Thinning

7. What were the annual program expenses during the past fiscal year?

8. Was there a planting during the past fiscal year?

- Yes
- No

8.a What were the number of acres regenerated through planting over the past fiscal year?

8.b What species were planted?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

9. Did natural regeneration occur last fiscal year?

Yes
 No

9.a How many acres are naturally regenerated?

20

10. Does the site have longleaf pine (*Pinus palustris*)?

Yes
 No

10.a What is the number of acres of longleaf pine (*Pinus palustris*)?

2

11. What are the primary commercial species managed?

Reporting Unit Metrics Q&A Report: DAM NECK ANNEX

12. Is prescribed burning used?

Yes
 No

12.a What is the number of acres burned in the past year?

13. How many personnel are funded through forestry funds?

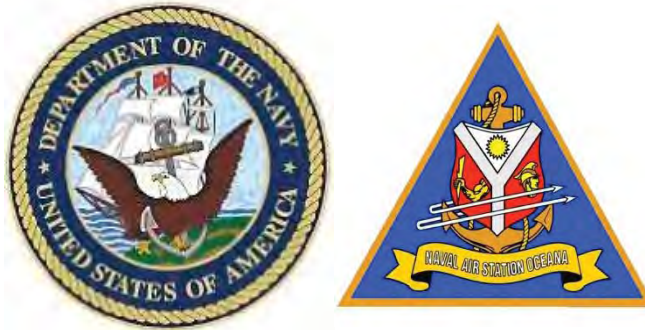
14. Primary site forestry program POC.

Summary Score

1 - Ecosystem Integrity	0.90
Ecosystems	0.79
Encroachment	1.00
2 - Listed Species Critical Habitat	0.84
Threatened and Endangered Species	0.84
Unoccupied Critical Habitat	
3 - Recreation Use and Access	0.88
4 - Sikes Act Cooperation	0.81
5 - Team Adequacy	0.82
6 - INRMP Implementation	0.32
FY16 Projects	0.32
Satisfaction Index	0.80
7 - Support of Installation Mission	0.87

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

NAVAL AIR STATION OCEANA AND NAVAL AUXILIARY LANDING FIELD FENTRESS CITIES OF VIRGINIA BEACH AND CHESAPEAKE, VIRGINIA



Prepared for:

**United States Department of the Navy
Naval Facilities Engineering Command Mid-Atlantic**

Initially Prepared by:

**Tetra Tech, Inc.
December 2014**

Last Updated by:

**Installation Natural Resources Manager
January 2017**

**INTEGRATED NATURAL RESOURCES
MANAGEMENT PLAN**

**NAVAL AIR STATION OCEANA AND
NAVAL AUXILIARY LANDING FIELD FENTRESS
CITIES OF VIRGINIA BEACH AND CHESAPEAKE, VIRGINIA**

Initially Prepared by:

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December 2014

Last Updated by:

Installation Natural Resources Manager

January 2017

For:

United States Department of the Navy

Naval Facilities Engineering Command Mid-Atlantic

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

NAVAL AIR STATION OCEANA AND NAVAL AUXILIARY LANDING FIELD FENTRESS

Approving Officials:

 _____ Louis J. Schager, CAPT Installation Commanding Officer Naval Air Station Oceana	<u>6/9/15</u> _____ Date
CARAWAN.WILBU R.E.1229602760 <small>Digitally signed by CARAWAN.WILBU.E.1229602760 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=CARAWAN.WILBU.E.1229602760 Date: 2015.04.21 14:48:20 -0400'</small>	<u>4-21-15</u> _____ Date
Emmett Carawan Natural Resources Manager Naval Facilities Engineering Command Mid-Atlantic Region	
WRIGHT.MICHAEL.F ARRELL.1269931724 <small>Digitally signed by WRIGHT.MICHAEL.F ARRELL.1269931724 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, ou=WRIGHT.MICHAEL.F ARRELL.1269931724 Date: 2015.02.11 15:23:20 -0500'</small>	<u>11 Feb 2015</u> _____ Date
Michael Wright Natural Resources Manager Naval Air Station Oceana	
 _____ Cynthia A. Schulz Field Supervisor Virginia Ecological Services United States Fish and Wildlife Service Virginia Field Office	<u>12/19/12</u> _____ Date
David L. O'Brien <small>Digitally signed by David L. O'Brien DN: cn=David L. O'Brien, o=NOAA Fisheries Service, ou=Habitat Conservation Division, email=David.L.obrien@noaa.gov, c=US Date: 2015.05.29 09:23:53 -0400'</small>	<u>29 May 2015</u> _____ Date
David L. O'Brien Fisheries Biologist Virginia Field Office National Oceanic and Atmospheric Administration	
 _____ Robert W. Duncan Executive Director Virginia Department of Game and Inland Fisheries	<u>2/26/2015</u> _____ Date

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
NAVAL AIR STATION OCEANA AND
NAVAL AUXILIARY LANDING FIELD FENTRESS

INRMP Review

Date of Annual Review/Update	Name and Title of Reviewer(s)
21 Oct 2014	See Appendix M
08 Oct 2015	See Appendix M
12 - 13 Oct 2016	See Appendix M

Date Adjusted	Section/Page	Comment	Reviewer
20150306	Signature Pages	Inserted Updated VDGIF and installation NRM Signatures updated name with name of current installation CO.	Michael Wright
20150306 20150409 20150413 20150414	Appendices	Updated with contractor final deliverables.	Michael Wright
20150409 20150413 20150414	Appendices & Main Doc.	Added Various Sticky Note Comments	Michael Wright
20150409	3.2.9.1	Updated text to reflect first confirmed eagle nest found on NASO in 2015.	Michael Wright
20150514	3.1.2.2	Deleted text and added proposed text submitted by NAVFAC ML EV2 Wetlands SME, Thad McDonald.	Michael Wright
20150514	4.2.1	Deleted text and added proposed text submitted by NAVFAC ML EV2 Wetlands SME, Thad McDonald.	Michael Wright
20150603	TOC & 3.4	Changed section head numbering in TOC and document body text headings, contractor misnumbered.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20150603	TOC & 3.5	Changed section head numbering in TOC and document body text headings, contractor misnumbered.	Michael Wright
20150603	Signature Pages	Consolidated all Agency Official Signatures into a single set of Signatures. One additional page of signatures that includes the previous CO signature still remains, until an updated CO signature is obtained.	Michael Wright
20150603	Appendix E	Deleted place holder maps and Added updated 50ft Wetland and Riparian Buffer Maps for NASO and NALFF.	Michael Wright
20150604	Appendix E	Deleted Jun 3rd maps and replaced with updated Jun 4th updated 50ft Wetland and Riparian Buffer Maps for NASO and NALFF. Just adjusted coloring and display for additional clarity.	Michael Wright
20150604	TOC & 1.4.2-1.4.3, 2.3.2-2.3.6, 2.5-2.7, 3.1.4-3.1.9, 4.7-4.15	Changed section head numbering in TOC and document body text headings, contractor misnumbered.	Michael Wright
20150604	4.10.2.2	Updated verbiage regarding bald eagle buffer requirements.	Michael Wright
20150604	General	Removed previous comments that have been addressed.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20150604	Appendix I	Replaced Capt Chope's 2013 CO Env Policy Letter with Capt Schager's 2015 letter.	Michael Wright
20150609	Signature Page	Inserted final consolidated signature page. Deleted old and individual signature pages from the front of the document.	Michael Wright
20150812	Appendix F, Enclosure 21	Replaced Draft NASO Pond/Stream Assessment with Final Version. (NALFF Assessment Draft Due 01 Oct 2015.)	Michael Wright
20150812	Appendix H, Enclosures 1 & 2	Replaced Former Agricultural Lease Agreement Documentation with Current lease and soil & water conservation plan.	Michael Wright
20150812	Appendix K, Enclosure 3	Added AOMP Vegetation Management Zones Maps and update TOC.	Michael Wright
20150812	Appendix F, Enclosure 18	Replaced Commercial Forest Inventory with the Revised Commercial Forest Inventory.	Michael Wright
20150812	Appendix E, Enclosure 4	Replaced Wetlands Maps with Updated Wetlands Maps to reflect the additional Land Evaluation Areas at NALFF.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20150812	Figure1-6	Deleted Map For INRMP Public Distribution Until NOSSA Approval is Obtained for Release.	Michael Wright
20150812	Appendix K, Enclosure 9	Deleted Maps For INRMP Public Distribution Until NOSSA Approval is Obtained for Release.	Michael Wright
20150812	Appendix F, Enclosure 2	Inserted Map to Show Nearshore Area to be assessed/surveyed and the Accepted Contractor Proposal minus cost information.	Michael Wright
20150825	Figure1-6	Replaced Map For INRMP Public Distribution after coordination with NOSSA per PWD Planning Office.	Michael Wright
20150825	Appendix K, Enclosure 9	Replaced Maps For INRMP Public Distribution after coordination with NOSSA per PWD Planning Office.	Michael Wright
20150825	Appendix M, Enclosures 1 & 2	POM16 & POM 18 Project Table and Project Justification and Cost Estimate Updates	Michael Wright
20150909	Appendix M, Enclosures 2	Added POM18 Manpower Justification Input submitted to NAVFAC MIDLANT CORE EV2.	Michael Wright
20150910	Appendix K, Enclosure 9	Updated Hunting Rules and Regulations	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20151015	Appendix M , Enclosure 3	Added 08 Oct 2015 INRMP Metrics Agencies Meeting Attendance Roster.	Michael Wright
20160527	Appendix M, Enclosure 3	Added ICO Final INRMP Metrics Results Package, deleted NASO DNA information that was submitted with the package.	Michael Wright
20160601	Appendix F, Enclosure 22	Added the May 2015 NALFF NLEB Survey report. NASO Survey report is pending the results of Acoustic Surveys.	Michael Wright
20160601	Appendix M , Enclosure 3	Replaced 2015 IPAC information with 27 April 2016 information for NASO and NALFF.	Michael Wright
		Need to Update NLEB info in the text of the main INRMP document.	Michael Wright
20160601	Appendix E, Enclosure 5; ***still need to update INRMP text***	Added the Ditch Maintenance Map to INRMP Appendix and Need to Reference as appropriate in INRMP text.	Michael Wright
		Need to add verbiage to INRMP re BHWG AOMP Vegetation Height Management Map.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20160601	Appendix K, Enclosure 12 ***Still need to update INRMP text.***	Added the following information to appendix. Still need to update appropriate sections /references to Avian Protection Plan Guidance documents in the body of the INRMP. Projects should reference and implement applicable avian collision with powerline reduction/avoidance guidelines/procedures. These documents can be obtained from the following websites: < http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/guidance-documents.php >; http://www.aplic.org/ ; and < http://www.dodpif.org/plans/app.php >. Also need to add to appendix and reference in INRMP the REDUCING BIRD COLLISIONS WITH BUILDINGS AND BUILDING GLASS BEST PRACTICES document from USFWS.	Michael Wright
20160601	Appendix H, Enclosure 3 ***Still need to update INRMP text.***	Added NALFF Nutrient Management Plan Maps to appendix and Need to provide a reference to how the NR program is involved (ag lease & pesticide spraying) in INRMP text.	Michael Wright
20160601	Appendix K, Enclosure 9 ***Still need to update INRMP text.***	Added MWR horse trail map and Need to reference in appropriate sections in INRMP text: hunting and invasive species mngt, possibly erosion and wetland mngt.	Michael Wright
		Need to update Appendix G species lists. These lists are not complete. Until updated people should search both the INRMP and it's associated appendices for specific species occurrences.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
		Figure 1-8 and INRMP as a whole, does not clearly depict nor adequately discuss the NEXHQ and Midway Manor properties. These are ICO AOR properties unlike the NOSC properties that PWD-OC services.	Michael Wright
		Section 2.4 Flora: National Vegetation Classification has been completed and added to appendix. Update text accordingly.	Michael Wright
		Figures 2-7 & 2-8. Figure does not depict all the communities discussed in section 2.4. Agriculture is not discussed in Section 2.4, but is depicted in the figure. Figure needs to be replaced with a smaller version of the Appendix F, enclosure 3 maps. Text of INRMP needs to be updated with information regarding each Vegetation Classification identified on the installation.	Michael Wright
20160601	Appendix E, Enclosure 1; Section 2.3.5	Section 2.3.5 Wetlands: 1st paragraph last sentence needs to be deleted (NWI is depicted in those figures). Replace May 2011 JD date for NASO with current May 2016 date. Update NASO to reflect JD map in Appendix E.	Michael Wright
		Section 2.5.1 Mammals. Need to update bat information based off of 2015-2016 survey efforts. Need to add potential marine mammal species associated with Owls Creek Parcel/Nearshore environment.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
		Section 2.5.3 Herpetofauna. What about potential for sea turtles in nearshore environment of Owls Creek. This is not an ideal location. There is the potential for strandings to occur. There is a low potential for nestings to occur.	Michael Wright
		Section 2.5.4 Fish. Need to add verbiage associated with low potential for sturgeon to occur in the Owls Creek nearshore environment. Need to update 3rd paragraph to remove blueback herring. This was a miss-identification during intial field surveys that was later corrected to be another migratory species, gizzard shad.	Michael Wright
		Table 2-4. Need to add Little Brown Bat as confirmed at NASO 2014/2015 survey effort. Species is pending a petition for listing under ESA. Need to update all confirmed dates with data from Final Oceana and Fentress Bat survey efforts. Canebrake rattlesnake was observed 2013 at NALFF not Oceana, need to update table accordingly. Need to remove American eel from list NOAA-NMFS determined not warranted for listing...note determination is currently in litigation.	Michael Wright
		3.1.2.1 Wetland Protection. Section does not discuss existing wetland mitigation sites. Need to reference Chapter 4 Figure 4-1 page 4-9.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
		Section 3.3 Forest Management. Needs to be updated to reflect the data from the 2014 Forest Inventory, located in Appendix F.	Michael Wright
		Figure 4-1 Wetland Mitigation Sites. Need to update. Need to verify Wherry Housing Area is associated with wetland mitigation, as the area is associated with a forest mitigation requirement. Also, need to add a figure associated with NALFF mitigation site(s).	Michael Wright
		Section 4.5 Agricultural Outleasing. Update last paragraph to reflect that new leases were signed in 2015. Need to update NASO Ag info throughout document to remove the parcel that has been turned over for REPO Solar PV 35 year lease. Update INRMP to include verbiage regarding REPO Solar PV arrays.	Michael Wright
		Section 1.7 and appropriate locations throughout document. Update INRMP to include verbiage regarding REPO Solar PV arrays.	Michael Wright
		Section 1.4, Literature Cited/References and throughout as appropriate, update references to ICO Environmental Policy Letter. INRMP references the 2011 and 2013 Letters; however, the 2015 letter is located in Appendix I.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
		<p>Figure 1-6. Need to add existing Mitigation Sites to this map. Need to remove the word probable from the Cultural Sensitive Legend description.</p> <p>PWD Planning, Jack Bain, confirmed that Safety Arc/Zones/Fans as depicted/ described are okay for public release, per NOSSA's lack of further comment by 25 Aug 2015.</p>	Michael Wright
		<p>Figure 1-7. Need to Add Ecological Reserve Area boundary and existing Mitigation sites to this map. Need to remove the word probable from the Cultural Sensitive Legend description.</p>	Michael Wright
		<p>Figure 3-4. See Appendix F, Enclosure 7 for Proposed Adjusted SIA boundaries given the 2012-2014 Updated Natural Heritage/T&E Species and Ecological Community Survey Efforts.</p>	Michael Wright
		<p>Section 3.1.8 Integrated Pest Management. This focuses on flora, what about fauna? Need to update INRMP accordingly.</p>	Michael Wright
		<p>Figure 3-6. Need to update Hunting Zone Types (Archery Only vs Muzzleloader). Also need to depict Small vs Big Game Hunting Zones.</p> <p>Pending Security and Safety Approvals, per CO, 9 Jun 2015, a portion of the former Wherry Housing area may need to be added to map as an authorized hunting area.</p>	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
		Figure 3-7. Need to update Hunting Zone Types (Archery Only vs Muzzleloader). Also need to depict Small vs Big Game Hunting Zones.	Michael Wright
		<p>Section 3.2.8. In the State of Virginia as of 24 March 2016 <http://www.vdacs.virginia.gov/plant-industry-services-plant-pest-survey-and-detection.shtml> there are 6 ongoing pest survey programs for the following species: Asian Longhorned Beetle; Eurpoean Grapevine Moth; Giant Hogweed; Gypsy Moth; Khapra Beetle; and Sudden Oak Death (Phytophthora ramorum). Other tracked Pests of Concern in VA: Asian Ambrosia Beetle; Giant African Land Snails; Imported Fire Ants; Pine Shoot Beetle; and Sirex Woodwasp. <http://caps.ceris.purdue.edu/pest-lists>. Invasives in VA: <http://www.dcr.virginia.gov/natural-heritage/vaisc/species/></p> <p>Not Established but Top goal for prevention in VA: Zebra Mussel; Sirex Wood Wasp; Rusty Crayfish; Sudden Oak Death; Emerald Ash Borer; Chinese Mitten Crab. Established in VA and Goal For Control: Northern snakehead fish; rapa whelk; tree of heaven; japanese stilt grass; imported fire ant; and phragmites.</p> <p>Chesapeake Bay Program Invasive Species Priorities for Mngt.: mute swan, nutria, purple loosestrife, Phragmites, water chestnut, and zebra mussel.</p>	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
		Section 4.2.4. Need to update GIS geodatabase and INRMP maps and text to ensure they accurately capture all known mitigation sites.	Michael Wright
	Various	<p>Need to add Information on Natural Resources Emergency Nuisance and Emergency Wildlife Notification Processes.</p> <p>Need to update with information regarding dead animal notifications and who responds and when they respond.</p> <p>Dead Animals are potential zoonotic disease vectors just as much as living animals. Animals found dead in human populated areas of the installation should be disposed of via cremation (especially when origin of death or animal condition of health cannot be determined or is uncertain).</p>	Michael Wright
20160607	Appendix C, Enclosure 2; Still need to update main INRMP text	Added ICO Auth. to Carry Firearms. Reference in appropriate sections of main INRMP text.	Michael Wright
20160624	Various	Added comments to alter prescribed burn/fire verbiage in the body of the INRMP.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20160624	Appendix A, Enclosure 1	Deleted NASO DNA/CP EA and replaced with the appropriate 2001 NASO/NALFF EA for the INRMP.	Michael Wright
		<p>Need to add to appropriate sections of INRMP text: If the activity proposes to conduct night operations or install lighting in association with this project, the activity should NOT install lighting that could disorient birds migrating at night. Activity should follow Unified Facilities Criteria (UFC), Interior and exterior lighting systems and controls and ensure: Lighting structures be installed that minimize ambient light (light should be directed/shielded downwards, not up or out), the following website provides examples of acceptable and unacceptable lighting fixtures <http://darksky.org/lighting/lighting-basics/>; and light-bulbs to be installed should utilize a color temperature of no more than 3000 Kelvins (NO blue-rich white lights), utilizing “warm-white” or filtered LEDs can meet this requirement. This may mean more poles have to be installed than what would be required for higher kelvine bulbs to meet any lighting requirements. Following these measures can gain the installation/project Bird Safe LEAD lighting credits. The Activity should take every precaution to avoid potential negative impacts to Migratory Birds. This project is located along the Atlantic Flyway.</p>	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
		<p>Need to add to appropriate sections: The Activity should take every precaution to avoid potential negative impacts to Migratory Birds. This project is located along the Atlantic Flyway. In addition there are known Threatened and Endangered Species that migrate through this area. Landscape alterations (i.e., Tree removal, mowing, land clearing, etc.) actions should occur during months with minimal impacts to migrating and nesting birds. United States Fish & Wildlife Service's (USFWS) recommended time frame for vegetation clearing activities = Nov-Feb. If birds of conservation concern are identified as utilizing this area additional consultations and permit requirements with USFWS may be required. For habitat disturbing activities that must be conducted during the active breeding season, the contractor must perform a pre-job clearance survey by a qualified wildlife biologist (credentials must be provided to the Contract Manager and Installation Natural Resources Manager) to identify any active nests and implement avoidance measures for those particular nests. If any nests are found during these surveys, the contractor must contact the installation natural resources program manager (NRM). The NRM will provide further guidance and coordinate obtaining permits and the associated removal of the nest's, once approved.</p> <p>Project must conduct a survey of migratory birds if conducting vegetation clearing activities in the months of Mar, Apr, May, Jun, Jul, Aug, Sep or Oct. The survey boundary and nest locations must be surveyed with a Global Positioning System (GPS) and placed into an appropriate Geographic Information Systems (GIS) geodatabase. The GIS data must be compliant with the current Navy Data Model Standard Environmental Module (to obtain details, coordinate with the NAVFAC ML EV GIS Coordinator). Any data (date, surveyor name, species, species behavior, nest activity, etc.) not included in the geodatabase, must be placed in tables that can be joined to the associated GIS data. The geodatabase, associated tables, and photos must be provided to the installation NRM and NAVFAC MIDLANT Environmental GIS Coordinator.</p> <p>As of 27 April 2016 the USFWS IPAC system documented 36 species of Breeding Birds of Conservation Concern (BCC) that could occur on the project site. Any take of a migratory bird (including possession of parts of a bird), an active nest, or eggs is a violation of the Migratory Bird Treaty Act, unless appropriate permits and authorizations are obtained.</p> <p>Installation has suitable eagle nesting & roosting habitat. As of the 03 Apr 2016 nesting bald eagle survey there is only one Eagle Nest confirmed to occur on the installation. Projects should verify annually that there are no active eagle nests within 2,640 ft of their project site(s). Eagles are occasionally observed on the installation. Eagles begin establishing nesting territories in the fall, and have active nests over the winter and early spring months. Consultations with USFWS and VDGIF may be required if a nest is located within 2,640 ft of the project site.</p> <p>Note: Once a project site has been confirmed to not have any birds nesting on-site, the contractor/activity should conduct daily site checks to harass birds off of the project site and remove any items that look like the start of a nest being built (sticks, moss, other piled debris, etc.). For protected species of birds, once a nest has been established and is active (containing eggs or hatchlings) work must cease until the birds fledge the nest or until appropriate permits and authorizations are granted to remove the nest.</p>	<p>Michael Wright</p>

Date Adjusted	Section/Page	Comment	Reviewer
		<p>Recommend adding verbiage: From 16 Sep to 15 Apr the installation natural resources staff can authorize osprey nest removal. From 16 Apr to 15 Sep installation natural resources staff must coordinate with USDA or VDGIF to make a determination if a nest can be removed without further permitting requirements. If permits are required for Nest removal the Navy must be able to justify nest removal due to negative impacts to the birds and/or critical military mission failure due to nest's presence as part of the permit application process. Once a nest is removed tenants should either build a structure over the area that will make the site unattractive to nesting in the future or be prepared to remove nesting materials every 2-3 days during nesting season (typically March-Sep), thus avoiding a nest from actually establishing. An additional recommendation is for the activity to build a nesting platform in the vicinity of the current undesirable site (e.g., tower, electrical transformer, light poles, etc.) that would be more attractive to the birds (coordination with the Natural Resources program would be required), thus creating a more desirable nesting location, potentially stopping nesting attempts on military facility infrastructure. If an osprey nests onsite during active construction, work can continue uninterrupted, so long as there is no need to remove any nests. It is recommended, if a nest is allowed to be built within the work zone, that a perimeter be established on the ground extending out 8-10+ feet from around the base of the nesting platform, to minimize people working on or around the nest from being hit with nesting debris.</p>	<p>Michael Wright</p>

Date Adjusted	Section/Page	Comment	Reviewer
		<p>Update to reflect NASO's 1st confirmed Bald Eagle & Aircraft "Strike," 01 Oct 2016. Bird was immature and not banded. After investigation it was determined that the bird did not physically come into contact with the aircraft, but likely got caught up in the "jet wash." Information from USDA-WS Bash Biologist provided the following information regarding BAEA & Jet wash incidents: "BAEA getting caught up in jet wash and being killed or seriously injured seems to be not common, but also not uncommon. We (USDA/WS) have noticed BAEAs have a preference to loaf on runways and taxiways to get away from the other birds that like to pester them. It has been my personal experience that this behavior leads to the birds getting caught up in jet wash as planes land. Due to the lack of evidence of a bird strike on the plane from this weekend, it is likely this is what occurred here. When I worked in northern VA, we had two eagles get beaten up by jet wash from commercial jets within a few years. One eagle died and another ended up being put down by a rehab facility due to the severity of its injuries. Overall, we're noticing an increasing trend in eagle strikes throughout our state and the US. As populations continue to thrive, it is likely the conflict will increase. It is extremely important we are vigilant this fall and winter and discourage any nesting near our flight facilities."</p>	Michael Wright
		<p>Need to insert the 2013 Final Erosion Control Plan into the INRMP Appendices. Note INRMP Text already references the document.</p>	Michael Wright
		<p>Need to insert 2016 INRMP Metrics Final Results into INRMP Appendices.</p>	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
		Need to insert Nov 2016 NASO NLEB survey report into INRMP Appendices.	Michael Wright
		Need to insert Aug 2016 Conservation Law Enforcement Program Assessment into INRMP appendices upon ICO approval.	Michael Wright
		Need to insert Dec 2015 NALFF Fish & Stream Assessment into INRMP appendices.	Michael Wright
		Need to update Hunting Information to reflect programmatic updates (hunting area closures, harvest records, etc.).	Michael Wright

FINAL INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

**NAVAL AIR STATION OCEANA DAM NECK ANNEX
VIRGINIA BEACH, VIRGINIA**



Prepared for:

United States Department of the Navy

Naval Facilities Engineering Command Mid-Atlantic

Initially Prepared by:

Tetra Tech, Inc.

February 2014

Last Updated by:

Installation Natural Resources Manager

January 2017

**FINAL
INTEGRATED NATURAL RESOURCES
MANAGEMENT PLAN**

**NAVAL AIR STATION OCEANA DAM NECK ANNEX
VIRGINIA BEACH, VIRGINIA**

Prepared for:

United States Department of the Navy
Naval Facilities Engineering Command Mid-Atlantic

Initially Prepared by:

Tetra Tech, Inc.

February 2014

Last Updated by:

Installation Natural Resources Manager

January 2017

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
NAVAL AIR STATION OCEANA DAM NECK ANNEX

Approving Officials:



Louis J. Schager, CAPT
Installation Commanding Officer
Naval Air Station Oceana
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ou=USN, cn=CARAWAN.WILBU.R.E.1229602760
Date: 2015.04.07 15:28:33 -0400

6/9/15

Date

4-7-15

Emmett Carawan
Natural Resources Manager
Naval Facilities Engineering Command
Mid-Atlantic Region

Date

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Date: 2015.01.06 09:59:27 -0500

06 January 2015

Michael Wright
Natural Resources Manager
Naval Air Station Oceana

Date



1/15/2015

Cindy Schulz
Field Supervisor
Virginia Ecological Services
United States Fish and Wildlife Service
Virginia Field Office

Date

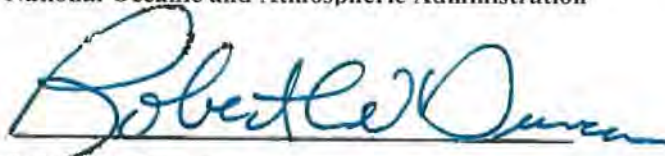
David L. O'Brien

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DN: cn=David L. O'Brien, o=NOAA Fisheries
Service, ou=Habitat Conservation Division,
email=David.L.obrien@noaa.gov, c=US
Date: 2015.05.29 09:34:53 -0400

29 May 2015

David L. O'Brien
Fisheries Biologist
Virginia Field Office
National Oceanic and Atmospheric Administration

Date



2/26/15

Robert W. Duncan
Executive Director
Virginia Department of Game and Inland Fisheries

Date

Date Adjusted	Section/Page	Comment	Reviewer
20141015	Appendix	Added Final Contract Deliverables	Michael Wright
20150407	Signature Page	Update ICO Signature Block	Michael Wright
20150407	Appendix	Added Pollinator Information	Michael Wright
20140507 to 20150407	Main Doc. & Appendix	Comment Sticky Notes & Text Updates	Michael Wright
20150514	3.2.2	Deleted text and added proposed text submitted by NAVFAC ML EV2 Wetlands SME, Thad McDonald regarding floodplains.	Michael Wright
20150603	Signature Pages	Consolidated all Agency Official Signatures into a single set of Signatures. One additional page of signatures that includes the previous CO signature still remains, until an updated CO signature is obtained.	Michael Wright
20150603	Appendix E	Deleted place holder maps and Added updated 50ft Wetland and Riparian Buffer Map.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20150604	Appendix M	Replaced Capt Chope's 2013 CO Env Policy Letter with Capt Schager's 2015 letter.	Michael Wright
20150608	Appendix F Encl 2	Updated Marine Animal Stranding Reporting SOPs	Michael Wright
20150608	Appendix E	Deleted Placeholder and added updated Watershed/Hydrologic Unit Map.	Michael Wright
20150609	Signature Page	Inserted final consolidated signature page. Deleted old and individual signature pages from the front of the document.	Michael Wright
20150812	Appendix H, Enclosure 14	Replaced Draft NASO DNA Pond/ Stream Assessment with Final Version.	Michael Wright
20150812	Appendix H, Enclosure 13	Replaced Draft Commercial Forest Inventory with the Final Commercial Forest Inventory.	Michael Wright
20150812	Figure1-4	Deleted Map For INRMP Public Distribution Until NOSSA Approval is Obtained for Release.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20150812	Appendix J, Enclosure 2	Deleted Maps For INRMP Public Distribution Until NOSSA Approval is Obtained for Release.	Michael Wright
20150812	Appendix H, Enclosure 2	Inserted Map to Show Nearshore Area to be assessed/surveyed and the Accepted Contractor Proposal.	Michael Wright
20150825	Figure1-4	Replaced Map For INRMP Public Distribution after coordination with NOSSA per PWD Planning Office.	Michael Wright
20150825	Appendix J, Enclosure 2	Replaced Maps For INRMP Public Distribution after coordination with NOSSA per PWD Planning Office.	Michael Wright
20150825	Appendix M, Enclosures 1 & 2	POM16 & POM 18 Project Table and Project Justification and Cost Estimate Updates	Michael Wright
20150909	Appendix M, Enclosures 2	Added POM18 Manpower Justification Input submitted to NAVFAC MIDLANT CORE EV2.	Michael Wright
20150910	Appendix J, Enclosure 2	Updated Hunting Rules and Regulations	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20150922	Appendix F Encl 1 & 2	Updated Sea Turtle SOPs to Include copies of Agreements and Permits.	Michael Wright
20151015	Appendix M , Enclosure 3	Added 08 Oct 2015 INRMP Metrics Agencies Meeting Attendance Roster.	Michael Wright
20151105	Appendix M, Enclosure 3	Added ICO 2015 INRMP Metrics Responses.	Michael Wright
20160606	Appendix M, Enclosure 3	Replaced older version with Final 2015 ICO INRMP Metrics Package. Deleted the NASO/NALFF INRMP information from the package.	Michael Wright
	Throughout	Update protected species info. NLEB found on installation via acoustic monitoring (update status info as well). RBEB found on installation via mist netting.	Michael Wright
	Appendix I, enclosure 2; Appendix H, enclosure 6	Update Avian Species List to include confirmed observation of Sandhill Cranes in 2016 during Shorebird Survey effort by NAVFAC LANT, Jennifer Wright.	Michael Wright
20160606	Appendix H, Enclosure 9; Appendix F Enclosure 6	Add the following documents to appendix: Natural Heritage Inventory/ Listed Species Survey; Bat Baseline; Sea Turtle Lighting Assessment; and Sea Turtle BA.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	Appendix I; Sections 2.5.1, 3.6, 4.3.5, etc.	Verify that Harp, Harbor and Gray Seals are identified in the INRMP as having been confirmed on the installation.	Michael Wright
	Appendix F, Enclosures 1 & 2	Update Marine Animal Stranding Procedures to reflect personnel/ notification changes.	Michael Wright
20160606	Appendix M, Enclosure 3	Delete early versions and replace with 2015 ICO Final INRMP Metrics Results Package, deleted NASO/NALFF INRMP information that was submitted with the package.	Michael Wright
20160606	Appendix M, Enclosure 3	Replace 2015 IPAC information with 27 April 2016 information for NASO and NALFF.	Michael Wright
	Appendix I	Need to update Appendix species lists. These lists are not complete. Until updated people should search both the INRMP and it's associated appendices for specific species occurrences.	Michael Wright
	Table 2-4	Need to cross-walk Table 2-4 with the FY15 INRMP Metrics List and Feb 2016 version of the Listed Species Survey (appendix h, enclosure 9) and edit Table 2-4 accordingly. Table needs to reflect Terrestrial and as appropriate Marine Species (delete the word Terrestrial from table title update INRMP text accordingly. RBEB, NLEB, Sea Turtles, Sturgeon, etc. need to be added to the table. State listed RBEB and Federal listed NLEB identified on the installation summer of 2015. American Eel determined not warranted for ESA listing. Monarch Butterfly has been petitioned for ESA listing and is currently under review by USFWS.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
20160606	Appendix J, Enclosure 7; Still need to update main INRMP text.	Added the following information to appendix. Still need to update appropriate sections /references to Avian Protection Plan Guidance documents in the body of the INRMP. Projects should reference and implement applicable avian collision with powerline reduction/avoidance guidelines/procedures. These documents can be obtained from the following websites: < http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/guidance-documents.php >; http://www.aplic.org/ ; and < http://www.dodpif.org/plans/app.php >. Also need to add to appendix and reference in INRMP the REDUCING BIRD COLLISIONS WITH BUILDINGS AND BUILDING GLASS BEST PRACTICES document from USFWS.	Michael Wright
20160606	Appendix B, Enclosure 3; Still need to update main INRMP text.	Need to add LCAC Land Training Course and Beach Operations Training Course Map to INRMP and reference accordingly in INRMP text.	Michael Wright
	Appendix C	Recommend Changing Appendix to: Commanding Officer Designations and Authorizations: Encl 1 Designation Letters; Encl 2 CO EV Policy; Encl 3 CO Auth to Carry Firearms; etc.	Michael Wright
	Figure 1-4	Figure 1-4. Needs to be updated. Does not depict the PJD wetlands for the NSWDC compound (currently only depicts NWI data for this area. Adjust so SIAs and wetlands can both be viewed. Need to add existing mitigation sites to this map.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	Section 3.12	<p>Section 3.12. Update as appropriate. In the State of Virginia as of 24 March 2016 <http://www.vdacs.virginia.gov/plant-industry-services-plant-pest-survey-and-detection.shtml> there are 6 ongoing pest survey programs for the following species: Asian Longhorned Beetle; European Grapevine Moth; Giant Hogweed; Gypsy Moth; Khapra Beetle; and Sudden Oak Death (Phytophthora ramorum). Other tracked Pests of Concern in VA: Asian Ambrosia Beetle; Giant African Land Snails; Imported Fire Ants; Pine Shoot Beetle; and Sirex Woodwasp. <http://caps.ceris.purdue.edu/pest-lists>. Invasives in VA: <http://www.dcr.virginia.gov/natural-heritage/vaisc/species/> Not Established but Top goal for prevention in VA: Zebra Mussel; Sirex Wood Wasp; Rusty Crayfish; Sudden Oak Death; Emerald Ash Borer; Chinese Mitten Crab. Established in VA and Goal For Control: Northern snakehead fish; rapa whelk; tree of heaven; japanese stilt grass; imported fire ant; and phragmites. Chesapeake Bay Program Invasive Species Priorities for Mngt.: mute swan, nutria, purple loosestrife, Phragmites, water chestnut, and zebra mussel.</p>	Michael Wright
	Section 2.6.2.1.1	<p>Need to update NLEB status information (April 2015 = Federally Threatened under the ESA). Species was confirmed present on the installation via acoustic monitoring in 2015. Need to add Rafinesque's big-eared bat information, state endangered. Confirmed on the installation in 2015.</p>	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	Section 1.7.1	Section 1.7.1. Research origin of statement, "In the northern area of NASO DNA, nearly all of the primary and secondary dunes have been reduced..." Cross reference with Dune Delineation evaluation. Sentence likely needs to be deleted from the INRMP. May be a legacy statement from pre-restoration actions on the North-end dunes. Statement was likely true in the 1990's, but per the 2013-2014 Dune Delineation Report located in the INRMP Appendix, the dunes have recovered and there is sufficient dunal vegetation on the majority of the dunes. VMRC verified the dune delineation and indicated that the NASO DNA's dunes are excellent examples of successful restoration actions resulting in Naturalized Dunes.	Michael Wright
	Section 2.6.2.2	Need to update with Aug 2014 Piping plover observation information.	Michael Wright
	Section 2.6.2.2.1	VDGIF had not completed State wide surveys since 2010. In FY15 a project was awarded to complete a mapping effort of suitable nesting habitat, nest location surveys, and eagle fledgling tracking. Surveys and tracking, will commence Winter of 2015. Initial Flight completed, 03 Apr 2016, no eagle nests documented on installation; however, nests were document adjacent to the installation.	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	Section 2.6.2.2.2	Last confirmed observation 21 Aug 2014 by Paul Block, NAVFAC LANT NRS as part of the installation's funded annual shorebird survey efforts.	Michael Wright
	Section 2.6.2.4.1	Oct 2015 determined to be not warranted for listing under ESA.	Michael Wright
	Section 2.6.2.5	Info. needs to be updated with previously discussed species and more details provided associated with all species. In particular monarch butterfly, candidate species for listing under ESA, needs to be added and the Appendix information associated with pollinator species needs to be referenced.	Michael Wright
	Section 3.11.3	Program is currently understaffed. An assessment of need was funded in FY15 to be completed in FY16/17. This assessment should be utilized to direct staffing levels and/or cooperative agreement requirements. This assessment should be added to the INRMP appendix and should be referenced here and in other appropriate INRMP locations.	Michael Wright
	Section 3.11.3, paragraph 2	Delete, the term Game Warden. This term is obsolete conservation officer is now the universal term since these individuals enforce more than Game Species laws. (Apply this throughout document.)	Michael Wright

Date Adjusted	Section/Page	Comment	Reviewer
	<p>Section 3.10.4, pg 3-30 paragraphs 2-3 of 5</p>	<p>Need to update with current information. There are no known eagle nests on the property, as of 03 April 2016 surveying efforts; however, there are known eagle's nests on adjacent landowner property. The installation falls within one or more of the USFWS defined buffers in accordance with BAGEPA of an active nest. Eagles are occasionally observed on the property. Eagles begin establishing nesting territories in the fall, and have active nests over the winter and early spring months. Surveys may be required to ensure there are no violations of established eagle buffer distances (activity should be prepared to fund any required surveys). Coordination with the installation Natural Resources Manager will need to be maintained to ensure no new nests or roosts are established prior to the project construction time-line. Consultations with USFWS and VDGIF may be required. USFWS & VDGIF Distance Buffers associated with active nests (in parenthesis are examples of types of activities extending from the nest out the associated distance requiring regulatory agency consultation and possibly permits: *330ft (motorized watercraft and ATV use, non-motorized recreation/human entry); *660ft (construction, land alterations, etc.); *1,000ft (helicopter and fixed-wing aircraft); *2,640ft (blasting operations, fireworks, and other loud, intermittent noises). Navy awarded a Cooperative Ecosystems Studies Unit Agreement with W&M CCB to survey for eagle nests and track offspring associated with any known nests (survey completed 03 Apr 2016).</p>	<p>Michael Wright</p>

Date Adjusted	Section/Page	Comment	Reviewer
	Various	<p>Need to add Information on Natural Resources Emergency Nuisance and Emergency Wildlife Notification Processes.</p> <p>Need to update with information regarding dead animal notifications and who responds and when they respond.</p> <p>Dead Animals are potential zoonotic disease vectors just as much as living animals. Animals found dead in human populated areas of the installation should be disposed of via cremation (especially when origin of death or animal condition of health cannot be determined or is uncertain).</p>	Michael Wright
	Section 3.10.5.1	<p>Need to add to section on Inactive Nests: Anyone seeking to remove an inactive nest on the installation, prior to removal, must coordinate with the installation NRM. All nest removals must be appropriately documented in order to identify problem locations over time and to update existing Navy databases.</p>	Michael Wright
		<p>Need to add to appropriate sections of INRMP text: If the activity proposes to conduct night operations or install lighting in association with this project, the activity should NOT install lighting that could disorient birds migrating at night. Activity should follow Unified Facilities Criteria (UFC), Interior and exterior lighting systems and controls and ensure: Lighting structures be installed that minimize ambient light (light should be directed/shielded downwards, not up or out), the following website provides examples of acceptable and unacceptable lighting fixtures <http://darksky.org/lighting/lighting-basics/>; and light-bulbs to be installed should utilize a color temperature of no more than 3000 Kelvins (NO blue-rich white lights), utilizing “warm-white” or filtered LEDs can meet this requirement. This may mean more poles have to be installed than what would be required for higher kelvine bulbs to meet any lighting requirements. Following these measures can gain the installation/project Bird Safe LEAD lighting credits. The Activity should take every precaution to avoid potential negative impacts to Migratory Birds. This project is located along the Atlantic Flyway.</p>	Michael Wright

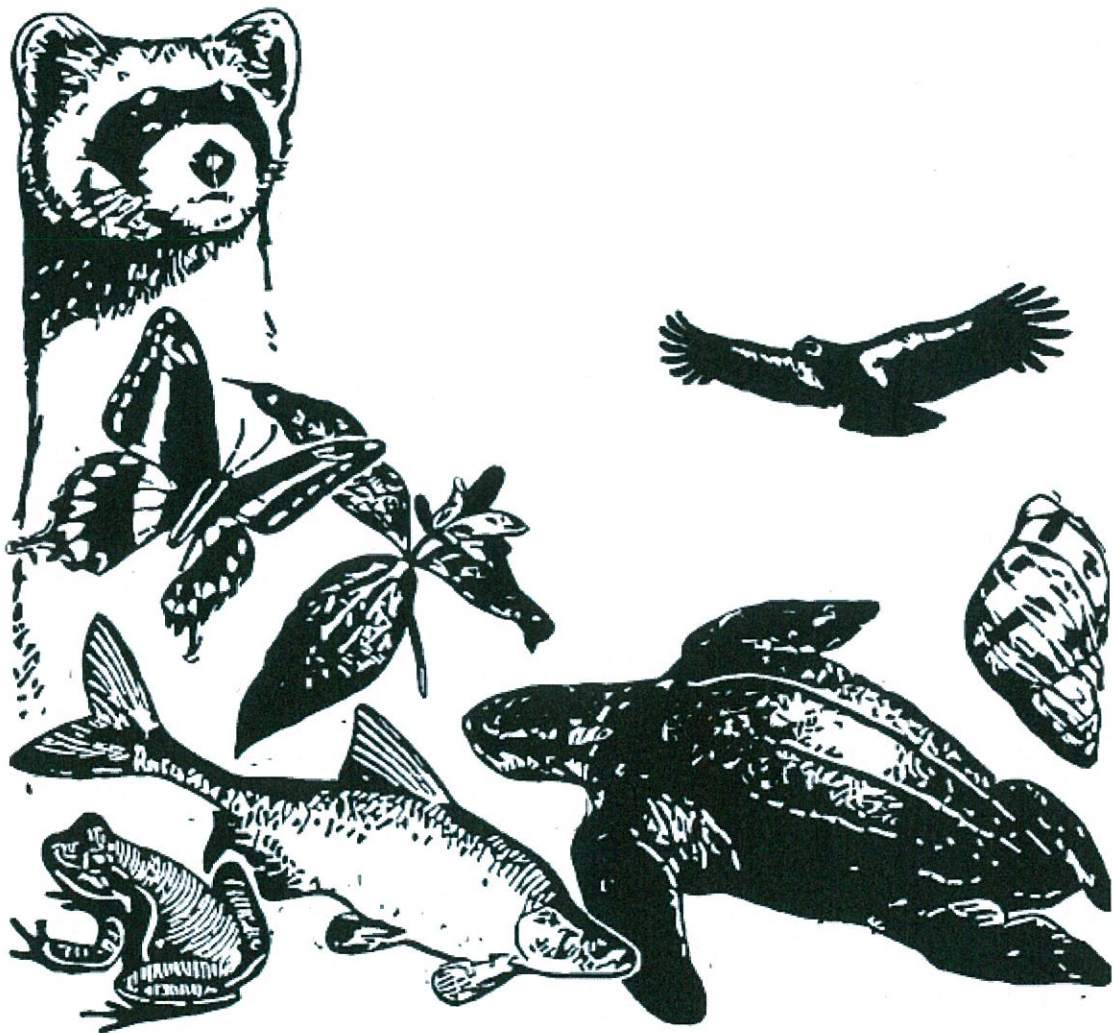
Date Adjusted	Section/Page	Comment	Reviewer
		<p>Need to add to appropriate sections: The Activity should take every precaution to avoid potential negative impacts to Migratory Birds. This project is located along the Atlantic Flyway. In addition there are known Threatened and Endangered Species that migrate through this area. Landscape alterations (i.e., Tree removal, mowing, land clearing, etc.) actions should occur during months with minimal impacts to migrating and nesting birds. United States Fish & Wildlife Service's (USFWS) recommended time frame for vegetation clearing activities = Nov-Feb. If birds of conservation concern are identified as utilizing this area additional consultations and permit requirements with USFWS may be required. For habitat disturbing activities that must be conducted during the active breeding season, the contractor must perform a pre-job clearance survey by a qualified wildlife biologist (credentials must be provided to the Contract Manager and Installation Natural Resources Manager) to identify any active nests and implement avoidance measures for those particular nests. If any nests are found during these surveys, the contractor must contact the installation natural resources program manager (NRM). The NRM will provide further guidance and coordinate obtaining permits and the associated removal of the nest's, once approved.</p> <p>Project must conduct a survey of migratory birds if conducting vegetation clearing activities in the months of Mar, Apr, May, Jun, Jul, Aug, Sep or Oct. The survey boundary and nest locations must be surveyed with a Global Positioning System (GPS) and placed into an appropriate Geographic Information Systems (GIS) geodatabase. The GIS data must be compliant with the current Navy Data Model Standard Environmental Module (to obtain details, coordinate with the NAVFAC ML EV GIS Coordinator). Any data (date, surveyor name, species, species behavior, nest activity, etc.) not included in the geodatabase, must be placed in tables that can be joined to the associated GIS data. The geodatabase, associated tables, and photos must be provided to the installation NRM and NAVFAC MIDLANT Environmental GIS Coordinator.</p> <p>As of 27 April 2016 the USFWS IPAC system documented 36 species of Breeding Birds of Conservation Concern (BCC) that could occur on the project site. Any take of a migratory bird (including possession of parts of a bird), an active nest, or eggs is a violation of the Migratory Bird Treaty Act, unless appropriate permits and authorizations are obtained. Installation has suitable eagle nesting & roosting habitat.</p> <p>Note: Once a project site has been confirmed to not have any birds nesting on-site, the contractor/activity should conduct daily site checks to harass birds off of the project site and remove any items that look like the start of a nest being built (sticks, moss, other piled debris, etc.). For protected species of birds, once a nest has been established and is active (containing eggs or hatchlings) work must cease until the birds fledge the nest or until appropriate permits and authorizations are granted to remove the nest.</p>	<p>Michael Wright</p>

Date Adjusted	Section/Page	Comment	Reviewer
		Installation Instructions (Hunt/Fish/Firewood) = Update/Create and update INRMP Accordingly.	Michael Wright
		Insert Sea Turtle BO received 21 Oct 2016 & Update INRMP accordingly	Michael Wright
		Brief ICO on the Conservation Law-enforcement Program Needs Assessment Results and Update INRMP accordingly, after ICO briefing.	Michael Wright
		Insert FY16 INRMP Metrics Results & Associated Briefing/Presentation Materials.	Michael Wright
		Insert Feb 2016 Listed Species Survey into INRMP appendices.	Michael Wright
		Insert VIMS Dune Delineation Confirmation in the INRMP appendices with the Dune Delineation Report/Survey.	Michael Wright
		Update INRMP to reflect 2016 Piping Plover, Rosete Tern, and Sandhill Crane observations.	Michael Wright

IPaC Trust Resources Report

Generated April 27, 2016 11:40 AM MDT, IPaC v3.0.2

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



U.S. Fish & Wildlife Service

IPaC Trust Resources Report

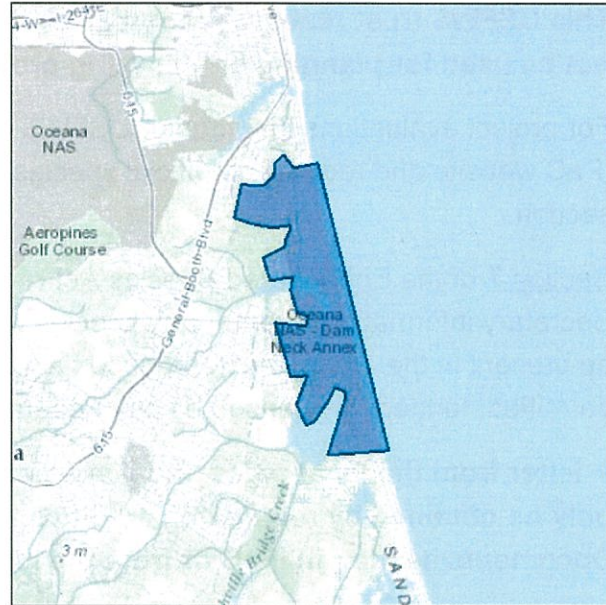


LOCATION

Virginia Beach County, Virginia

IPAC LINK

<https://ecos.fws.gov/ipac/project/YVA4D-VRGIZ-E4TD5-ZKY3H-FJC5YA>



U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

Virginia Ecological Services Field Office

6669 Short Lane

Gloucester, VA 23061-4410

(804) 693-6694

Mammals

Northern Long-eared Bat *Myotis septentrionalis* Threatened

CRITICAL HABITAT

No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A0JE

Reptiles

Green Sea Turtle *Chelonia mydas* Threatened

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=C00S

Hawksbill Sea Turtle *Eretmochelys imbricata* Endangered

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=C00E

Kemp's Ridley Sea Turtle *Lepidochelys kempii* Endangered

CRITICAL HABITAT

No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=C00O

Leatherback Sea Turtle *Dermochelys coriacea* Endangered

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=C00F

Loggerhead Sea Turtle *Caretta caretta* Threatened

CRITICAL HABITAT

There are both **final** and **proposed** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=C00U

Critical Habitats

There are no critical habitats in this location

Black Rail <i>Laterallus jamaicensis</i> Season: Breeding http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B09A	Bird of conservation concern
Black Skimmer <i>Rynchops niger</i> Season: Breeding http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B0EO	Bird of conservation concern
Black-throated Green Warbler <i>Dendroica virens</i> Season: Breeding	Bird of conservation concern
Brown-headed Nuthatch <i>Sitta pusilla</i> Year-round	Bird of conservation concern
Fox Sparrow <i>Passerella iliaca</i> Season: Wintering	Bird of conservation concern
Great Shearwater <i>Puffinus gravis</i> Season: Migrating	Bird of conservation concern
Gull-billed Tern <i>Gelochelidon nilotica</i> Season: Breeding http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B0JV	Bird of conservation concern
Horned Grebe <i>Podiceps auritus</i> Season: Wintering	Bird of conservation concern
Hudsonian Godwit <i>Limosa haemastica</i> Season: Migrating	Bird of conservation concern
Least Bittern <i>Ixobrychus exilis</i> Season: Breeding http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B092	
Least Tern <i>Sterna antillarum</i> Season: Breeding	Bird of conservation concern
Lesser Yellowlegs <i>Tringa flavipes</i> Season: Wintering http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B0MD	Bird of conservation concern
Loggerhead Shrike <i>Lanius ludovicianus</i> Year-round http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B0FY	Bird of conservation concern
Marbled Godwit <i>Limosa fedoa</i> Season: Wintering http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B0JL	Bird of conservation concern
Nelson's Sparrow <i>Ammodramus nelsoni</i> Season: Wintering	Bird of conservation concern
Peregrine Falcon <i>Falco peregrinus</i> Season: Wintering http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B0FU	Bird of conservation concern

Yellow Rail *Coturnicops noveboracensis*

Bird of conservation concern

Season: Wintering

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B0JG

Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Wetland data is unavailable at this time.



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Ecological Services
6669 Short Lane
Gloucester, Virginia 23061

Date: 15 October 2014

Online Project Review Certification Letter

Project Name: NASO DNA Integrated Natural Resources Mngt. Plan

Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Virginia Field Office online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the referenced project in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250), as amended (Eagle Act). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be submitted to this office for this certification to be valid. This letter and the project review package will be maintained in our records.

The species conclusions table in the enclosed project review package summarizes your ESA and Eagle Act conclusions. These conclusions resulted in “no effect” and/or “not likely to adversely affect” determinations for listed species and critical habitat and/or “no Eagle Act permit required” determinations for eagles regarding potential effects of your proposed project. We certify that the use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with the “no effect” and “not likely to adversely affect” determinations for listed species and critical habitat and “no Eagle Act permit required” determinations for eagles. Additional coordination with this office is not needed.

Candidate species are not legally protected pursuant to the ESA. However, the Service encourages consideration of these species by avoiding adverse impacts to them. Please contact this office for additional coordination if your project action area contains candidate species.

Should project plans change or if additional information on the distribution of listed species, critical habitat, or bald eagles becomes available, this determination may be reconsidered. This certification letter is valid for one year.

Applicant

Page 2

Information about the online project review process including instructions and use, species information, and other information regarding project reviews within Virginia is available at our website http://www.fws.gov/northeast/virginiafield/endspecies/project_reviews.html. If you have any questions, please contact Kimberly Smith of this office at (804) 693-6694, extension 124.

Sincerely,

/s/ Cynthia A. Schulz

Cindy Schulz
Supervisor
Virginia Field Office

Enclosures - project review package

Species Conclusions Table

Project Name: NASO DNA Integrated Natural Resources Mngt. Plan

Date: 15 October 2014

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Piping Plover (<i>Charadrius melodus</i>)	Species present; no critical habitat present	Not likely to adversely affect	Migrant species observed on site, no nests have been identified on site. See INRMP for details on surveys completed, surveys planned and management actions.
Red Knot (<i>Calidris canutus rufa</i>)	Species present; no critical habitat present	Not likely to adversely affect	Migrant, infrequent observation. See INRMP for details on surveys completed, surveys planned and management actions.
Roseate tern (<i>Sterna dougallii dougallii</i>)	Species present; no critical habitat present	Not likely to adversely affect	Migrant, infrequent observation. See INRMP for details on surveys completed, surveys planned and management actions.
Green sea turtle (<i>Chelonia mydas</i>)	Species present; no critical habitat present	Not likely to adversely affect	Strandings no nesting on site. Observed in nearshore environment. Has nested on adjacent landowner properties. See INRMP for details on surveys completed, surveys planned and management actions.
Hawksbill sea turtle (<i>Eretmochelys imbricata</i>)	Species present; no critical habitat present	Not likely to adversely affect	Strandings no nesting on site. Observed in nearshore environment. See INRMP for details on surveys completed, surveys planned and management actions.
Kemp's Ridley sea turtle (<i>Lepidochelys kempii</i>)	Species present; no critical habitat present	Not likely to adversely affect	Known to nest on site. Observed in nearshore environment. See INRMP for details on surveys completed, surveys planned and management actions.
Leatherback sea turtle (<i>Dermochelys coriacea</i>)	Species present; no critical habitat present	Not likely to adversely affect	Strandings no nesting on site. Observed in nearshore environment. See INRMP for details on surveys completed, surveys planned and management actions.
Loggerhead sea turtle (<i>Caretta caretta</i>)	Species present; no critical habitat present	Not likely to adversely affect	Known to nest on site. Observed in nearshore environment. See INRMP for details on surveys completed, surveys planned and management actions.

Species Conclusions Table (cont.)

Project Name: NASO DNA Integrated Natural Resources Mngt. Plan

Date: 15 October 2014

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
American eel (<i>Anguilla rostrata</i>)	Species present; no critical habitat present	Not likely to adversely affect	Known to occur on site. Observed in nearshore environment. See INRMP for details on surveys completed, surveys planned and management actions.
Shortnose sturgeon (<i>Acipenser brevirostrum</i>)	Species present; no critical habitat present	Not likely to adversely affect	Per VDGIF VAFWIS Point with 3 mile radius search records. Strandings found on site. Observed in nearshore environment. See INRMP for details on surveys completed, surveys planned and management actions.
West Indian manatee (<i>Trichechus manatus</i>)	Species present; no critical habitat present	Not likely to adversely affect	Per VDGIF VAFWIS Point with 3 mile radius search records. Observed in nearshore environment. See INRMP for details on surveys completed, surveys planned and management actions.
Puma/Cougar (<i>Puma concolor cougar</i>)	Suitable habitat present; species not present; no critical habitat present	Not likely to adversely affect	Per VDGIF VAFWIS Point with 3 mile radius search records. No confirmed records on site within the last 10+ years. See INRMP for details on surveys completed, surveys planned and management actions.
Atlantic sturgeon (<i>Acipenser oxyrinchus</i>)	Species present; no critical habitat present	Not likely to adversely affect	Per VDGIF VAFWIS Point with 3 mile radius search records. Strandings found on site. Observed in nearshore environment. See INRMP for details on surveys completed, surveys planned and management actions.
Red-cockaded woodpecker (<i>Picoides borealis</i>)	Suitable habitat present; species not present; no critical habitat present	Not likely to adversely affect	Per VDGIF VAFWIS Point with 3 mile radius search records. No confirmed records on site within the last 10+ years. Potential habitat available, but not ideal. See INRMP for details on surveys completed, surveys planned and management actions.

Species Conclusions Table (cont.)

Project Name: NASO DNA Integrated Natural Resources Mngt. Plan

Date: 15 October 2014

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Northern long-eared bat (<i>Myotis septentrionalis</i>)	Suitable habitat present; species not present; no critical habitat present	Not likely to adversely affect	Per VDGIF VAFWIS Point with 3 mile radius search records. No confirmed records on site within the last 10+ years. 2014 Bat surveys did not record NLEB. A 2015 survey effort has been funded to conduct NLEB focused surveys following USFWS NLEB Surveying Protocols. See INRMP for details on surveys completed, surveys planned and management actions.
Alewife (<i>Alosa pseudoharengus</i>)	Species present; no critical habitat present	Not likely to adversely affect	Per VDGIF VAFWIS Point with 3 mile radius search records. Observed in nearshore environment. See INRMP for details on surveys completed, surveys planned and management actions.
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Species present; no critical habitat present; unlikely to disturb nesting bald eagles	No Eagle Act permit required	Per VDGIF VAFWIS Point with 3 mile radius search records. Nests on adjacent property. Regularly observed on property feeding or loafing. Two nests VB0601 and VB0702 both occur on adjacent lands; however, they are not within 660ft of the installation boundary. See INRMP for details on surveys completed, surveys planned and management actions.
Duke's skipper (<i>Euphyes dukesi</i>)	Suitable habitat present; species not present; no critical habitat present	Not likely to adversely affect	Per VDGIF VAFWIS Point with 3 mile radius search records. No confirmed records on site within the last 10+ years. See INRMP for details on surveys completed, surveys planned and management actions.
Brimley's Assassin Bug (<i>Pnirontis brimleyi</i>)	Suitable habitat present; species not present; no critical habitat present	Not likely to adversely affect	Per VNHP Database Search for City of Virginia Beach. See INRMP for details on surveys completed, surveys planned and management actions.

Species Conclusions Table (cont.)

Project Name: NASO DNA Integrated Natural Resources Mngt. Plan

Date: 15 October 2014

Blue Witch Grass (<i>Dichanthelium caeruleum</i>)	Suitable habitat present; species not present; no critical habitat present	Not likely to adversely affect	Per VNHP Database Search for City of Virginia Beach. See INRMP for details on surveys completed, surveys planned and management actions.
Rare Skipper (<i>Problema bulenta</i>)	Suitable habitat present; species not present; no critical habitat present	Not likely to adversely affect	Per VNHP Database Search for City of Virginia Beach. See INRMP for details on surveys completed, surveys planned and management actions.
Long Beach Seedbox (<i>Ludwigia brevipes</i>)	Species present; Suitable habitat present; no critical habitat present	Not likely to adversely affect	Per VNHP Database Search for City of Virginia Beach. See INRMP for details on surveys completed, surveys planned and management actions.
Virginia Least Trillium (<i>Trillium pusillum</i> var. <i>virginianum</i>)	Suitable habitat present; species not present; no critical habitat present	Not likely to adversely affect	Per VNHP Database Search for City of Virginia Beach. See INRMP for details on surveys completed, surveys planned and management actions.



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 SHORT LANE
GLOUCESTER, VA 23061
PHONE: (804)693-6694 FAX: (804)693-9032
URL: www.fws.gov/northeast/virginiafield/

Consultation Tracking Number: 05E2VA00-2015-SLI-0110

October 15, 2014

Project Name: NASO DNA Integrated Natural Resources Mngt. Plan

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment



United States Department of Interior
Fish and Wildlife Service

Project name: NASO DNA Integrated Natural Resources Mngt. Plan

Official Species List

Provided by:

Virginia Ecological Services Field Office

6669 SHORT LANE

GLOUCESTER, VA 23061

(804) 693-6694

<http://www.fws.gov/northeast/virginiafield/>

Consultation Tracking Number: 05E2VA00-2015-SLI-0110

Project Type: Land - Management Plans

Project Description: INRMP for NASO Dam Neck Annex has been updated. The US Navy is requesting USFWS Review for Operation and Effect and signature of concurrence.



United States Department of Interior
Fish and Wildlife Service

Project name: NASO DNA Integrated Natural Resources Mngt. Plan

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-75.9461059 36.7598409, -75.9629287 36.7595658, -75.9596757 36.7656168, -75.9583024 36.769199, -75.9582938 36.7707047, -75.9608687 36.7712548, -75.9651603 36.7654862, -75.9679154 36.7652111, -75.9689454 36.7669988, -75.9680957 36.769199, -75.9665507 36.7707116, -75.9692887 36.7724992, -75.9701642 36.7756548, -75.9711684 36.7779923, -75.9742583 36.7801921, -75.9744386 36.7836362, -75.9747819 36.785286, -75.9672288 36.784468, -75.9668855 36.7873413, -75.9682502 36.7876163, -75.9764985 36.7924347, -75.9775285 36.7980707, -75.9720353 36.7991634, -75.9718637 36.8025998, -75.9732284 36.8038368, -75.9826697 36.8043866, -75.984043 36.8041117, -75.9823264 36.8111212, -75.9770049 36.8113961, -75.9751166 36.8159381, -75.9718551 36.8178621, -75.9682502 36.8144333, -75.9685935 36.8127841, -75.9684218 36.8125093, -75.9649886 36.813059, -75.9461059 36.7598409))))

Project Counties: Virginia Beach, VA



Endangered Species Act Species List

There are a total of 8 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Piping Plover (<i>Charadrius melodus</i>) Population: except Great Lakes watershed	Threatened	Final designated	
Red Knot (<i>Calidris canutus rufa</i>)	Proposed Threatened		
Roseate tern (<i>Sterna dougallii dougallii</i>) Population: northeast U.S. nesting pop.	Endangered		
Reptiles			
Green sea turtle (<i>Chelonia mydas</i>) Population: Except where endangered	Threatened	Final designated	
Hawksbill sea turtle (<i>Eretmochelys imbricata</i>) Population: Entire	Endangered	Final designated	
Kemp's Ridley sea turtle (<i>Lepidochelys kempii</i>) Population: Entire	Endangered		
Leatherback sea turtle (<i>Dermochelys coriacea</i>)	Endangered	Final designated	



United States Department of Interior
Fish and Wildlife Service

Project name: NASO DNA Integrated Natural Resources Mngt. Plan

Population: Entire			
Loggerhead sea turtle (<i>Caretta caretta</i>) Population: Northwest Atlantic Ocean DPS	Threatened	Final designated	



United States Department of Interior
Fish and Wildlife Service

Project name: NASO DNA Integrated Natural Resources Mngt. Plan

Critical habitats that lie within your project area

There are no critical habitats within your project area.

Natural Heritage Resources

Your Criteria

Federal Legal Status: Select All

County: Virginia Beach (City)

Search Run: 10/15/2014 15:31:11 PM

Click scientific names below to go to NatureServe report.

Click column headings for an explanation of species and community ranks.

Common Name/Natural Community	Scientific Name	Global Conservation Status Rank	State Conservation Status Rank	Federal Legal Status	State Legal Status	Statewide Occurrences
Virginia Beach (City) HETEROPTERA (TRUE BUGS)	Pnirontis brimleyi	G2	S1S3	SOC	None	1
Brimley's Assassin Bug LEPIDOPTERA (BUTTERFLIES & MOTHS)	Problema bulenta	G2G3	S1S2	SOC	None	6
Rare Skipper REPTILES						

Common Name/Natural Community	Scientific Name	Global Conservation Status Rank	State Conservation Status Rank	Federal Legal Status	State Legal Status	Statewide Occurrences
Loggerhead (Sea Turtle)	Caretta caretta	G3	S1B,S1N	LE	LT	5
VASCULAR PLANTS						
Blue Witch Grass	Dichanthelium caeruleascens	G2G3	S1	SOC	None	6
Long Beach Seedbox	Ludwigia brevipes	G2G3	S2	SOC	None	15
Virginia Least Trillium	Trillium pusillum var. virginianum	G3T2	S2	SOC	None	33

Note: On-line queries provide basic information from DCR's databases at the time of the request. They are NOT to be substituted for a project review or for on-site surveys required for environmental assessments of specific project areas.

For Additional Information on locations of Natural Heritage Resources please submit an [information request](#).

To Contribute information on locations of natural heritage resources, please fill out and submit a [rare species sighting form](#).

Natural Heritage Resources

Your Criteria

Federal Legal Status: Select All

County: Virginia Beach (City)

Search Run: 10/15/2014 15:31:11 PM

Click scientific names below to go to NatureServe report.

Click column headings for an explanation of species and community ranks.

Common Name/Natural Community	Scientific Name	Global Conservation Status Rank	State Conservation Status Rank	Federal Legal Status	State Legal Status	Statewide Occurrences
Virginia Beach (City) HETEROPTERA (TRUE BUGS)						
Brimley's Assassin Bug	Pnirontis brimleyi	G2	S1S3	SOC	None	1
LEPIDOPTERA (BUTTERFLIES & MOTHS)						
Rare Skipper	Problema bulenta	G2G3	S1S2	SOC	None	6
REPTILES						

Common Name/Natural Community	Scientific Name	Global Conservation Status Rank	State Conservation Status Rank	Federal Legal Status	State Legal Status	Statewide Occurrences
Loggerhead (Sea Turtle) VASCULAR PLANTS	Caretta caretta	G3	S1B,S1N	LE	LT	5
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To Contribute information on locations of natural heritage resources, please fill out and submit a [rare species sighting form](#).



Virginia Department of Game and Inland Fisheries

Fish and Wildlife Information Service

[Home](#) » [By Map](#) » VaFWIS GeographicSelect Options

[Visitor Options](#)

VaFWIS Search Report Compiled on 10/15/2014, 2:51:08 PM

[Help](#)

[Species Information](#)

Known or likely to occur within a **3 mile radius around point 36,45,40.5 -75,57,00.4**
in **810 Virginia Beach City, VA**

[View Map of Site Location](#)

[By Name](#)

[By Land Management](#)

632 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 52) (52 species with Status* or Tier I** or Tier II**)

[References](#)

[Geographic Search](#)

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[By Coordinates](#)

[By Place Name](#)

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BOVA Code	Status*	Tier**	Common Name	Scientific Name
010031	FESE	I	Sturgeon, shortnose	Acipenser brevirostrum
040228	FESE	I	Woodpecker, red-cockaded	Picoides borealis
010032	FESE	II	Sturgeon, Atlantic	Acipenser oxyrinchus
040183	FESE	IV	Tern, roseate	Sterna dougallii dougallii
030073	FESE		Turtle, hawksbill sea	Eretmochelys imbricata
030074	FESE		Turtle, Kemp's ridley sea	Lepidochelys kempii
030075	FESE		Turtle, leatherback sea	Dermochelys coriacea
050112	FESE		Puma (= cougar), eastern	Puma concolor cougar
120030	FESE		Manatee, West Indian	Trichechus manatus
030071	FTST	I	Turtle, loggerhead sea	Caretta caretta
040120	FTST	I	Plover, piping	Charadrius melodus
030072	FTST		Turtle, green sea	Chelonia mydas
030064	SE	I	Turtle, eastern chicken	Deirochelys reticularia reticularia
040118	SE	I	Plover, Wilson's	Charadrius wilsonia
040110	SE	I	Rail, black	Laterallus jamaicensis
050034	SE	I	Bat, Rafinesque's eastern big-eared	Corynorhinus rafinesquii macrotis
030013	SE	II	Rattlesnake, canebrake	Crotalus horridus
040096	ST	I	Falcon, peregrine	Falco peregrinus
040129	ST	I	Sandpiper, upland	Bartramia longicauda
040293	ST	I	Shrike, loggerhead	Lanius ludovicianus
040379	ST	I	Sparrow, Henslow's	Ammodramus henslowii
040179	ST	I	Tern, gull-billed	Sterna nilotica
020002	ST	II	Treefrog, barking	Hyla gratiosa
030010	ST	II	Lizard, eastern glass	Ophisaurus ventralis
050008	ST	IV	Shrew, Dismal Swamp southeastern	Sorex longirostris fisheri
040403	ST		Falcon, Arctic peregrine	Falco peregrinus tundrius
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans
040144	FP	IV	Knot, red	Calidris canutus rufa
050022	FP		Bat, northern long-eared	Myotis septentrionalis
010038	FC	IV	Alewife	Alosa pseudoharengus
040093	FS	II	Eagle, bald	Haliaeetus leucocephalus
100002	FS	III	Skipper, Duke's (or scarce swamp)	Euphyes dukesi
030067	CC	II	Terrapin, northern diamond-backed	Malaclemys terrapin terrapin
030063	CC	III	Turtle, spotted	Clemmys guttata
040372		I	Crossbill, red	Loxia curvirostra
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius
040319		I	Warbler, black-throated green	Dendroica virens
040422		I	Warbler, Wayne's	Dendroica virens waynei
040038		II	Bittern, American	Botaurus lentiginosus
040052		II	Duck, American black	Anas rubripes
040029		II	Heron, little blue	Egretta caerulea caerulea
040036		II	Night-heron, yellow-crowned	Nyctanassa violacea violacea
040213		II	Owl, northern saw-whet	Aegolius acadicus
040114		II	Oystercatcher, American	Haematopus palliatus
040105		II	Rail, king	Rallus elegans
040192		II	Skimmer, black	Rynchops niger
040381		II	Sparrow, saltmarsh sharp-tailed	Ammodramus caudacutus
040186		II	Tern, least	Sterna antillarum

040187		II	Tern, royal	Sterna maxima maximus
040320		II	Warbler, cerulean	Dendroica cerulea
040304		II	Warbler, Swainson's	Limnothlypis swainsonii
040266		II	Wren, winter	Troglodytes troglodytes

To view **All 632 species** [View 632](#)

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Anadromous Fish Use Streams

N/A

Impediments to Fish Passage

N/A

Threatened and Endangered Waters

N/A

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests (5 records)

[View Map of All Query Results](#)
[Bald Eagle Nests](#)

Nest	N Obs	Latest Date	DGIF Nest Status	View Map
VB0001	20	May 18 2011	RECENTLY ACTIVE	Yes
VB0401	13	Apr 27 2010	HISTORIC	Yes
VB0601	13	May 18 2011	RECENTLY ACTIVE	Yes
VB0702	10	May 18 2011	RECENTLY ACTIVE	Yes
VB9301	13	Mar 8 2000	HISTORIC	Yes

Displayed 5 Bald Eagle Nests

Habitat Predicted for Aquatic WAP Tier I & II Species

N/A

Habitat Predicted for Terrestrial WAP Tier I & II Species (6 Species)

[View Map of Combined Terrestrial Habitat Predicted for 6 WAP Tier I & II Species Listed Below](#)

ordered by Status Concern for Conservation

BOVA Code	Status*	Tier**	Common Name	Scientific Name	View Map
040183	FESE	IV	Tern, roseate	Sterna dougallii dougallii	Yes
030071	FTST	I	Turtle, loggerhead sea	Caretta caretta	Yes
030013	SE	II	Rattlesnake, canebrake	Crotalus horridus	Yes
030067	CC	II	Terrapin, northern diamond-backed	Malaclemys terrapin terrapin	Yes
040422		I	Warbler, Wayne's	Dendroica virens waynei	Yes
040105		II	Rail, king	Rallus elegans	Yes

Virginia Breeding Bird Atlas Blocks (3 records)

[View Map of All Query Results](#)
[Virginia Breeding Bird Atlas Blocks](#)

BBA ID	Atlas Quadrangle Block Name	Breeding Bird Atlas Species	View Map

		Different Species	Highest TE *	Highest Tier **	
62036	Princess Anne, SE	59		IV	Yes
63033	Virginia Beach, CW	61		II	Yes
63035	Virginia Beach, SW	75		II	Yes

Public Holdings: (3 names)

Name	Agency	Level
Dam Neck Combat Training Center	Dept. of the Army	Federal
Camp Pendleton State Military Reservation	U.S. Dept. of Army	Federal
Back Bay National Wildlife Refuge	U.S. Fish and Wildlife Service	Federal

Summary of BOVA Species Associated with Cities and Counties of the Commonwealth of Virginia:

FIPS Code	City and County Name	Different Species	Highest TE	Highest Tier
810	Virginia Beach City	556	FESE	I

USGS 7.5' Quadrangles:

Princess Anne
North Bay
Virginia Beach

USGS NRCS Watersheds in Virginia:

N/A

USGS National 6th Order Watersheds Summary of Wildlife Action Plan Tier I, II, III, and IV Species:

HU6 Code	USGS 6th Order Hydrologic Unit	Different Species	Highest TE	Highest Tier
AO25	Atlantic Ocean-Sand Ridge	82	FESE	I
AO26	Atlantic Ocean-030102051706	0		
AS18	Ashville Bridge Creek	83	FESE	I
AS19	Shipps Bay-North Bay	87	FESE	I

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| Wednesday, October 15, 2014 14:51:33 | [DGIF](#) | [Credits](#) | [Disclaimer](#) | Please view our [privacy policy](#) |
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The CENTER for CONSERVATION BIOLOGY

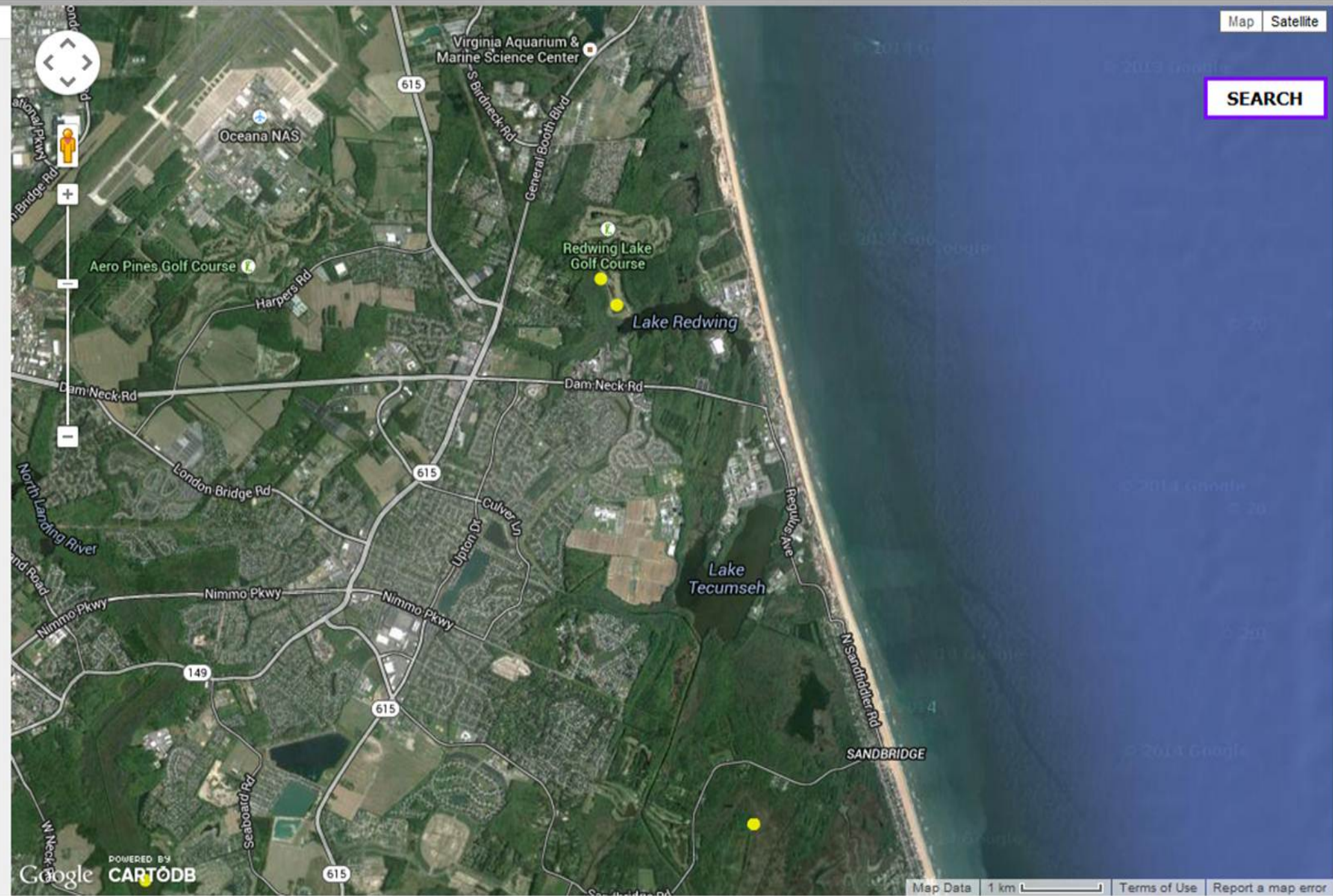
About | What | Resources | News | Give to CCB

HELP / FAQ

MAPPING PORTAL

Layers

- Bald Eagle
 - > Eagle Nests
 - Most recent data CCB has on bald eagle nest locations in Virginia. Data is largely from two annual aerial flights conducted in winter and spring of all tributaries of the lower Chesapeake Bay and other prominent bodies of water. Reported ground survey data is also included.
 - [More info](#)
 - Eagle Nest Buffers 330'/660'
 - Eagle Roost Centroids
 - Eagle Roost Polygons
 - Eagle Roost Buffers 330'/660'
- Waterbirds
 - Colonial Waterbirds 2013
 - Chesapeake Bay Herons 2013
 - Colonial Waterbirds 2008
 - Colonial Waterbirds 2003
- Osprey
 - OspreyWatch Nests
 - Chesapeake Bay Osprey Nests 1995-1996
- Other Species
 - Nightjar Survey Network Routes



Map Satellite

SEARCH

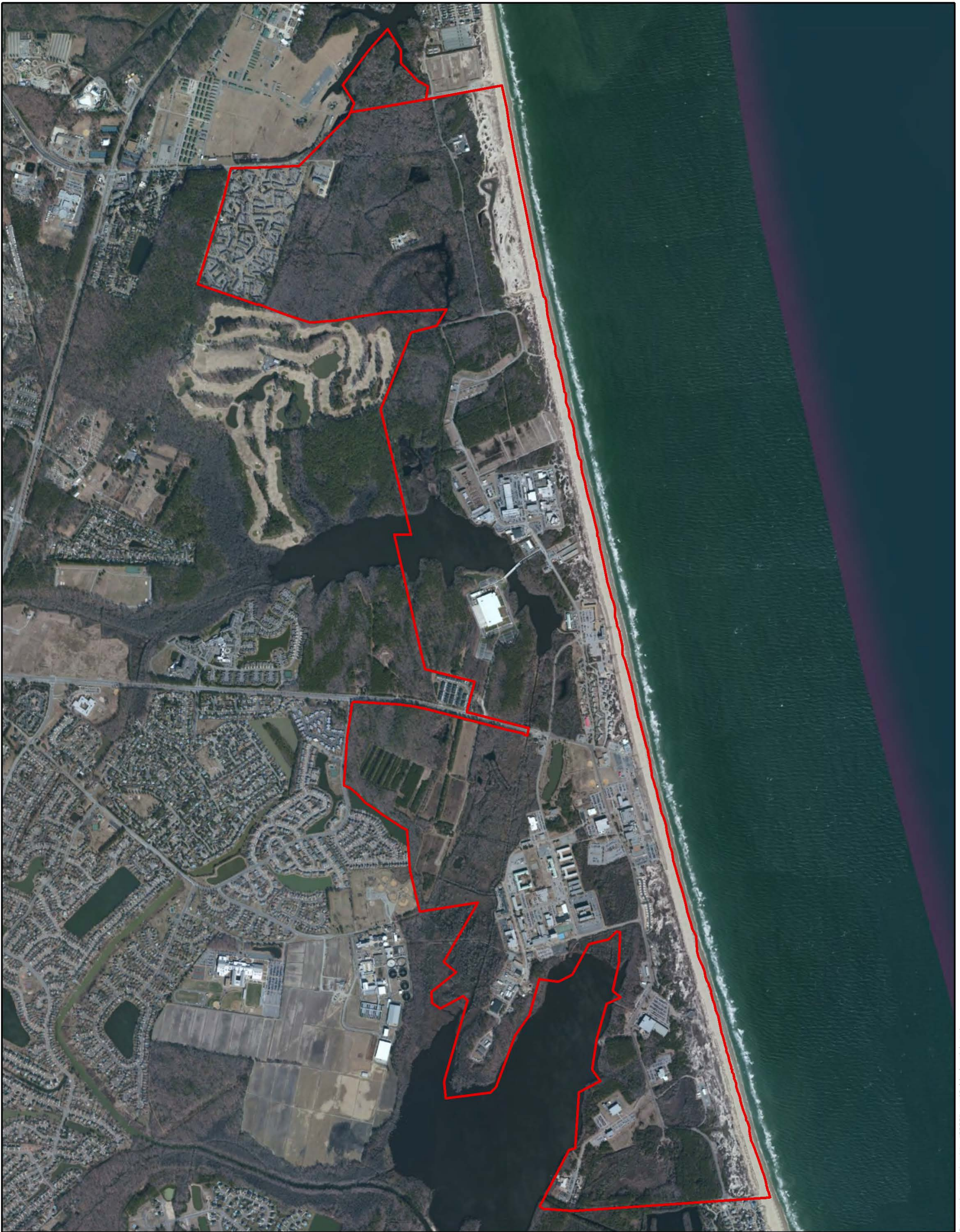
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Appendix N

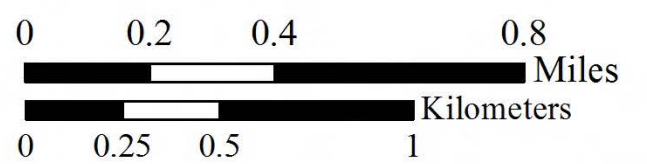
NASO DNA INRMP Large-Sized Figures (11" x 17")

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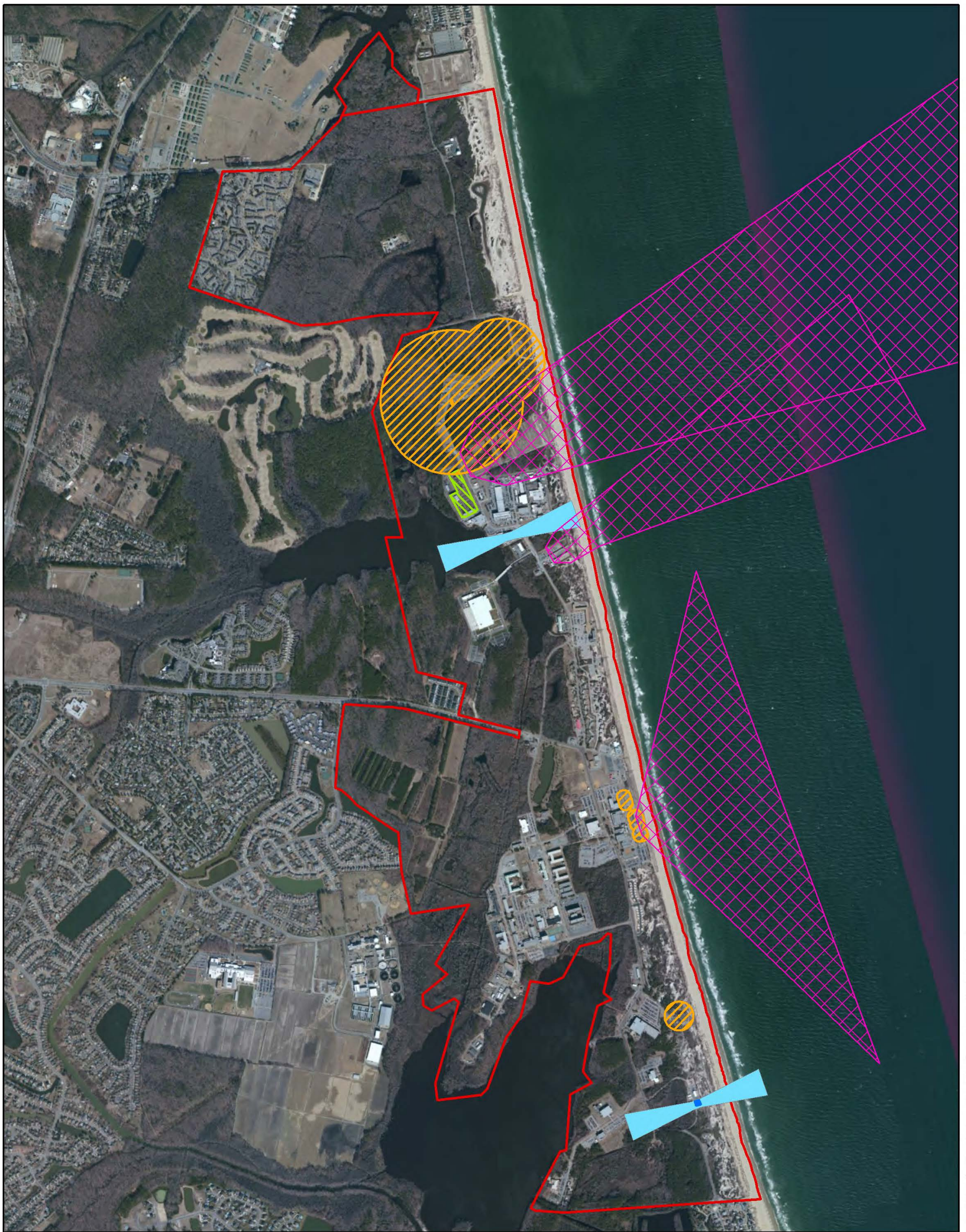
Legend

 Installation Boundary





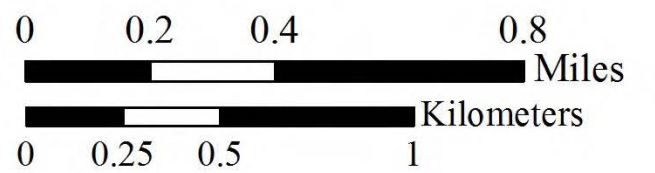
Sources: Navy 2012 and ESRI 2012.

Date:
August 2013



Legend

-  Installation Boundary
-  Clear Zone
-  Explosive Safety Quantity Distance/Antenna Arc
-  Firing Fan
-  Helo Pad
-  Small Arms Firing Range



Sources: Navy 2012 and ESRI 2012.

Date: January 2014



Legend

Installation Boundary

Opportunities

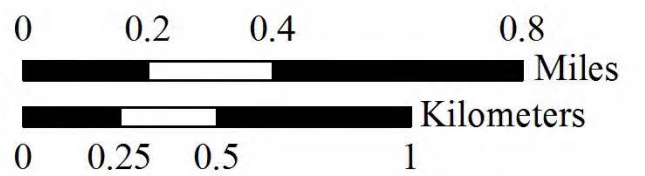
Urban Open Area

Constraints

Streams
 100-Year Floodplain
 500-Year Floodplain
 Waterbody
 USACE Jurisdictional Wetlands

National Wetlands
 Inventory Wetlands
 Helicopter Pad Wetlands
 Southeast Redwing Lake Wetlands
 50-Foot Wetland Buffer
 Middle Beach Dunes
 Dune and Swale
 Lovetts Marsh
 Interdunal Swale, Dune, and Freshwater Marsh

Environmental Restoration Program Active Site
 Firing Fan
 Above-ground Storage Tank
 Underground Storage Tank




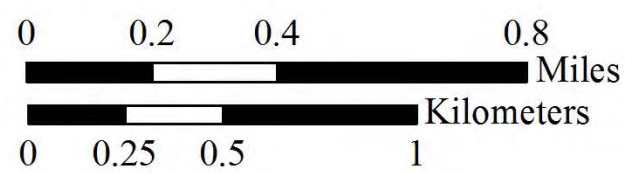
Sources: Navy 2012 and ESRI 2012.

Date: Feb. 2014



Legend

 Installation Boundary




Sources: Navy 2012 and ESRI 2012.




















Date: August 2013

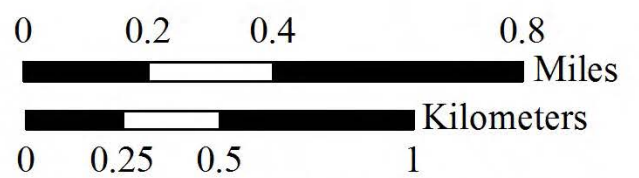


Legend

 Installation Boundary

Soil Types

 1 - Acredale silt loam	 13 - Dragston fine sandy loam	 36 - Tetotum loam
 3 - Augusta loam	 15 - Duckston fine sand	 38 - Tomotley loam
 5 - Backbay mucky peat	 19 - Munden fine sandy loam	 40 - Udorthents, loamy
 6 - Beaches	 21 - Nawney silt loam	 42 - Urban
 8 - Chapanoke silt loam	 22E - Newhan fine sand, 2-30% slopes	 W - Water
 10 - Corolla fine sand	 23C - Newhan-corolla fine sand, 0-15% slopes	
 11 - Corolla-duckston fine sand	 24 - Nimmo loam	




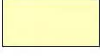







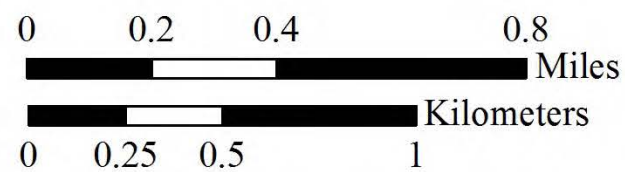
Sources: Navy 2012, ESRI 2012, and USDA NRCS 2009a.

Date:
August 2013



Legend

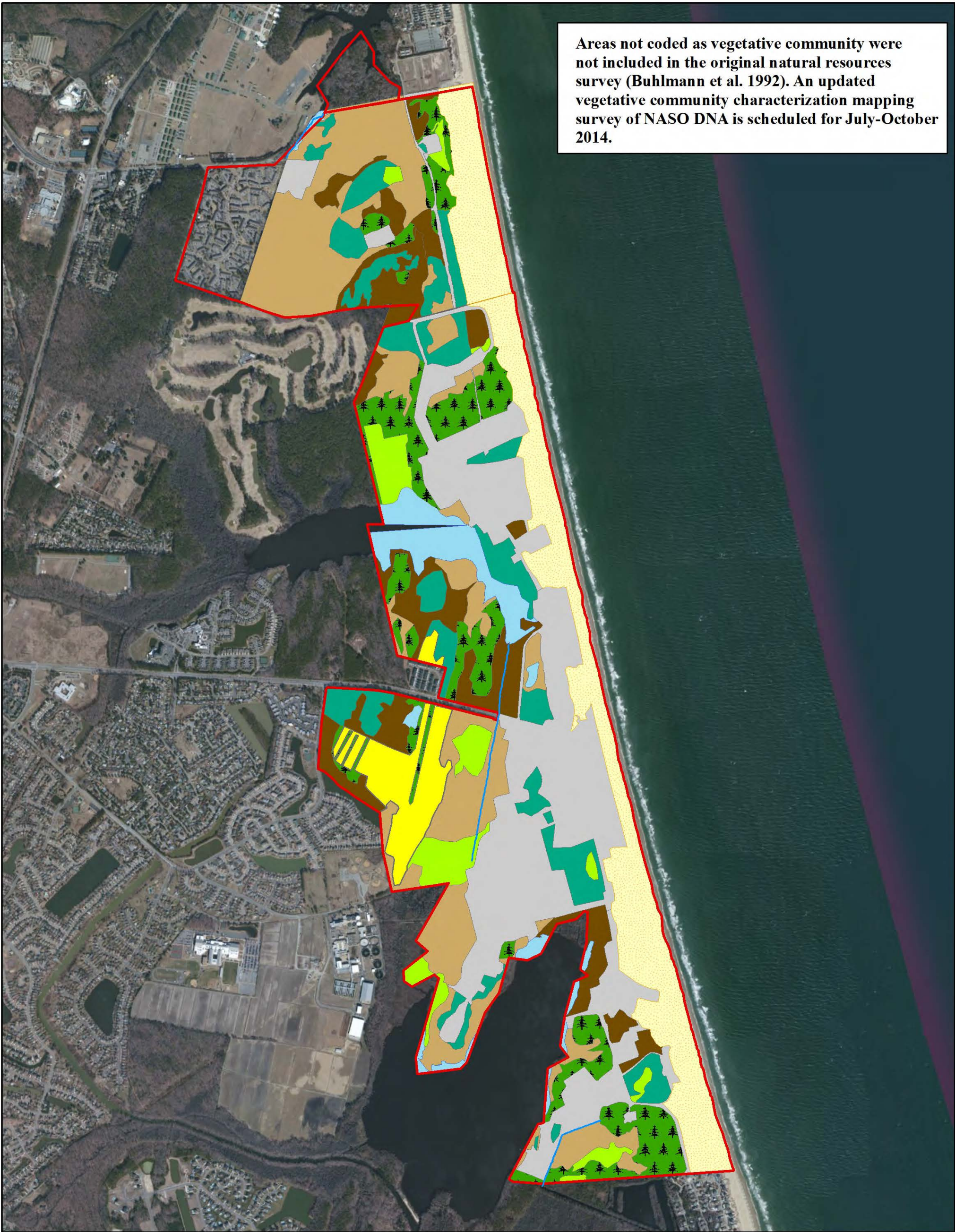
- | | | | |
|--|-----------------------|---|-------------------------------|
|  | Installation Boundary |  | USACE Jurisdictional Wetlands |
|  | Streams |  | 50-Foot Wetland Buffer |
|  | 100-Year Floodplain | | |
|  | 500-Year Floodplain | | |
|  | Nearshore Environment | | |
|  | Waterbody | | |
|  | Watershed Boundary | | |




Sources: Navy 2012, ESRI 2012, Wright 2012, USDA NRCS 2013, and E-CFR 2014.

Date: February 2014

Areas not coded as vegetative community were not included in the original natural resources survey (Buhlmann et al. 1992). An updated vegetative community characterization mapping survey of NASO DNA is scheduled for July-October 2014.



Legend

 Installation Boundary

Vegetative Community

 Beach/Dune

 Pine

 Marsh

 Pine/Hardwood

 Open Water

 Old Field

 Hardwood

 Urban

 Hardwood/Pine

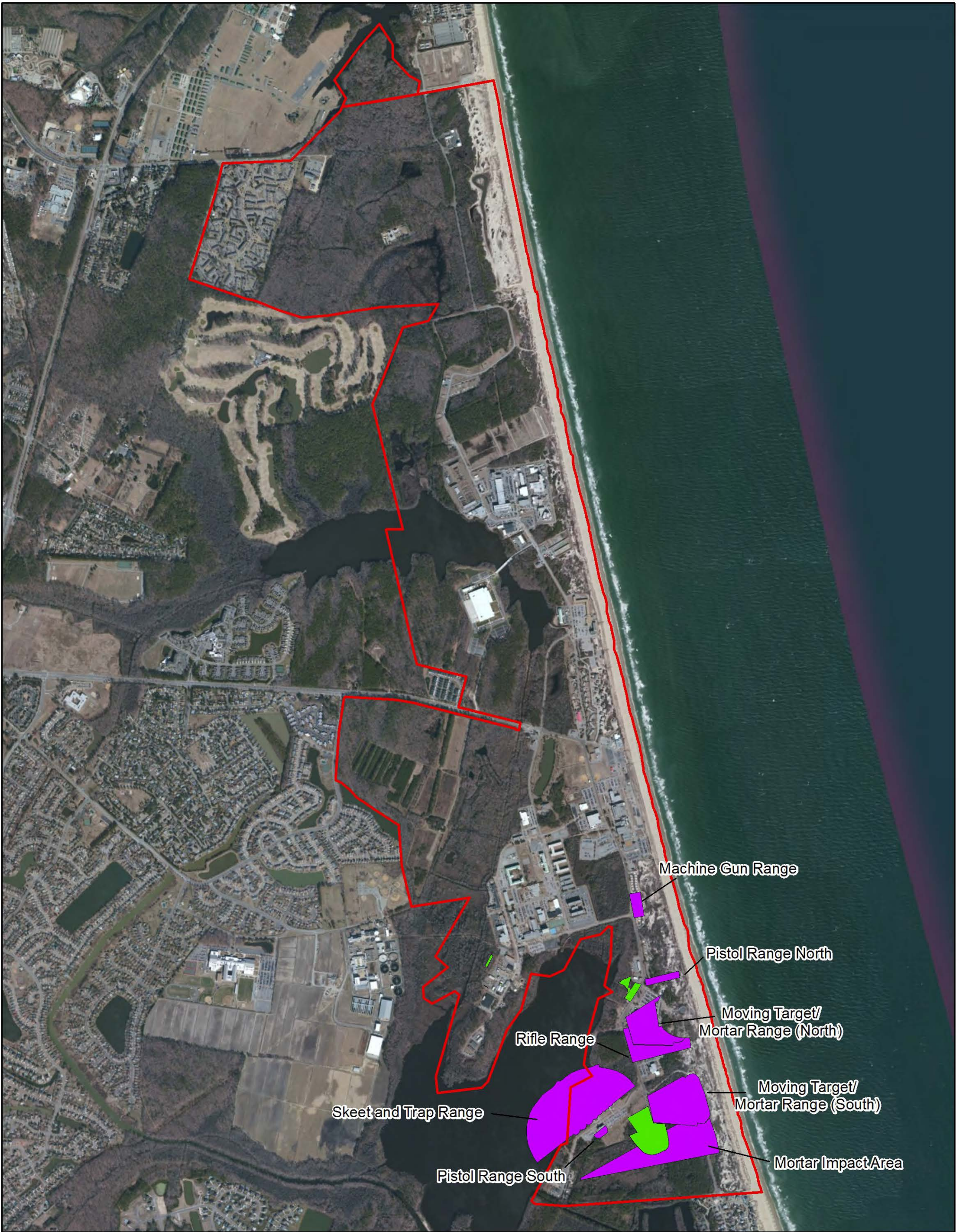


0 0.2 0.4 0.8 Miles

0 0.25 0.5 1 Kilometers

Sources: Navy 2012 and ESRI 2012.

Date: August 2013



Legend

 Installation Boundary

Environmental Restoration Program site

 Active

 No Further Action Required

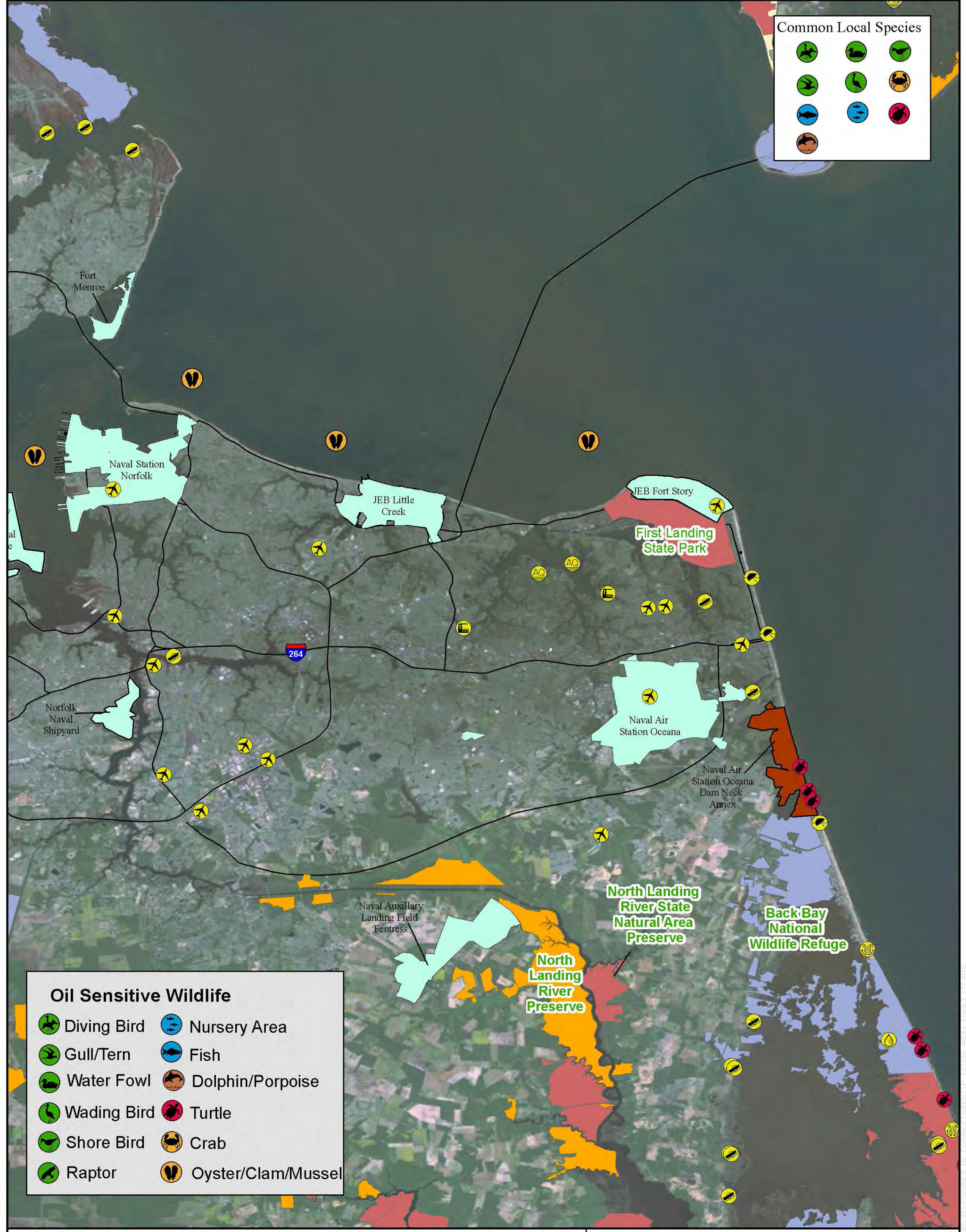


0 0.2 0.4 0.8 Miles

0 0.25 0.5 1 Kilometers

Sources: Navy 2012 and ESRI 2012.

Date:
February 2014



Common Local Species

Oil Sensitive Wildlife

	Diving Bird		Nursery Area
	Gull/Tern		Fish
	Water Fowl		Dolphin/Porpoise
	Wading Bird		Turtle
	Shore Bird		Crab
	Raptor		Oyster/Clam/Mussel

Legend

	Naval Air Station Oceana Dam Neck Annex		Aquaculture
	Regional Military Installation		Beach
	Road		Boat Ramp
	Private Conservation Land		Coast Guard
	State Conservation Land		Lock/Dam
	USFWS National Wildlife Refuge		Marina
	Airport/Heliport		Water Intake

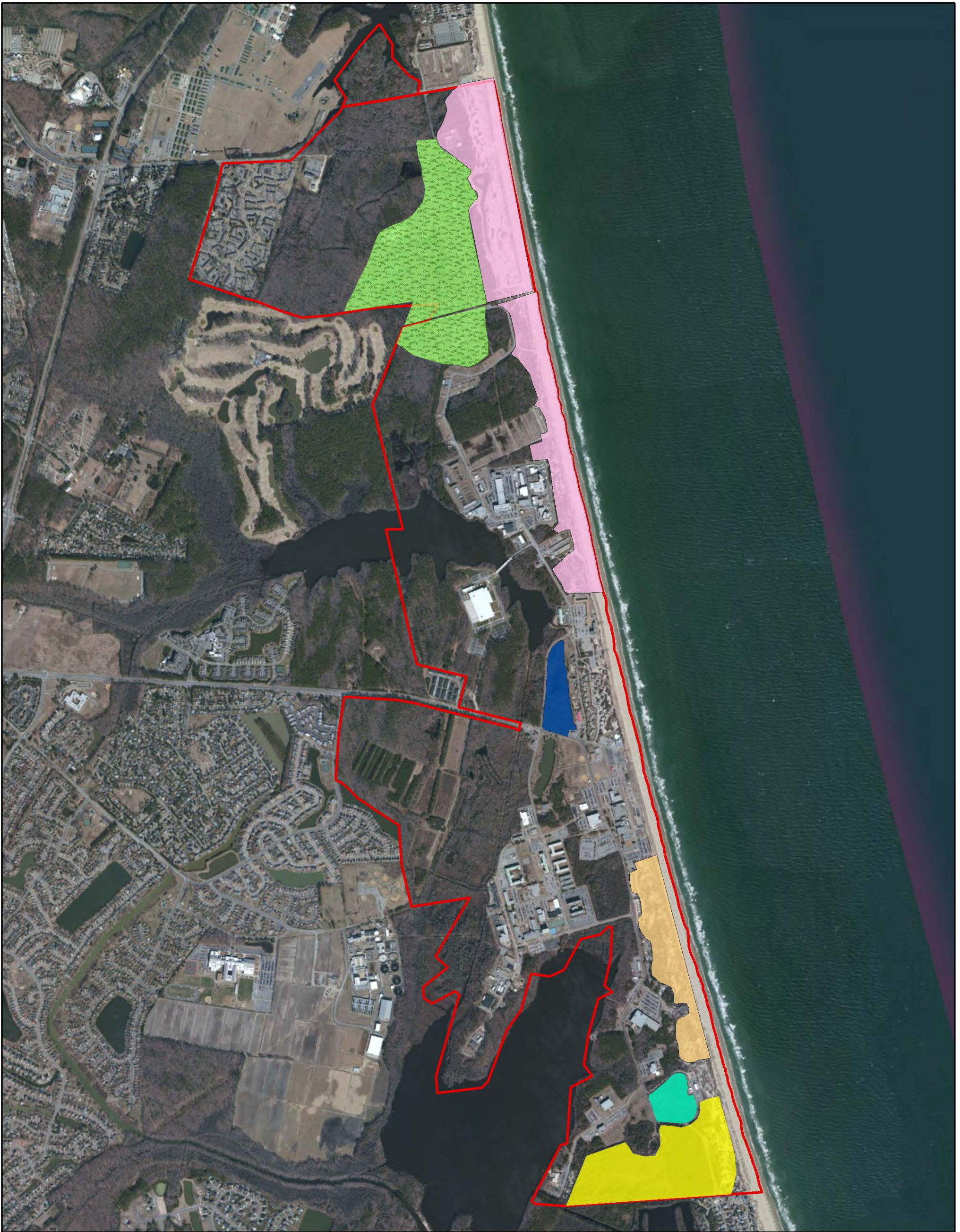
North arrow and scale bars:

0 3 6 Miles

0 3 6 Kilometers

Source: Navy 2012, ESRI 2012, and NOAA Environmental Sensitivity Index 2005.

Date August 2013




Legend


 Installation Boundary

Special Interest Areas

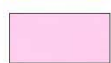
 Helicopter Pad Wetlands

 Southeast Redwing Lake Wetlands

 Lovetts Marsh

 Interdunal Swale, Dune, and Freshwater Marsh

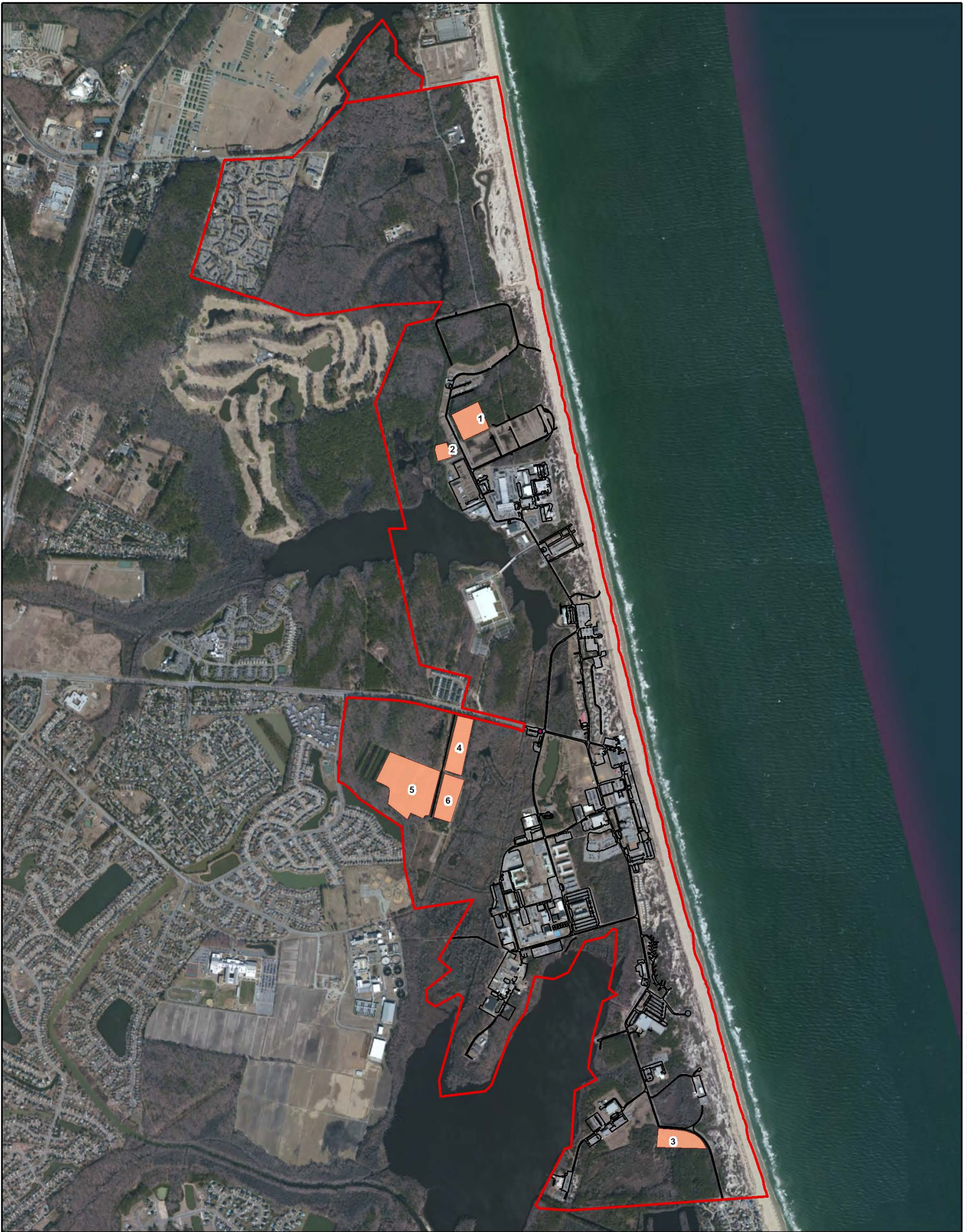
 Middle Beach Dunes

 Dune and Swale



Sources: Navy 2012 and ESRI 2012.

Date:
August 2013



Legend

- Installation Boundary
- Prescribed Burn Unit
- Road



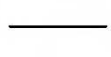
Sources: Navy 2012 and ESRI 2012.

Date:
August 2013



Legend

 Installation Boundary

 Road

 Osprey Nest

Nest Box

 Bat

 Bluebird

 Duck



0 0.2 0.4 0.8 Miles

0 0.25 0.5 1 Kilometers

Sources: Navy 2012 and ESRI 2012.

Date:
August 2013



Legend

- Installation Boundary
- 2011 Spray Locations
- Common Reed (*Phragmites australis*)




Sources: Navy 2012 and ESRI 2012.

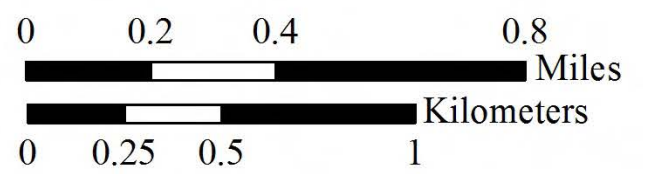
Date:
August 2013



Legend

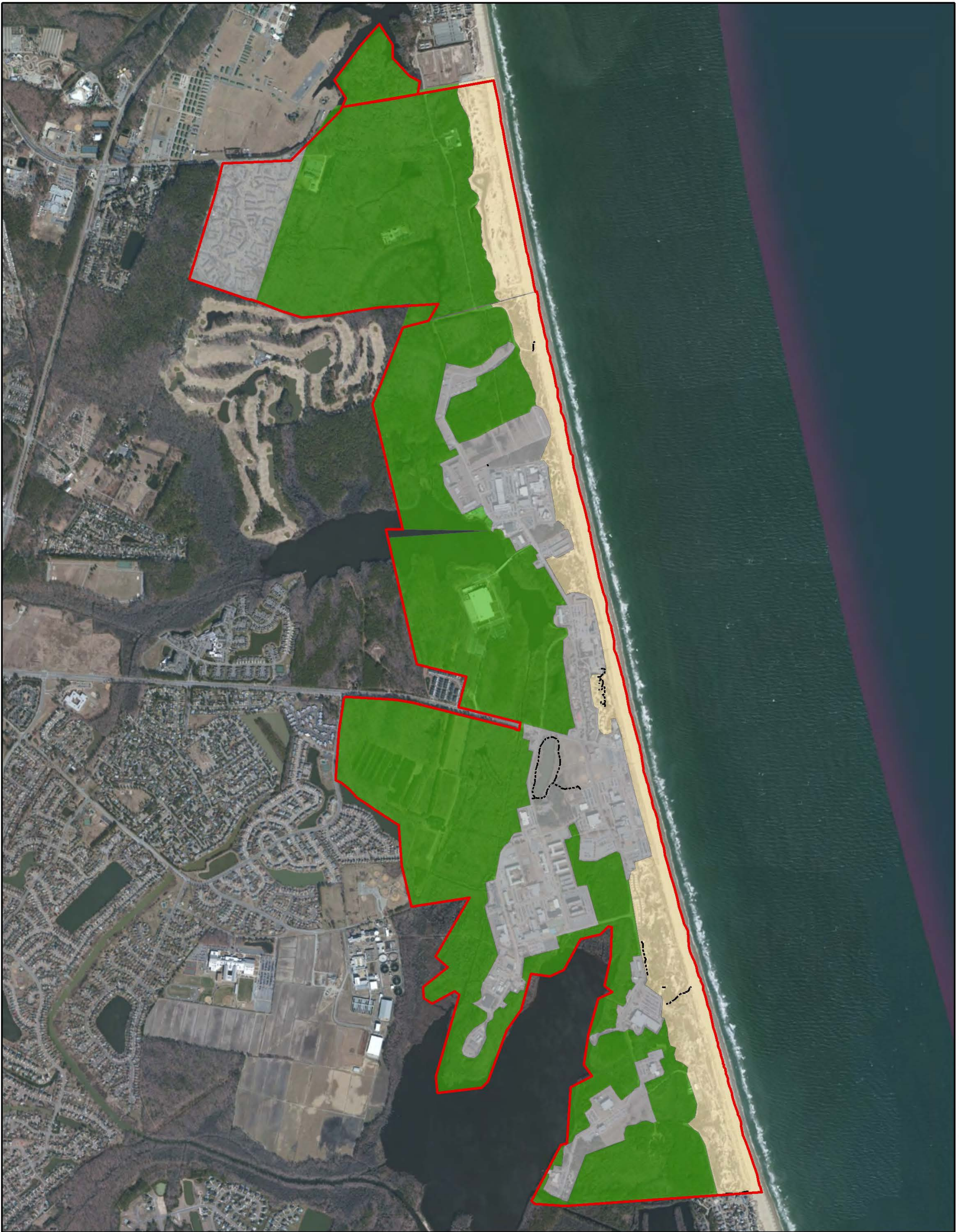
 Installation Boundary

 Cultural Probable Sensitive Area



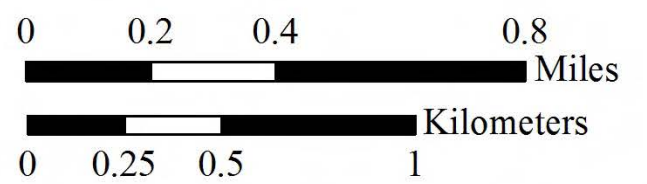
Sources: Navy 2012 and ESRI 2012.

Date:
August 2013



Legend

- Installation Boundary
- Recreational Trail
- Natural Resource Management Units
- Beaches and Dunes
- Natural Areas
- Urban



Sources: Navy 2012 and ESRI 2012.

Date:
August 2013